Montana Department of Natural Resources and Conservation, Plains Unit

Environmental Assessment

Combest Parcels Timber Sale

Kyle Johnson, Management Forester
3/5/2014

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MEMORANDUM

To: Kyle Johnson, Plains Unit Management Forester

From: David Olsen, Plains Unit Resource Program Manager

Date: February 3, 2013

RE: Combest Parcels Timber Sale

Primary Objective

The primary objective of the Combest Parcels Timber Sale is to generate income for the Common Schools and Public Buildings Trusts. The land parcels involved in this project are located in Sections 6, 14 and 22, Township 19 North, Range 26 West. The project would provide an estimated 2.7 MMBF of merchantable timber applied toward meeting the FY 2014 Northwestern Land Office timber sale volume goals.

Secondary Objective

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

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

Reduce fire hazard and associated risks of losses to State of Montana Trust Lands in the area.

Management Directives

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

DRAFT CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Combest Parcels Timber Sale
Proposed Implementation Date:	June, 2014
Proponent:	MT DNRC
Location:	Sections 6, 14 and 22, T19N R26W
County:	Sanders

I. TYPE AND PURPOSE OF ACTION

The Department of Natural Resources and Conservation (DNRC) is proposing to harvest approximately 19,944 tons (2.7 MMBF) of timber in the Combest Creek drainage, roughly 5 air miles south of Plains, Montana, in Sanders County. The project would involve ground and cable based harvest systems, mechanical slash piling and slash pile burning over 406 acres. This action would produce an estimated $557,172.00 for the Public Buildings (PB) Trust Grant and $41,148.00 for the Common Schools (CS) Trust Grant. In addition, approximately $68,137.48 would be produced for the DNRC's Forest Improvement account.

The proposed action would:

- reduce fuel loading and related wildfire risk,
- maintain and improve forest health,
- promote historic timber types and
- increase forest productivity beneficial to future trust actions.

The proposed action would harvest no trees within 50 feet of class one and two streams, except as needed to create skyline corridors. The minimum distance between skyline corridors that cross a class I stream would be 150'. The area within a 100-year site potential tree height from class one streams beyond the 50 foot no harvest area is defined as the Riparian Management Zone (RMZ). No more than 50 percent of the trees greater than 8" Diameter at Breast Height (DBH) would be harvested in the RMZ. Trees and shrubs less than 8" DBH would be retained in the RMZ to the fullest extent possible. A total of approximately 7 acres of RMZ would be harvested as described above.

The proposed action would include approximately 3.3 miles of new road construction and approximately 1 mile of existing road reconditioning. Additionally, approximately13.4 miles of existing system roads would be maintained and improved as needed to meet Forestry Best Management Practices (BMPs). For more specific project information refer to Attachment I, Area Maps, and Project Plan.

Lands involved in this proposed project area are held by the State of Montana in trust for the support for specific beneficiary institutions such as the public schools trust, public buildings, state colleges, universities, and other state institutions (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). DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (DNRC 1996) and the Administrative Rules for Forest Management (ARM 36.11.401 through 456) and Montana DNRC Forested State Trust Lands Habitat Conservation Plan (HCP), as well as other applicable state and federal laws.

II. PROJECT DEVELOPMENT

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

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

Public comment and involvement was solicited in the follow ways:

- March, 2008: Scoping letters were sent to adjacent landowners and interested parties. For a complete list of individuals and groups that received scoping notices, refer to the project file at the Plains Unit.
- March, 2008: Newspaper advertisements ran in the Sanders County Ledger, and the Clark Fork Valley Press.
- DNRC foresters and specialists visited the project site throughout the 2012 and 2013 field seasons.

From these solicitations for comment and site visits, public and internal comments were collected and used to assist in defining issues surrounding the proposed project. Several comments in support of the project were received from the local community. Additionally, DNRC specialists and foresters identified hydrological, soils, wildlife, cultural and vegetative concerns for the Action Alternative as well as 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 I, Area Maps and Project Plan; Attachment II, Resource Analyses; Attachment III, Silvicultural Prescriptions; Attachment IV, Mitigations; Attachment V, Preparers and Consultants).

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

Examples: cost-share agreement with U.S. Forest Service, 124 Permit, 3A Authorization, Air Quality Major Open Burning Permit.

Incidental Take Permit – U.S. Fish and Wildlife Service

DNRC is managing the habitats of threatened and endangered species on this project by implementing the Montana DNRC Forested Trust Lands Habitat Conservation Plan (HCP) and the associated Incidental Take Permit (Permit) that was issued by the United States Fish & Wildlife Service (USFWS) in February of 2012 under Section 10 of the Endangered Species Act. The HCP identifies specific conservation strategies for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout. This project complies with the HCP. The HCP can be found at www.dnrc.mt.gov/HCP.

Montana Department of Environmental Quality (DEQ)

Due to proposed Class II SMZ crossings in S22, T19N R26W associated with new road construction, the DNRC has applied for a Short-term Water Quality Standard for Turbidity (318 Authorization) for this project.

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

Montana/Idaho Airshed Group

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

Montana Fish Wildlife and Parks

Due to proposed Class II SMZ crossings in S22, T19N R26W associated with new road construction, the DNRC has applied for a Stream Protection Act 124 Permit for this project.

3. ALTERNATIVE DEVELOPMENT:

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

No Action: Under the No Action Alternative, no management activity would occur. No timber harvesting and no road construction or improvements would occur. Effects of the No Action Alternative are shown in the Checklist Attachments and can be used to compare effects of the proposed action.

Action: The Action Alternative is described in Section 1, Type and Purpose of Action. No other action alternatives were identified during project scoping or analysis; therefore only forest product removal and sale are analyzed in the EA checklist.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

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

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:

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

A DNRC soils scientist has reviewed the project area, transportation system and harvest plan. Recommendations to minimize direct, indirect, and cumulative impacts have been incorporated in the project design (see: Attachment I, Area Maps and Project Plan; Attachment II, Resource Analyses; Attachment III, Harvest Prescriptions; Attachment IV, Mitigations. As detailed in the Soils Analysis, no substantial direct, indirect or cumulative impacts to soils resources are expected to result from the implementation of the Action Alternative.

5. WATER QUALITY, QUANTITY AND DISTRIBUTION:

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

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

6. AIR QUALITY:

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

The proposed project is located in Montana State Airshed 2 as designated by the Montana/Idaho Airshed Group. Particulate matter may be introduced into the Airshed from the burning of logging slash. All burning would be conducted following the rules, regulations, and procedures of the DNRC major open burning permit and the Montana/Idaho Airshed Group operations guide.

Impacts are expected to be minor and temporary as all slash burning would be conducted burning on days with good to excellent dispersion when smoke would not be expected to impair visibility. Therefore, direct, indirect, and cumulative effects to air quality are expected to be minimal.

7. VEGETATION COVER, QUANTITY AND QUALITY:

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

Tree removal through timber harvesting would cause changes in the vegetative structure, overall stand age and density of the project area.

Silvicultural prescriptions have been developed to keep stands moving towards desired future conditions (DFC) through the removal of diseased, insect infested, over mature and non-preferred shade tolerant timber species.

No stands in the project area meet the old growth requirements as defined by Green et al. (1992). Therefore no effects to old growth are likely to occur with the action or no action alternative.

One vegetative Species of Concern as identified by the Montana Natural Heritage Program was listed as occurring within Township 19 North, Range 26 West: Cascade reedgrass (*Calamagrostis tweedyi).* During the field seasons of 2012 and 2013 this species was not discovered by DNRC staff within the project area. If this plant is discovered in the project area at any point in the proposed Action, all associated activities would cease until proper protection and mitigation measures can be determined and implemented. Therefore, no effects to vegetative Species of Concern are likely to occur from the Action Alternative.

For more information on the vegetation of the project area see: Attachment II, Resource Analyses, Vegetation Analysis. Further recommendations to minimize direct, indirect and cumulative impacts have been incorporated in the project design (See Attachment I, Area Maps and Project plan: Attachment II, Resource Analysis; Vegetative Analysis, Attachment III, Prescriptions; Attachment IV, Mitigations).

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

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

DNRC Wildlife Biologists and Fisheries Biologist have reviewed the proposed project. Recommendations to minimize direct, indirect, and cumulative impacts have been incorporated in the project design (See: Attachment II, Resource Analyses; Attachment IV, Mitigations). As detailed in the Wildlife Analysis and the Water Resources Analysis, no substantial direct, indirect or cumulative impacts to fish or wildlife or associated habitats are expected to result from the implementation of the Action Alternative.

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

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

"DNRC is managing the habitats of threatened and endangered species on this project by implementing the Montana DNRC Forested Trust Lands Habitat Conservation Plan (HCP) and the associated Incidental Take Permit (Permit) that was issued by the United States Fish & Wildlife Service (USFWS) in February of 2012 under Section 10 of the Endangered Species Act. The HCP identifies specific conservation strategies for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout. This project complies with the HCP. The HCP can be found at www.dnrc.mt.gov/HCP."

DNRC Wildlife Biologists and Fisheries Biologist have reviewed the proposed project. Recommendations to minimize direct, indirect, and cumulative impacts have been incorporated in the project design (See: Attachment II, Resource Analyses; Attachment IV, Mitigations). As detailed in the Wildlife Analysis and the Water Resources Analysis, no substantial direct, indirect or cumulative impacts to fish or wildlife or associated habitats are expected to result from the implementation of the Action Alternative.

10. HISTORICAL AND ARCHAEOLOGICAL SITES:

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

The DNRC Archeologist has been consulted with and supplied the following statement:

> The DNRC has no record of cultural resources within the project's area of potential effect. However, a professional inventory of cultural resources has not been conducted. If previously unknown, cultural or paleontological materials are identified during project related activities, all work will cease until a professional assessment of such resources can be made.

Based on the above information and mitigations no direct, indirect, or cumulative impacts would under the action alternative.

11. AESTHETICS:

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

Portions of the project area are visible from the town of Plains, MT and MT Highway 200. Silvicultural prescriptions have been designed to promote historic timber types and emulate natural fire regimes. Any adverse visual impacts are expected to be temporary, as the residual stand and early seral regeneration is expected to fill in canopy openings produced by the project. Therefore, direct, indirect, and cumulative effects to aesthetics are expected to be short term and minimal.

12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:

Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify direct, indirect, and cumulative effects to environmental resources.

No direct, indirect, or cumulative impacts would likely occur under either alternative

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

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

No other studies, plans or projects exist on the project area. The following Environmental Documents have been published for DNRC projects in the surrounding area:

- 2003 - Environmental Assessment for the Miller Creek timber sale: S16, T19N R26W
- 2004 - Environmental Assessment for the Swamp Ridge timber sale: S36, T20N R27W
- 2005 - Environmental Assessment for the Sheep Gap timber sale: S22, T20N R27W
- 2013 – Categorical Exclusion for Blacktail Ridge Fire Salvage: S16, T19N R26W

Through project design, specialist input and mitigations, no direct, indirect or cumulative impacts are expected to result from the proposed Action.

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.

Potential risks to human health and safety are in line with forest industry standards.

Safety on the project area would be monitored throughout the project by Forest Officers and work suspended if unsafe conditions were observed. Warning signs would be placed on open roads and near the project site to warn the public of potential safety concerns.

Human health would not be impacted by the proposed timber sale or associated activity. Therefore there would be no direct, indirect, or cumulative impacts from this proposed action.

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15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:

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

The impact of the proposed action would be to add a small contribution to the continued industrial and commercial production activities in Sanders County, and western Montana.

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16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:

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

The impact of the proposed action on quantity and distribution of employment would be to support approximately 27 jobs for one year. This is according to Montana Bureau of Business and Economic Research, which estimates about 10 jobs are supported for one year for every 1 MMBF that is harvested.

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17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

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

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

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18. DEMAND FOR GOVERNMENT SERVICES:

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

Log trucks hauling to the purchasing mill would result in temporary increases in traffic on the designated haul roads. For specific haul route information, refer to Attachment I: Area Maps and Project Plan.

Timber harvesting and log hauling is a normal contributor to the traffic and activities of the local area. This traffic increase would be temporary and limited to times when damage to road surfaces would not likely occur. Warning signs would be placed to warn the public of hauling traffic.

No changes to the level of government services would be needed as a result of this project, therefore it would not contribute to direct, indirect or cumulative effects on government services.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

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

MT DNRC: Northwestern Land Office (NWLO) Operating Plan

- This project has been prepared in accordance with the goals outlined in the NWLO Operating Plan as well as statewide programmatic goals and missions of the MT DNRC.

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

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

There are no designated wilderness or developed recreational areas accessed through the project site, although portions of the project area are utilized frequently for hunting, trapping and recreating. The residual stand should benefit users by increasing site distances and reducing dead and dying trees. Access through the project area may be temporally impacted during harvesting along open roads. Any open road closures would be temporary and short term, and timed to have minimal impact to recreation traffic. In the long term, access through the project area would remain unchanged by the proposed action. Therefore, no effects on recreational and wilderness activities are likely to occur with the implementation of the action alternative.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:

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

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

22. SOCIAL STRUCTURES AND MORES:

Identify potential disruption of native or traditional lifestyles or communities.

No direct, indirect and cumulative impacts related to social structures and mores or disruption of native or traditional lifestyles or communities would be expected under either alternative

23. CULTURAL UNIQUENESS AND DIVERSITY:

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

No direct, indirect and cumulative impacts related to cultural uniqueness and diversity would be expected under either alternative

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

Estimate the return to the trust. Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify direct, indirect, and cumulative economic and social effects likely to occur as a result of the proposed action.

Costs, revenues and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return. The estimated stumpage is based on comparable sales analysis. This method compares recent sales to find 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 timber.

The No Action Alternative does not generate any return to the Trust Grants or the FI account at this time.

The proposed action would produce an estimated 19,944 tons (2.7 MMBF) of timber. This action would produce an estimated $557,172.00 for the Public Buildings (PB) Trust Grant and $41,148.00 for the Common Schools (CS) Trust Grant; as well as approximately $68,137.48 in Forest Improvement Fees.

EA Checklist Prepared By:	**Name:**	Kyle Johnson	**Date:**	March 5, 2014
	Title:	Management Forester, Plains Unit, MT DNRC		

V. FINDING

25. ALTERNATIVE SELECTED:

The interdisciplinary team has completed the Environmental Assessment for the Combest Parcels Timber Sale. In the development of this EA two alternatives were considered, Action and No Action. These two alternatives were evaluated on their ability to: 1) Increase the vigor and health of the stand by limiting the effects of insects and disease and to reducing stocking levels; 2) Generate revenue for the Public Buildings and Commons Schools Trust Funds and 3) Increase forest productivity beneficial to future actions.

After a thorough review of the EA, project file, public correspondence, Department policies, standards and guidelines, I have selected the Action Alternative for the implementation on this project. I have selected the Action Alternative for implementation with the understanding that resource mitigation measures identified in the Environmental Assessment will be applied to meet the intended protection. The Action Alternative has been selected for the following reasons:

1) The Action Alternative meets the Purpose of Action and the specific project objectives listed on page 3 of the EA.

2) DNRC is required to administer these lands to produce the largest measure of reasonable and legitimate long-term return for beneficiaries (*Montana Codes Annotated 77-1-202*). DNRC meets this long term obligation by managing intensely for healthy and biologically diverse forests.

3) The Action Alternative includes the necessary mitigations and a consensus of professional opinion on limits of acceptable environmental impact.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

I find that none of the project impacts are regarded as severe, enduring, geographically widespread, or frequent. Further, I find that the quantity and quality of the natural resources, including any that may be considered unique or fragile, will not be adversely affected to significant degree. I find no precedent for future actions that would cause significant impacts, and I find no conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that adverse impacts will be avoided, controlled, or mitigated by the design of the project to an extent that they are not significant.

27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

	EIS		More Detailed EA	X	No Further Analysis

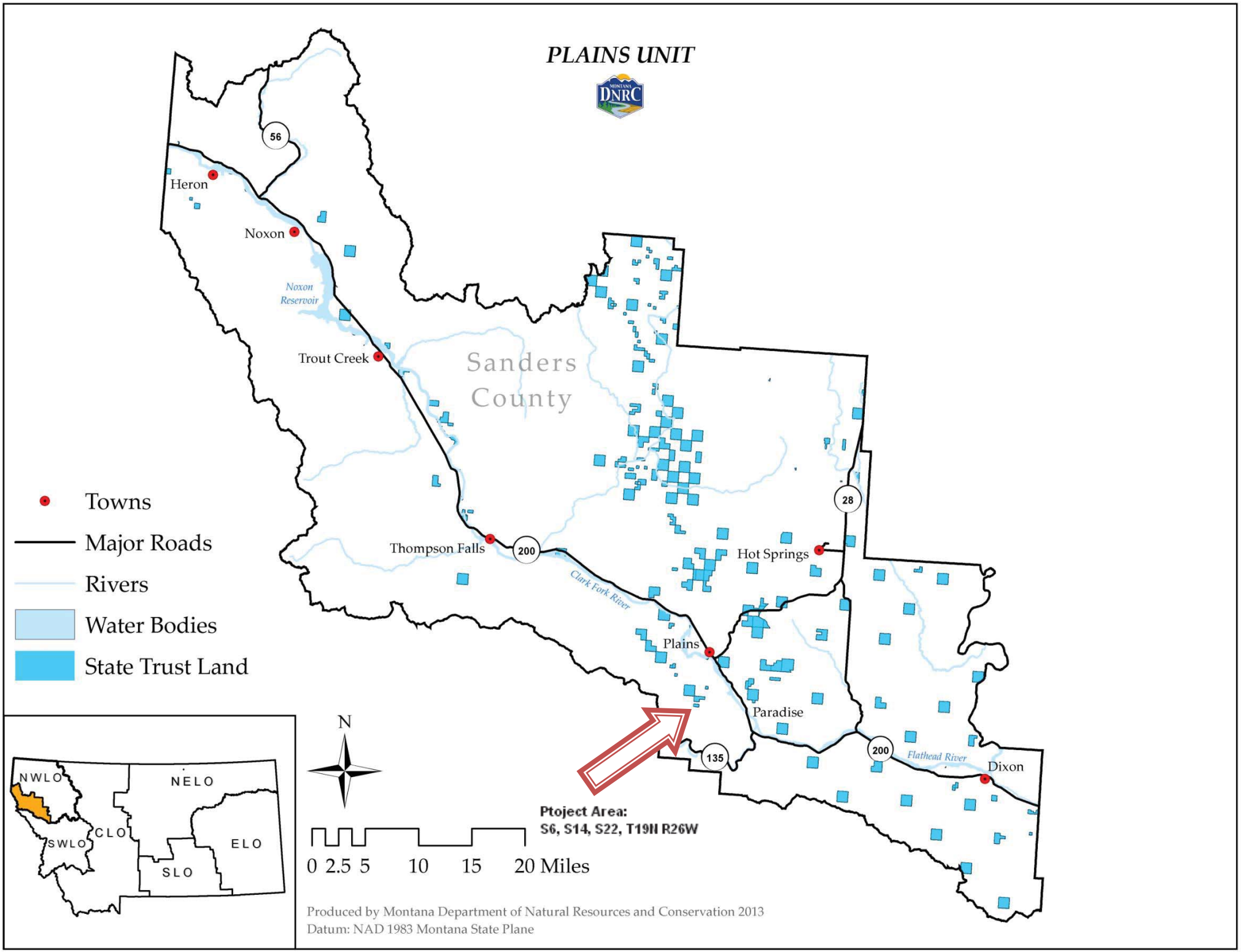
EA Checklist Approved By:	***Name:*** David M. Olsen **Title:** Plains Unit Manager
Signature: David M. Olsen	**Date:** 3/6/2014

ATTACHMENT I

Area Maps and Project Plan

- Vicinity Map Page 15
- Transportation Plan Maps Pages 16 -17
- Harvest Unit Maps Pages 18 – 20
- Current Cover Type Maps Pages 21 - 23
- Desired Future Condition Maps Pages 24 - 26

PLAINS UNIT



Produced by Montana Department of Natural Resources and Conservation 2013
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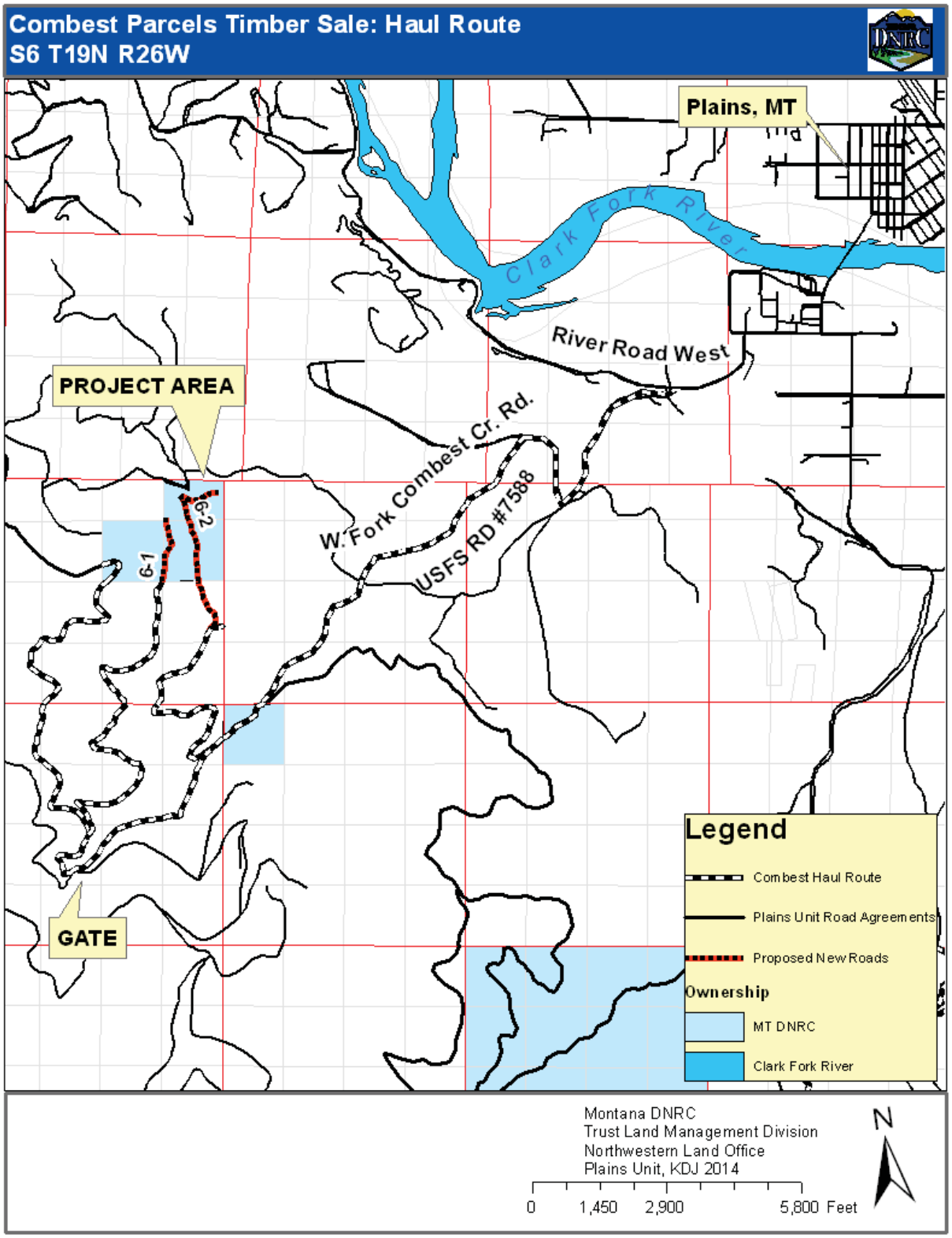
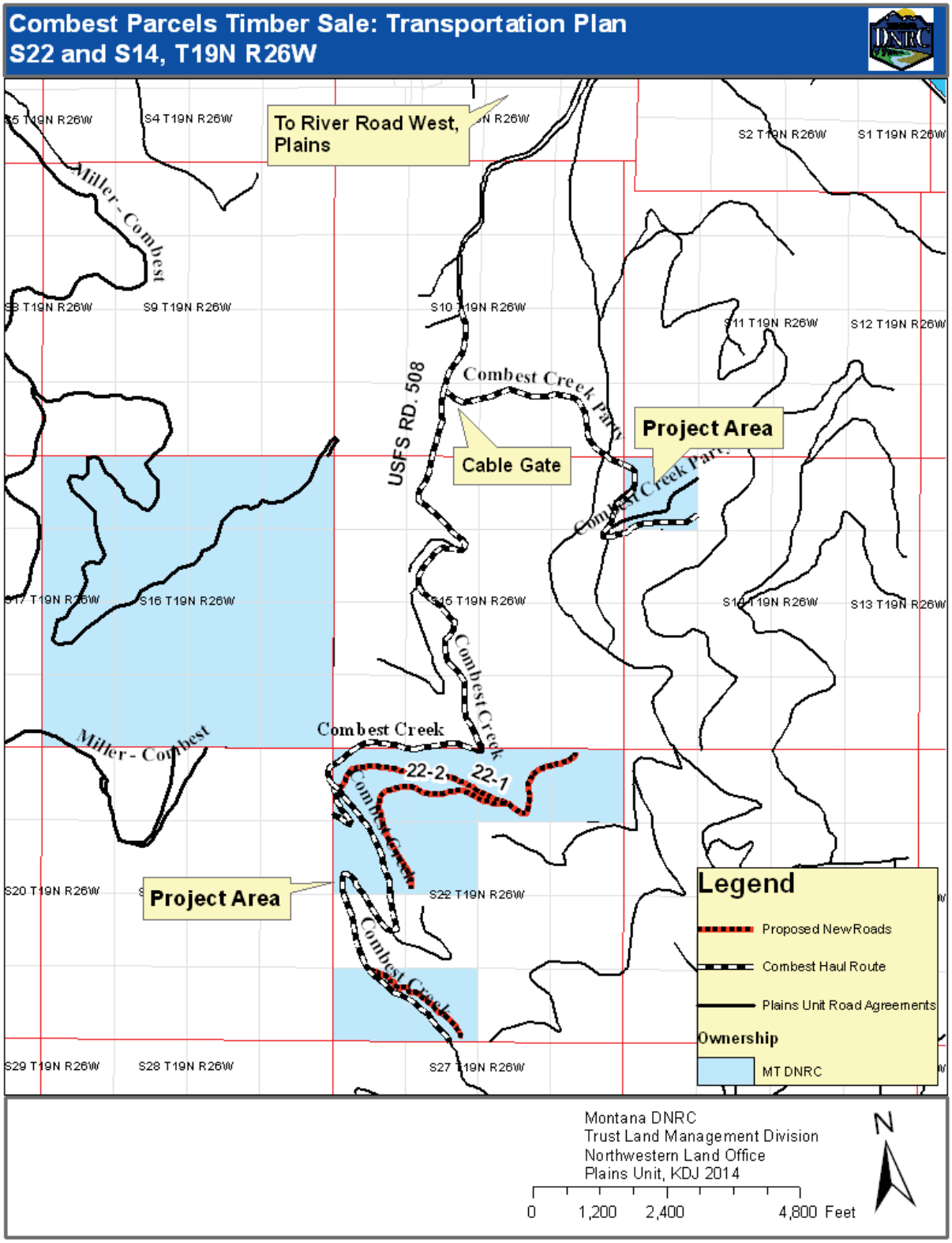

Combest Parcels Timber Sale: Haul Route
S6 T19N R26W
Plains, MT
Clark Fork River
River Road West
PROJECT AREA
W. Fork Combest Cr. Rd.
USFS RD #7588
6-2
6-1
GATE
Legend
Combest Haul Route
Plains Unit Road Agreements
Proposed New Roads
Ownership
MT DNRC
Clark Fork River
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2014
0
1,450
2,900
5,800 Feet
N


Combest Parcels Timber Sale: Transportation Plan
S22 and S14, T19N R26W
To River Road West, Plains
Miller - Combest
USFS RD. 508
Combest Creek Pkwy
Cable Gate
Project Area
Combest Creek
22-2
22-1
Project Area
S4 T19N R26W
S2 T19N R26W
S1 T19N R26W
S9 T19N R26W
S11 T19N R26W
S12 T19N R26W
S16 T19N R26W
S13 T19N R26W
S20 T19N R26W
S22 T19N R26W
S29 T19N R26W
S28 T19N R26W
Legend
Proposed New Roads
Combest Haul Route
Plains Unit Road Agreements
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2014
0
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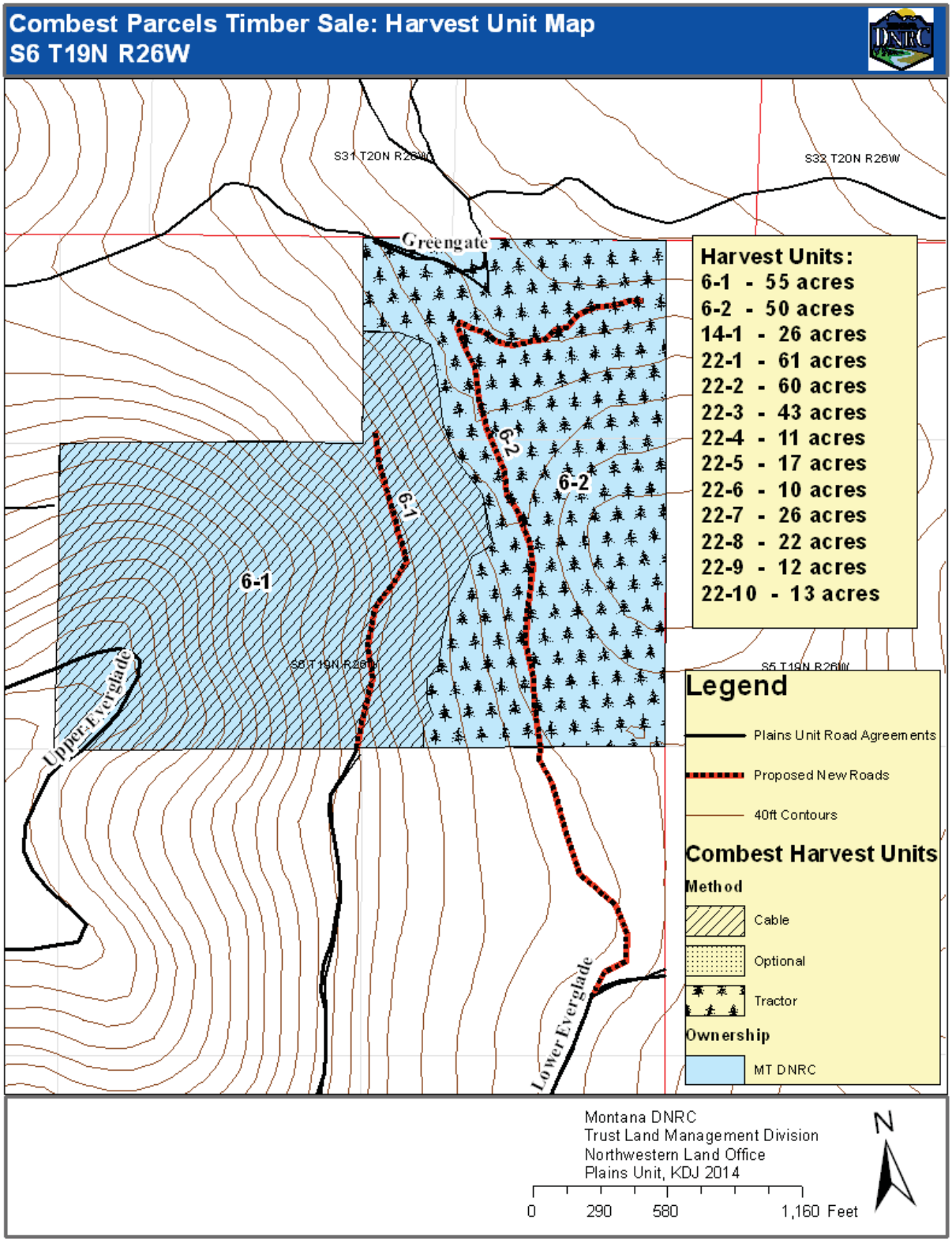
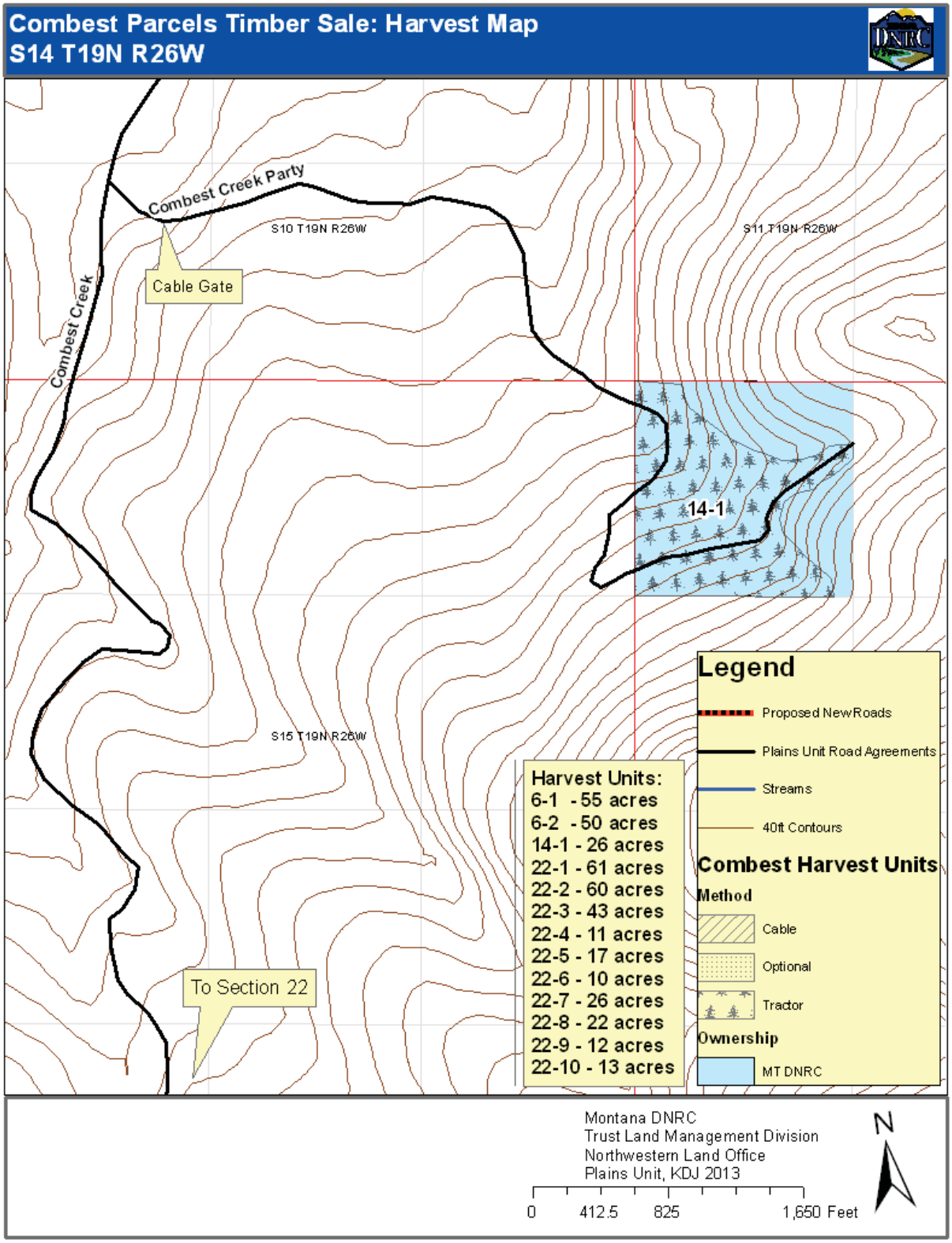
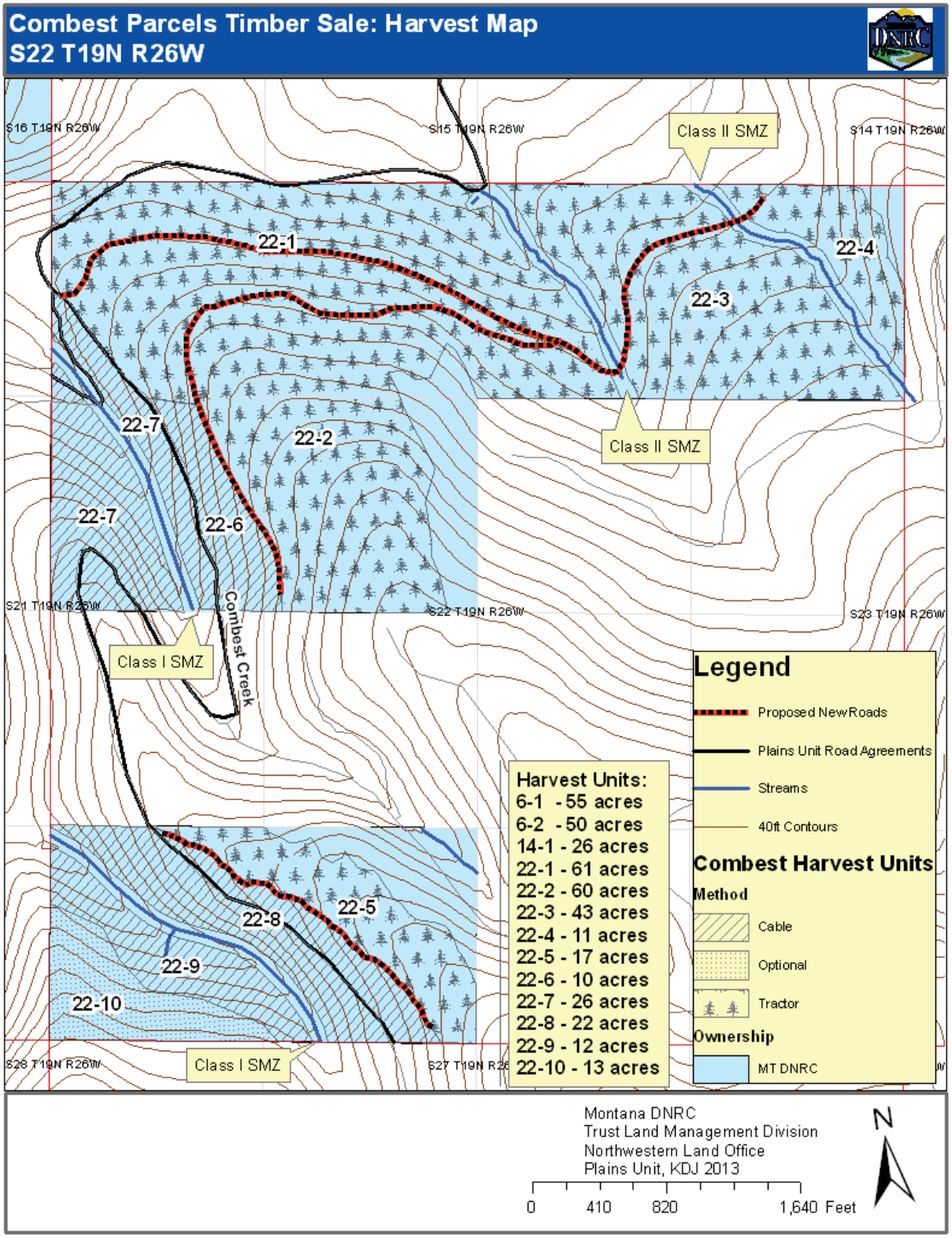
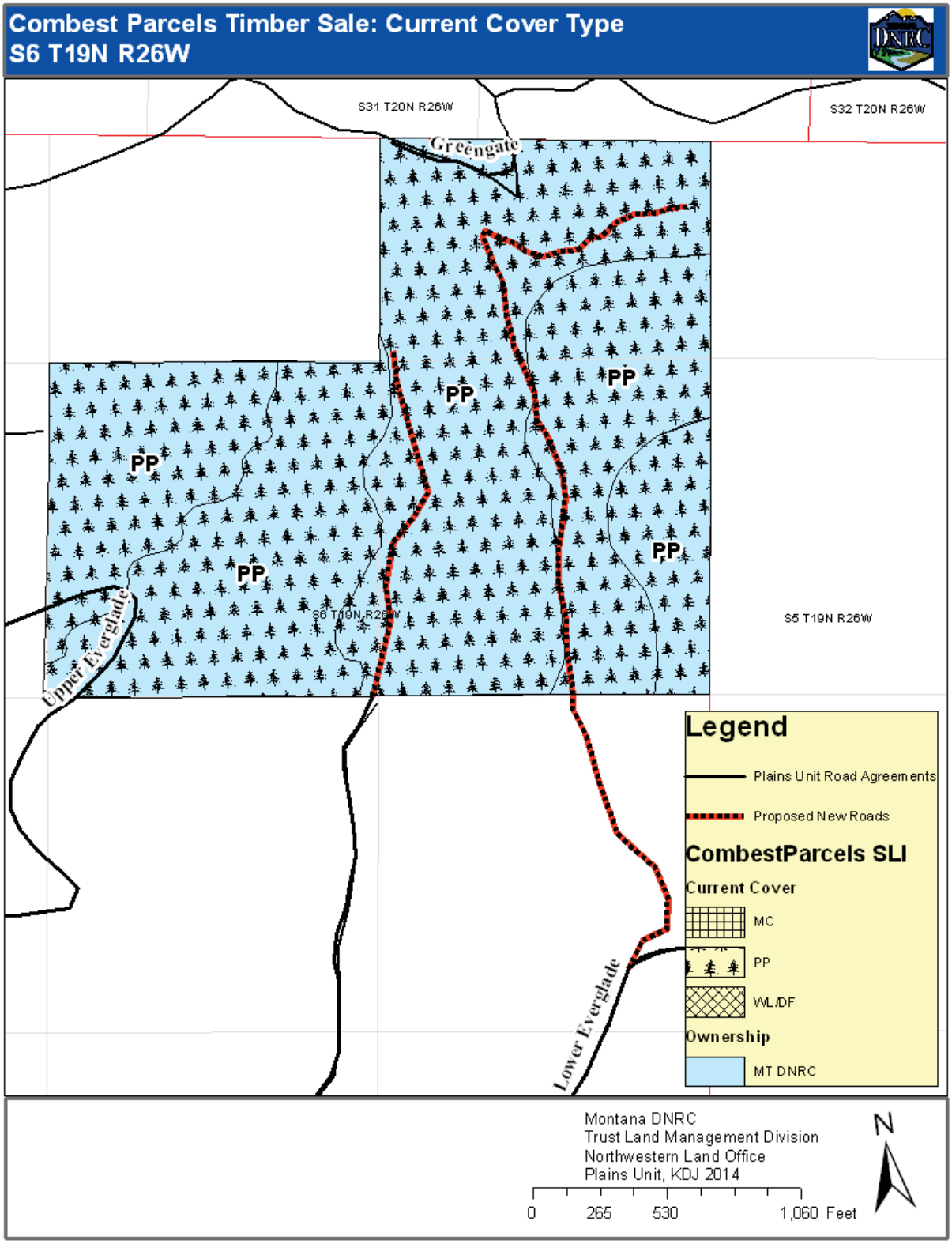
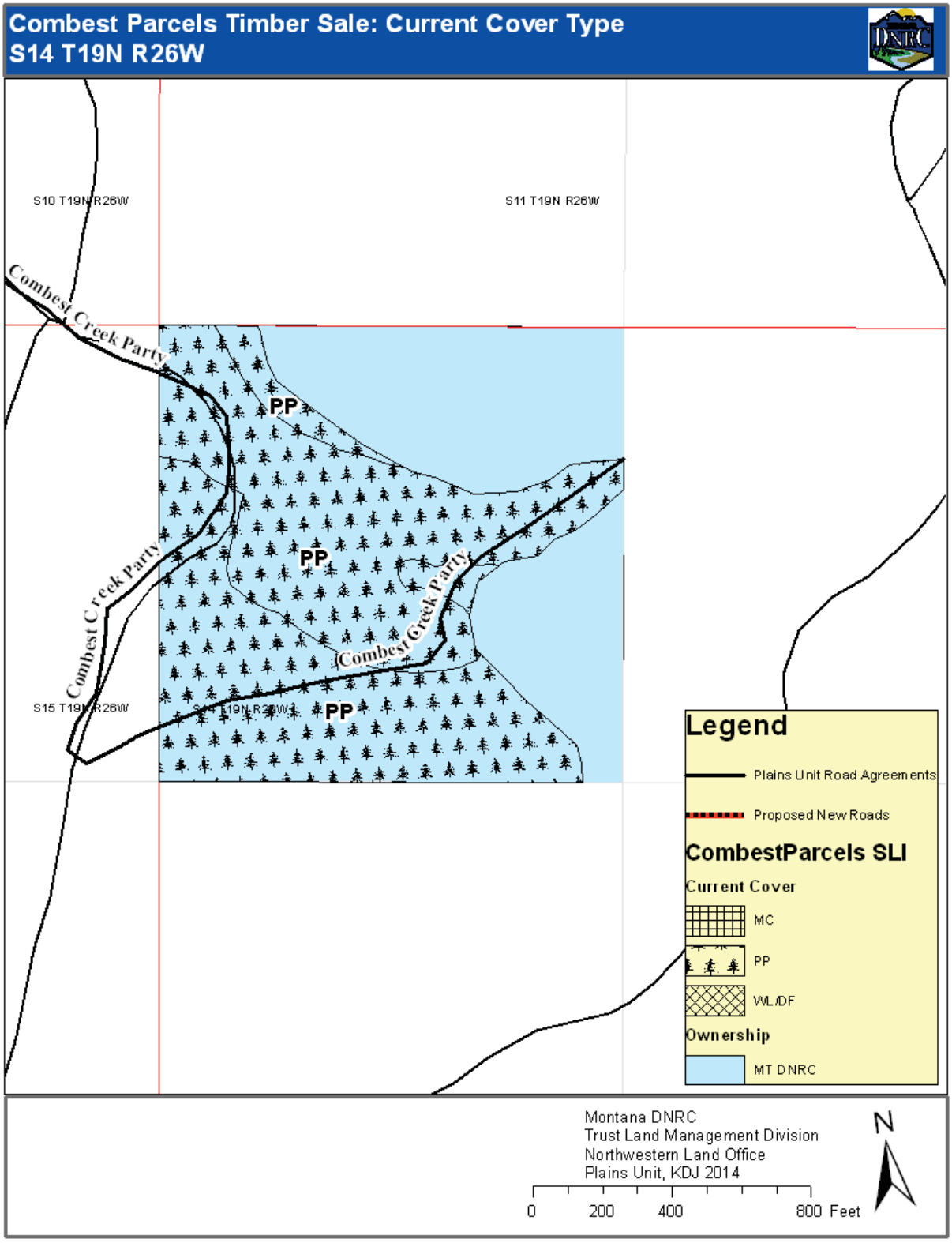
2,400
4,800 Feet
N

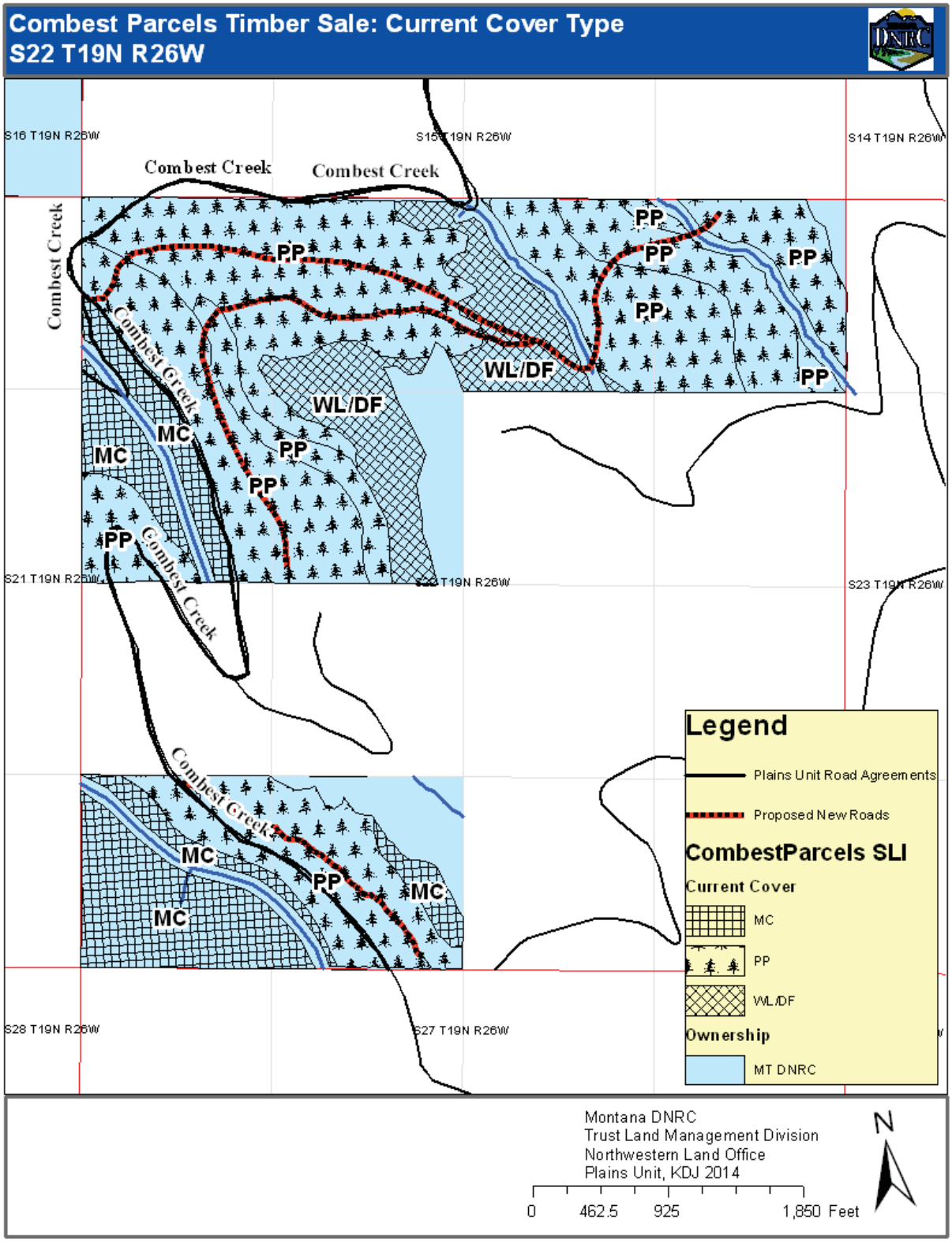

Combest Parcels Timber Sale: Harvest Unit Map
S6 T19N R26W
S31 T20N R26W
S32 T20N R26W
Greengate
Harvest Units:
6-1 - 55 acres
6-2 - 50 acres
14-1 - 26 acres
22-1 - 61 acres
22-2 - 60 acres
22-3 - 43 acres
22-4 - 11 acres
22-5 - 17 acres
22-6 - 10 acres
22-7 - 26 acres
22-8 - 22 acres
22-9 - 12 acres
22-10 - 13 acres
6-1
6-2
S6 T19N R26W
S5 T19N R26W
Upper Everglade
Lower Everglade
Legend
Plains Unit Road Agreements
Proposed New Roads
40ft Contours
Combest Harvest Units
Method
Cable
Optional
Tractor
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2014
0
290
580
1,160 Feet
N

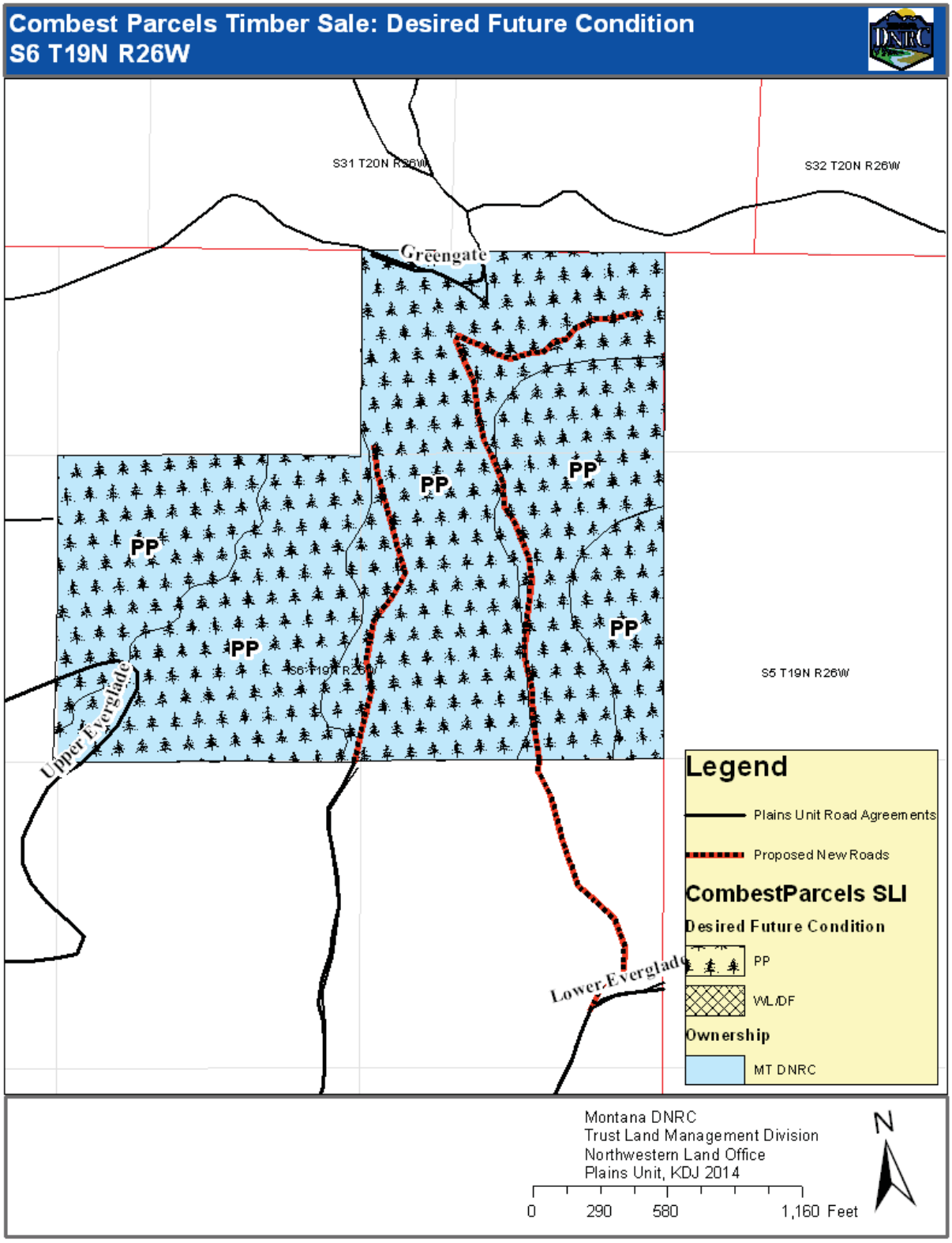

Combest Parcels Timber Sale: Harvest Map
S14 T19N R26W
Combest Creek Party
S10 T19N R26W
S11 T19N R26W
Cable Gate
Combest Creek
14-1
S15 T19N R26W
To Section 22
Harvest Units:
6-1 - 55 acres
6-2 - 50 acres
14-1 - 26 acres
22-1 - 61 acres
22-2 - 60 acres
22-3 - 43 acres
22-4 - 11 acres
22-5 - 17 acres
22-6 - 10 acres
22-7 - 26 acres
22-8 - 22 acres
22-9 - 12 acres
22-10 - 13 acres
Legend
Proposed New Roads
Plains Unit Road Agreements
Streams
40ft Contours
Combest Harvest Units
Method
Cable
Optional
Tractor
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2013
0
412.5
825
1,650 Feet
N

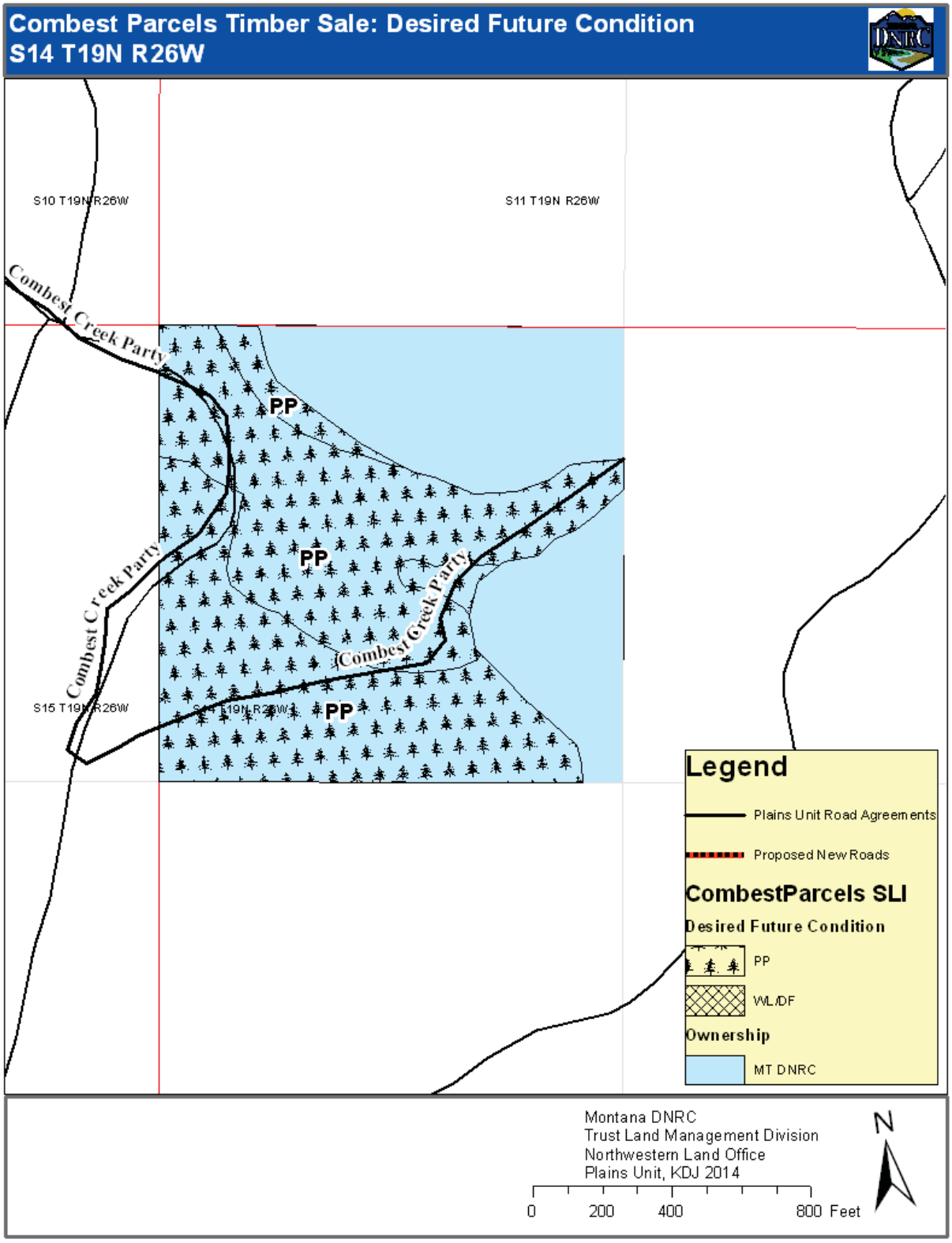

Combest Parcels Timber Sale: Harvest Map
S22 T19N R26W
S16 T19N R26W
S15 T19N R26W
S14 T19N R26W
S21 T19N R26W
S22 T19N R26W
S23 T19N R26W
S28 T19N R26W
S27 T19N R26
Class II SMZ
Class II SMZ
Class I SMZ
Class I SMZ
Combest Creek
22-1
22-2
22-3
22-4
22-5
22-6
22-7
22-7
22-8
22-9
22-10
Harvest Units:
6-1 - 55 acres
6-2 - 50 acres
14-1 - 26 acres
22-1 - 61 acres
22-2 - 60 acres
22-3 - 43 acres
22-4 - 11 acres
22-5 - 17 acres
22-6 - 10 acres
22-7 - 26 acres
22-8 - 22 acres
22-9 - 12 acres
22-10 - 13 acres
Legend
Proposed New Roads
Plains Unit Road Agreements
Streams
40ft Contours
Combest Harvest Units
Method
Cable
Optional
Tractor
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2013
0
410
820
1,640 Feet
N

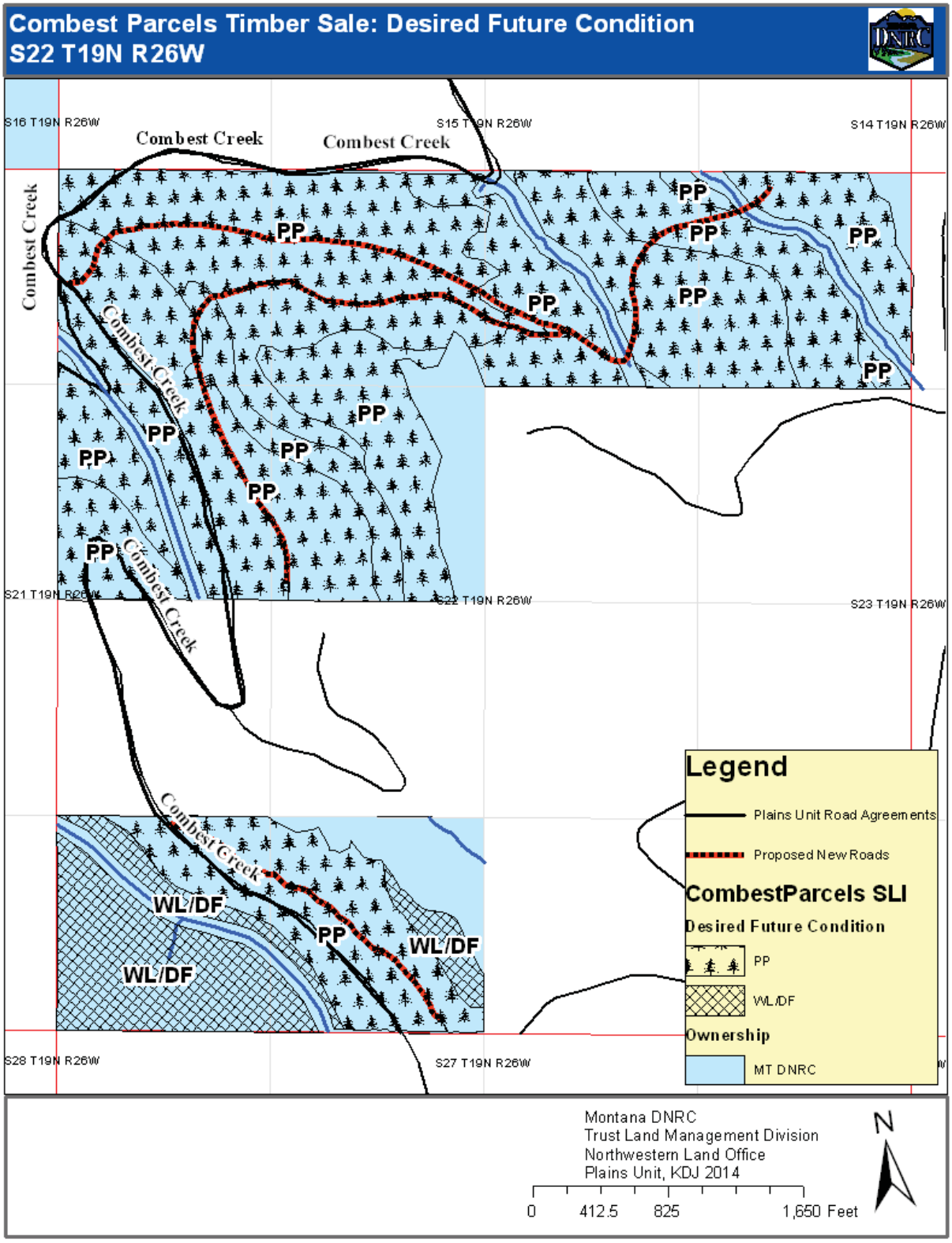

Combest Parcels Timber Sale: Current Cover Type
S6 T19N R26W
S31 T20N R26W
S32 T20N R26W
Greengate
PP
PP
PP
PP
PP
S6 T19N R26W
S5 T19N R26W
Upper Everglade
Lower Everglade
Legend
Plains Unit Road Agreements
Proposed New Roads
CombestParcels SLI
Current Cover
MC
PP
WL/DF
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2014
0
265
530
1,060 Feet
N


Combest Parcels Timber Sale: Current Cover Type
S14 T19N R26W
S10 T19N R26W
S11 T19N R26W
S15 T19N R26W
S14 T19N R26W
Combest Creek Party
Combest Creek Party
Combest Creek Party
PP
PP
PP
Legend
Plains Unit Road Agreements
Proposed New Roads
CombestParcels SLI
Current Cover
MC
PP
WL/DF
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2014
0
200
400
800 Feet
N


Combest Parcels Timber Sale: Current Cover Type
S22 T19N R26W
S16 T19N R26W
S15 T19N R26W
S14 T19N R26W
S21 T19N R26W
S23 T19N R26W
S28 T19N R26W
S27 T19N R26W
Combest Creek
Combest Creek
Combest Creek
Combest Creek
Combest Creek
Combest Creek
PP
WL/DF
MC
Legend
Plains Unit Road Agreements
Proposed New Roads
CombestParcels SLI
Current Cover
MC
PP
WL/DF
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2014
0
462.5
925
1,850 Feet
N


Combest Parcels Timber Sale: Desired Future Condition
S6 T19N R26W
S31 T20N R26W
S32 T20N R26W
Greengate
PP
PP
PP
PP
PP
S6 T19N R26W
S5 T19N R26W
Upper Everglade
Lower Everglade
Legend
Plains Unit Road Agreements
Proposed New Roads
CombestParcels SLI
Desired Future Condition
PP
WL/DF
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2014
0
290
580
1,160 Feet
N


Combest Parcels Timber Sale: Desired Future Condition
S14 T19N R26W
S10 T19N R26W
S11 T19N R26W
S15 T19N R26W
Combest Creek Party
PP
PP
PP
Legend
Plains Unit Road Agreements
Proposed New Roads
CombestParcels SLI
Desired Future Condition
PP
WL/DF
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2014
0
200
400
800 Feet
N


Combest Parcels Timber Sale: Desired Future Condition
S22 T19N R26W
S16 T19N R26W
S15 T19N R26W
S14 T19N R26W
S21 T19N R26W
S22 T19N R26W
S23 T19N R26W
S28 T19N R26W
S27 T19N R26W
Combest Creek
PP
WL/DF
Legend
Plains Unit Road Agreements
Proposed New Roads
CombestParcels SLI
Desired Future Condition
PP
WL/DF
Ownership
MT DNRC
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit, KDJ 2014
0
412.5
825
1,650 Feet
N

Attachment II

Resource Analyses

- Vegetative Analysis Page 28
- Wildlife Analysis Page 36
- Water Resources Analysis Page 62
- Soils Analysis Page 69

Vegetation Analysis

Introduction

This analysis is designed to disclose the existing condition of the vegetative resource and display the anticipated effects that may result from each alternative of this proposal. During initial project development, public comment was solicited via scoping letters and newspaper advertisements.

Several comments in support of the project were received from the local community. The following issue statements were developed from concerns raised by DNRC specialists and public comments received during scoping and will be addressed in the following analysis:

1. Concern for maximizing the return to the Public Buildings and Common Schools Trust Funds by intensively managing for healthy and biologically diverse forests.
2. Concern about minimizing losses in timber volume from mortality due to insect and disease outbreaks, thereby improving forest health and reducing wildfire susceptibility.
3. Concern regarding the continued presence and / or re-establishment of desired future conditions (DFC) and historically appropriate timber types on Trust Lands.

Analysis Area

The analysis area for direct and indirect effects is referred to as the project area, and consists of the state ownership within Sections 6, 14 and 22, T19N, R26W. These parcels are located approximately 5 air miles south of Plains, Montana, in Sanders County. Cumulative impacts are considered at the scale of the Plains Unit.

Analysis Method

The Plains Unit typically prepares two to four timber sale projects per year. Each proposed project is evaluated for its potential effects on lands managed by the DNRC and the surrounding landscape.

Methods used to prepare the analysis include:

- Review of stand level inventory (SLI) data
- field visits by project leaders
- review of scientific literature
- review of aerial photography
- consultation and field visits with other Forestry professionals.

Existing Condition

Stand History and Past Management

Sections 6, T19N, R26W

According to section records for this parcel, past management activities in the project area include limited timber harvesting and grazing. The only recorded timber harvest occurred in 1928, when approximately 539 MBF of ponderosa pine (*Pinus ponderosa*) was removed. The lower portions of the stand also appear to have had extensive firewood cutting, as there are limited snags in the area. No records exist for

this activity, suggesting the firewood harvesting has been illegal. This parcel has been historically grazed, and is currently under a forest grazing license.

The beneficiary for this parcel is split between two Trust Grants: 60% Public Buildings (P.B) and 40% Common Schools (C.S.).

Section 14, T19N, R26W

According to section records for this parcel, past management activities in the project area include timber harvesting, grazing and Christmas tree harvesting. The first recorded timber harvest occurred in 1928, when approximately 231 MBF of ponderosa pine was harvested. Then in 1987 approximately 116 MBF of western larch (*Larix occidentalis)*, Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine was harvested. Commercial Christmas tree permits were sold in the years 1957 – 1960 with approximately 30 bales harvested. This parcel has been historically grazed under cooperative agreement, but is not currently listed under any grazing agreement.

The beneficiary for this parcel is the P.B. Trust Grant.

Sections 22, **T19N, R26W**

Section records for this parcel indicate active management activities in the project area including timber harvesting, post and pole harvesting, grazing and Christmas tree harvesting. The first recorded timber harvest occurred in 1928, when approximately 2,663 MBF of ponderosa pine was harvested. Then from 1945 to 1977 multiple small scale timber sales and timber removal permits were prepared. During this time, approximately 25 MBF of western larch, 95 MBF of Douglas-fir, 366 MBF of ponderosa pine, 18 MBF of grand fir (*Abies grandis*), 2 MBF of western redcedar (*Thuja plicata*), and 5 MBF of lodgepole pine *(Pinus contorta)* was harvested. Commercial Christmas tree permits were sold in the years 1948 – 1972 with approximately 1,200 bales harvested. Post and Pole removal permits have also been issued during this time. Firewood permits have been issued for this parcel routinely from 2006 to the present. This parcel has been historically grazed under cooperative agreement, but is not currently listed under any grazing agreement.

The beneficiary for this parcel is the P.B. Trust Grant

Current Cover Types, Age Classes, and Stand Structure

Current conditions are described by DNRC's 2012 SLI for the Plains Unit, and verified by field visits by DNRC Foresters.

The project area is comprised of 20, Stand Level Inventory (SLI) stands and is characterized by the following forest current cover types according to the SLI database: (See Attachment I: Area Maps and Project Plan, Current Cover Type Maps).

Current Cover Type	Percent of project area
Ponderosa pine	75%
Mixed Conifer	13%
Western larch / Douglas-fir	12%

As indicated above, the majority of the project area is classified as ponderosa pine current cover type. In these stands, ponderosa pine is a major overstory component; however regeneration of ponderosa pine is very limited. These stands generally represent the drier, well drained portions of the project area.

Generally these stands have a closed canopy of ponderosa pine, western larch and Douglas-fir. Regeneration is generally limited to Douglas-fir where sufficient sunlight reaches the forest floor t o allow establishment. Where conditions are the driest and soils the poorest, ponderosa pine are the only trees present.

The areas of the project area classified as western larch / Douglas-fir current cover type are found on slightly wetter sights, with conditions favoring regeneration of shade tolerant species. In these stands the canopy is generally closed, consisting of Douglas-fir, western larch, grand fir and scattered ponderosa pine. Regeneration is limited to shade tolerant species such as grand fir and Douglas-fir.

The portions of the project area classified as mixed conifer current cover type represent the wettest, most shaded areas of the project area. These stands are generally shaded slopes and draws which exhibit greater productivity due to the higher available moisture. In these stands the canopy is generally closed consisting primarily of Douglas-fir, western larch, grand fir, western redcedar, and lodge pole pine with scattered ponderosa pine and western white pine (*Pinus monticola)*. In these stands regeneration is generally limited to dense pockets of grand fir and western redcedar.

Across the project area most stands consist of a multistoried stand, with early seral species making up the overstory and shade tolerant species making up the lower canopy levels. Overstory tree ages range from 100 – 150 years with scattered large diameter ponderosa pine in excess of 250 years old. Overstory tree heights range from just 60 ft on the driest sights to 100 ft on the slopes and draws. Overstory tree diameters average 12 - 14 inches with some scattered ponderosa pine in excess of 25" Diameter at Breast Height (DBH). The mid story canopy level trees are generally 50 – 100 years of age, 8 – 12" DBH and 30 – 50 feet tall. The understory regeneration is primarily shade tolerant species, 6 – 20 feet tall, 10 – 40 years of age, and 1 – 6" DBH.

For more information on individual stands, refer to: Attachment III, Harvest Unit Prescriptions.

Desired Future Conditions

Past and current events have changed the forest conditions on the state owned parcels involved in the project area from the desired future conditions (DFC) identified by DNRC. DFCs are based on historic cover types described by Losensky (1997), and are determined for each stand using a site-specific model that assigns a DFC in terms of cover type for each stand identified in the DNRC's Stand Level Inventory (SLI). At the administrative unit level, the aggregate acreage of each desired future cover type describes a broad picture of the desired future condition for that unit. This provides a basis for comparison of current and desired future conditions at both the project and landscape (administrative unit) levels.

The project area is characterized by the following DFCs according to the current SLI database:

DFC	Percent of project area
Ponderosa pine	91%
Western larch / Douglas-fir	9%

As indicated above the DFC for the project area is overwhelmingly Ponderosa Pine, with only the wettest, most shaded stands classified as Western larch / Douglas - fir. For more information on individual stands, refer to: Attachment III, Harvest Unit Prescriptions. (See Attachment I: Area Maps and Project Plan, Desired Future Condition Maps).

Table V-1:

Table V-1 compares the current cover type distribution and DFC for the project area.

Source: DNRC Stand Level Inventory (SLI) dated 11/12/2013.

Cover Type	Current Acres	DFC Acres	Current minus (-) DFC**
Ponderosa pine	329	378	-49
Mixed Conifer	44	0	44
Western larch/Douglas-fir	33	28	5
Grand Total	406	406	
**A positive value indicates excess current acreage compared to DFC, and a negative value indicates a deficiency in acreage compared to DFC			

Table V-2: Current cover types and desired future conditions on the Plains Unit.

Source: DNRC Stand Level Inventory (SLI) dated 11/12/2013.

Cover Type	Current Acres	DFC Acres	Current minus (-) DFC**
Douglas-fir	3,150	1,615	1,535
Hardwoods	23	125	-102
Lodgepole pine	1,723	1,984	-261
Mixed conifer	6,419	942	5,477
Other*	12,286	11,193	1,093
Ponderosa pine	27,351	32,259	-4,908
Subalpine fir	869	192	677
Western larch/Douglas-fir	11,721	14,434	-2,713
Western white pine	273	1,071	-798
Grand Total	63,815	63,815	
*Other includes non-commercial, nonstocked, and non-forest land. **A positive value indicates excess current acreage compared to DFC, and a negative value indicates a deficiency in acreage compared to DFC			

As shown in Table V-1, mixed conifer and western larch/Douglas-fir are currently over-represented in the project area, while the ponderosa pine is under-represented. On the broader scale of the Plains Unit (Table V-2), shade-tolerant types including mixed conifer, Douglas-fir, and subalpine fire are over-represented compared to DFC, while shade-intolerant types such as ponderosa pine, western larch / Douglas-fir and western white pine are under-represented.

Forest Fuels and Fire Behavior

According to Losensky's "Historical Vegetation of Montana" (1997), the area was historically characterized by frequent, low-intensity wildfires prior to the early 1900's. Since that time fire has been virtually eliminated from the project area, although some small areas within the project area do exhibit fire scars on the trees.

As a result of fire exclusion, ladder fuels (fuels that conduct ground fire to the canopy) have increased due to growth of shade tolerant species in the understory. Endemic insect and disease occurrences in the stands create fuels which are not removed by the natural fire regime. This is the case in many of the stands found in the project area with both dead standing timber and ladder fuels becoming prominent.

Forest Insects and Disease

The primary insect affecting the project area is: western pine beetle (*Dendroctonus brevicomis*) in the ponderosa pine. The primary parasite active the project area is dwarf mistletoe (*Arceuthobium spp.)* in the Douglas-fir and western larch. Additionally, the project area has pockets of root disease primarily affecting the Douglas-fir, Pini rot (*Phellinus pini*) in the western larch, and Indian paint fungus (*Echindotium tinctorium*)in the grand fir. For more information on insects and diseases affecting individual stands, refer to: Attachment III, Harvest Unit Prescriptions.

Noxious weeds

Noxious weeds are present in the project area, mainly along the roads. The primary noxious weed in the project area is spotted knapweed (*Centaurea maculos*), although others are likely to exist, especially along the roads.

Threatened and Endangered Vegetative Species (TES)

One vegetative Species of Concern as identified by the Montana Natural Heritage Program was listed as occurring within Township 19 North, Range 26 West: Cascade reedgrass (*Calamagrostis tweedyi).* During the field seasons of 2012 and 2013 this species was not discovered by DNRC staff within the project area. If this plant is discovered in the project area at any point in the proposed action, all associated activities would cease until proper protection and mitigation measures can be determined and implemented. Therefore, no effects to vegetative Species of Concern are likely to occur from the Action Alternative.

Direct and Indirect Effects

No Action Alternative

Issue 1: Concern for maximizing the return to the Public Buildings and Common Schools Trust Grants by intensively managing for healthy and biologically diverse forests.

No forest management activities would occur under this alternative and no returns for the PB or CS Trust Grants or the FI account would be generated. Forest health and biodiversity can be expected to decline as succession climax conditions are realized in the project area.

Issue 2: Concern about minimizing losses in timber volume from mortality due to insect and disease outbreaks, thereby improving forest health and reducing wildfire susceptibility.

Tree mortality due to insects and diseases present in the project area would continue to persist and increase. Current bark beetle populations will continue to advance towards epidemic levels due to over stocking and favorable conditions for beetles. The susceptibility of the stand to wildfire would continue to increase as the canopy becomes more closed in and growth of shade tolerant regeneration creates ladder fuels. Trees killed by the various insects and diseases present in the stand would add to the wildfire risk, providing readily available fuels in the canopy. As the dead trees fall the fuel loading in the stand would increase causing more risk that a low intensity ground fire could spread into the canopy and become a catastrophic stand replacing fire.

Issue 3: Concern regarding the continued presence and / or re-establishment of desired future conditions (DFC) and historically appropriate timber types on Trust Lands.

Timber types would continue to advance towards climax conditions with shade tolerant Douglas-fir, and grand fir continuing to thrive in the understory and midstory. Unchecked, these species will shade out all other tree species and convert the stand to a climax condition.(*Pfister et al 1977)* In places, these species have already begun to become dominant and are replacing the historic timber types and preferred DFC species in the overstory. Growth and vigor of trees present in the analysis area would continue to decline as competition increases with canopy closure.

Action Alternative

Issue 1: Concern for maximizing the return to the PB and CS Trust Grants by intensively managing for healthy and biologically diverse forests.

The proposed action alternative would harvest timber on approximately 406 acres. The proposed action would produce an estimated $557,172.00 for the PB Trust Grant and $41,148.00 for the CS Trust Grant. As well as approximately $68,137.48 in FI Fees. Harvesting would focus on removal of diseased, suppressed, poorly formed and shade tolerant species.

Harvest prescriptions would be designed to emulate historic fire regimes and encourage natural regeneration of historic timber types and desired future condition species. The proposed project area would be evaluated to determine the need for supplemental planting within 5 years of harvest.

Issue 2: Concern about minimizing losses in timber volume from mortality due to insect and disease outbreaks, thereby improving forest health and reducing wildfire susceptibility.

The current activity of insects and disease would be reduced by removal of infected and infested timber and converting the project area to a stand that is not desirable to insects. Retention of healthy individuals would continue to provide healthy and disease resistant natural regeneration on the site. Growth and vigor of the residual stand would be expected to increase as residual tree spacing would allow full light to crowns and more available water. Additionally the healthier, more open residual stand would be more resistant to future beetle infestation and disease outbreaks (*Hagle et al. 2003).*

Wildfire susceptibility would be expected to decrease through harvest activities and removal of dead and dying timber. Available fuel would be reduced by removal of ladder fuels from the understory and intermediate components of the stand, as well as opened crown spacing in the overstory component.

Issue 3: Concern regarding the continued presence and / or re-establishment of DFC and historically appropriate timber types on Trust Lands.

Under the Action Alternative, mixed conifer cover types would decrease in favor of western larch/Douglas-fir and ponderosa pine, resulting in a cover type distribution within the project area that more closely reflects DFC when compared to current conditions and the No-Action Alternative.

Cumulative Effects

No Action Alternative

Issue 1: Concern for maximizing the return to the PB and CS Trust Grants by intensively managing for healthy and biologically diverse forests.

No forest management activities would occur under this alternative, no returns for the PB or CS trust grants or the FI account would be generated. Forest health and biodiversity across the Plains Unit can be expected to decline slightly.

Issue 2: Concern about minimizing losses in timber volume from mortality due to insect and disease outbreaks, thereby improving forest health and reducing wildfire susceptibility.

Stand structure and species composition on state land across the Plains Unit will shift towards a shade tolerant, climax condition. Fuel loadings and wildfire risk are expected to continue to increase due to tree mortality from insects and disease outbreaks.

Issue 3: Concern regarding the continued presence and / or re-establishment of DFC and historically appropriate timber types on Trust Lands.

Across the Plains Unit there would be a shift away from DFC and towards climax conditions. A gradual loss of historically present timber types can be expected.

Action Alternative

Under the Action Alternative, timber harvest and related activities would occur on approximately 406 acres of the Plains Unit. These changes would have a minor impact on the landscape of the Plains Unit, changing less than one percent of the total land area.

Issue 1: Concern for maximizing the return to the PB and CS Trust Grants by intensively managing for healthy and biologically diverse forests.

The proposed action would produce an estimated $557,172.00 for the PB Trust Grant and $41,148.00 for the CS Trust Grant. As well as approximately $68,137.48 in FI Fees. Forest composition and biodiversity would be expected to improve slightly across the Plains Unit.

Issue 2: Concern about minimizing losses in timber volume from mortality due to insect and disease outbreaks, thereby improving forest health and reducing wildfire susceptibility.

Forest health would be improved and the instance of insects and disease mortality would be decreased slightly across the Plains unit. A slight decrease in wildfire risk is expected.

Issue 3: Concern regarding the continued presence and / or re-establishment of DFC and historically appropriate timber types on Trust Lands.

Across the Plains Unit there would be a slight shift towards DFC as the proposed treatment and implementation of current and future timber sales on the Plains Unit would alter cover types toward DFC.

References:

- Losensky, J. 1997. Historical Vegetation of Montana. Contact #970900. Montana DNRC. Missoula, MT. 109pp.

- Pfister, R., B. Kovalchik, S. Arno, and R. Presby. 1977. Forest habitat types of Montana. USDA For. Serv. Gen. Tech. Rep INT-34. Intermountain Forest and Range Experiment Station Ogden, Utah. 41 – 45pp.

- Hagle, S.K. Gibson, K.S. Tunnock S. 2003. Field guide to diseases and insect pests of northern and central rocky mountain conifers. USDA Forest Service, Northern Region. Missoula, Montana.

- P. Green, 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.

Wildlife Analysis

INTRODUCTION

The wildlife analysis is designed to disclose the existing condition of wildlife resources and the anticipated direct, indirect, and cumulative effects that may result from implementing the No-Action and Action alternatives. The following issue statements were developed from concerns raised by DNRC specialists received during scoping, and will be addressed in the following analysis:

- **Mature forest cover and connectivity.** The proposed activities could decrease mature forested cover, which could reduce habitat connectivity and suitability for wildlife species associated with mature forests.
- **Snags and coarse woody debris.** The proposed activities could reduce the availability of snags and coarse woody debris and increase human access for firewood harvesting, which could adversely affect the quality of wildlife habitat.
- **Canada lynx.** The proposed activities could reduce landscape connectivity and the availability of suitable Canada lynx habitat, reducing the capacity of the area to support Canada lynx.
- **Fishers.** The proposed activities could reduce the availability and connectivity of suitable fisher habitat and increase human access, which could reduce fisher habitat suitability and increase trapping mortality.
- **Flammulated owls.** The proposed activities could alter the structure of flammulated owl preferred habitat types, which could reduce habitat suitability for flammulated owls.
- **Pileated woodpeckers.** The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers.
- **Big game.** The proposed activities could reduce cover, which could reduce the quality of big game winter range habitat.

ANALYSIS AREAS

Direct and Indirect Effects

The direct and indirect effects of the proposed activities on all species/issues were analyzed within the project area (*FIGURE W-1 –ANALYSIS AREAS*), which consists of 462acres of DNRC-managed lands in T19N, R26W Sections 6, 14, and 22.

Cumulative Effects

The cumulative effects of the proposed activities on all species/issues were analyzed at a broad surrounding landscape scale. Analysis areas are summarized in *TABLE W-1 –ANALYSIS AREAS* and *FIGURE W-1 –ANALYSIS AREAS*. The Wildlife Cumulative Effects Analysis Area (CEAA) includes the project area as well as lands managed by other agencies and private landowners. Detailed descriptions of each analysis area are located in the ***Existing Condition*** section for each issue or wildlife species evaluated.

TABLE W-1. ANALYSIS AREAS. Descriptions of the project area and CEAAs.

ANALYSIS AREA NAME	DESCRIPTION	TOTAL ACRES	ISSUE(S)/SPECIES ANALYZED

Project Area	DNRC managed lands in T19N, R26W Sections 6, 14, and 22.	462	direct & indirect effects for all issues/species
Wildlife CEAA	The Miller Creek Subwatershed and portions of the Clark Fork River- Plains Subwatershed	17,514	mature forests and connectivity, snags and coarse wood debris, Canada lynx, pileated woodpeckers, big game winter range

ANALYSIS METHODS

Analysis methods are based on DNRC State Forest Land Management Rules, which are designed to promote biodiversity. The primary basis for this analysis included information obtained by: field visits, review of scientific literature, Montana Natural Heritage Program (MNHP) data queries, DNRC Stand Level Inventory (SLI) data analysis, aerial photograph analysis, and consultation with professionals. The coarse-filter wildlife analysis section includes analyses of the direct, indirect and cumulative effects of the proposed alternatives on old-growth forest, connectivity of mature forested habitat, and snags and coarse woody debris. In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species federally listed under the Endangered Species Act, species listed as sensitive by DNRC, and species managed as big game by Dept. of Fish Wildlife and Parks (DFWP).

Cumulative effects analyses account for known past and current activities, as well as planned future agency actions. Recent timber sale projects (≤20 years) that could contribute to cumulative effects are summarized in TABLE W-2 RECENT PROJECTS.

***TABLE W-2. RECENT PROJECTS*.** Recent projects that could contribute to cumulative effects and the number of harvested acres that occur in each analysis area.

Sale Name	Agency	Sale Date/Status	Project Area	Wildlife CEAA
Blacktail Ridge Salvage	DNRC	2013/Ongoing	0	79

Previous timber sales that occurred on USFS and private lands are accounted for by examining aerial photographs.

RELEVANT AGREEMENTS, LAWS, PLANS, RULES, AND REGULATIONS

Various policy and procedural documents provide the foundation for management criteria pertaining to wildlife and their habitat on state lands. The documents most pertinent to this project include: *DNRC Forest Management Rule*s, *DNRC Forested Trust Lands Final Environmental Impact Statement and Habitat Conservation Plan (USFWS and DNRC 2010)*, the *Endangered Species Act*, the *Migratory Bird Treaty Act*, and the *Bald and Golden Eagle Protection Act.*

COARSE-FILTER WILDLIFE ANALYSIS

Analysis of the anticipated effects of the proposed activities on mature forested cover and connectivity, and snags and coarse woody debris are discussed in detailed analyses below. Old-growth was not present in the proposed project area, thus effects to old-growth forests will not be discussed in further detail.

MATURE FORESTED HABITATS AND CONNECTIVITY

Issue: The proposed activities could decrease mature forested cover, which could reduce habitat connectivity and habitat suitability for wildlife species associated with mature forests.

Introduction

Mature forests characterized by large diameter trees and dense canopy cover provide many wildlife species with food, shelter, breeding sites, and travel corridors. Historically, the spatial configuration of mature forested habitats in the western United States was shaped by natural disturbance events, primarily wildfire, blowdown, and pest outbreaks. Natural disturbance events resulted in a mosaic-like spatial configuration of forest patches varying in age, species composition, and development. Spatial configuration, including patch size and connectivity of forested habitat, is important for many wildlife species. Patch size may affect the distribution of wildlife species that are attracted to, or avoid forest edges. Additionally, connectivity of mature forested habitats may facilitate movements of wildlife species that avoid openings in canopy cover. For example, discontinuous mature forested habitat would negatively affect movements of fisher, which avoid large openings in canopy cover. Timber harvest, like wildfire and blowdown, is a disturbance event that often creates open patches of young, early-successional habitats. Forest management considerations for wildlife species dependent on mature forested habitat include providing well-connected patches of habitat with ≥40% canopy cover.

Analysis Areas

The analysis area for direct and indirect effects is the 462-acre project area (*FIGURE W-1 – ANALYSIS AREAS*). The analysis area for cumulative effects is the 17,514-acre Wildlife CEAA described in *TABLE W-1 –ANALYSIS AREAS* and depicted in *FIGURE W-1 –ANALYSIS AREAS*. The Wildlife CEAA is defined by geographic features and represents an area large enough to support a diversity of species that use mature forested habitat and/or require connected forested habitat.

Analysis Methods

Analysis methods for mature forested habitats and landscape connectivity include field evaluations and Geographical Information System (GIS) analysis of aerial-photographs, DNRC stand level inventory data (SLI), and U.S. Forest Service (USFS) canopy cover data (VMap 9.1.1). Mature forested habitat is defined here and in the remainder of the document as forest stands with ≥40% canopy cover comprised primarily of trees that are on average >9 inches dbh. Forested stands containing trees of at least this size and density were considered adequate for providing minimal conditions necessary to facilitate movements of many wildlife species that benefit from well-connected mature forest conditions across the landscape. Factors considered in the analysis include: 1) the degree of timber harvesting, 2) availability and patch size of mature forested habitat (≥40% canopy cover, trees >9 inches dbh average), 3) open and restricted road density, and 4) the availability of potential travel corridors.

Existing Conditions

<u>Mature Forested Habitats and Connectivity</u>

The project area contains approximately 422 acres of mature stands composed primarily of Douglas-fir, ponderosa pine, and Douglas-fir-larch stands (92.3% of project area) (*TABLE W-3 – MATURE FOREST*). The remaining 40 acres consist primarily of mature stands with <40% canopy cover. Average patch size of mature forested habitat in the project area is 105 acres. However, this is due the scattered distribution of parcels that make up the project area rather than fragmentation of mature forested habitat. Mature forested habitat occurs in one large patch in each of the four parcels that make up the project area, potentially facilitating travel of wildlife species that prefer mature forested habitat (*FIGURE W-1 –ANALYSIS AREAS*). Mature canopy cover ranges from low (40% closure) to high (90% closure) and the project area likely provides suitable habitat for species requiring connected and/or mature habitats. Tributaries to Combest Creek occur in Section 22, which may facilitate wildlife movements between the project area and adjacent stands of mature forested habitat. Travel corridors can be adversely influenced by reductions in vegetative cover, increased human development, and increases in roads and human access. The network of open and restricted roads in the project area has reduced some landscape connectivity. Open road density and total road density in the project area are moderate (open road density: 1.9 miles/square mile, total road density: 2.8 miles/square mile).

The Wildlife CEAA contains 5,403 acres (30.9% of analysis area) of mature stands (>9 inches dbh average) with ≥40% canopy cover (*TABLE W-3 –MATURE FOREST*). The remaining acres in the Wildlife CEAA consist of approximately 2,017 acres of mature forested habitat with 10-39% canopy cover; 620 acres of non-forested habitat including wetlands and steep, slopes, and farm fields; and approximately 9,747 acres of young stands. Connectivity of mature forested habitat is greatest in the southern portion of the project area in the vicinity of USFS lands. Miller and Combest creeks provide important travel corridors connecting these lands to habitat located in the valley. Outside of USFS lands, the connectivity of mature forested habitat is low due to the history of timber harvest on private lands (*FIGURE W-1 –ANALYSIS AREAS*). The network of open roads has reduced some landscape connectivity. Open and seasonally restricted road density in the Wildlife CEAA is high (3.1 miles/square mile) and total road density is high (4.6 miles/square mile).

TABLE W-3 -MATURE FOREST. Average patch size and acreage of mature forested habitat (≥40% canopy cover, trees >9 inches dbh) pre- and post-harvest in the project area and Wildlife CEAA for the Combest Parcels Timber Sale. Percent of the total corresponding analysis area is in parentheses.

ANALYSIS AREA	AVERAGE PATCH SIZE		TOTAL ACRES OF MATURE FOREST	
	Existing	Post-harvest	Existing	Post-harvest
Project Area -- 462 Acres (% of area)	105	8	421 (92.1%)	47 (10.2%)
Wildlife CEAA – 17,514 Acres (% of area)	123	107	5,403 (30.8%)	5,028 (28.7%)

Environmental Effects

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

None of the proposed forest management activities would occur. Forests would continue to age and dense stands of shade-tolerant trees would continue to develop. Patch size and the availability of mature forested habitat would likely increase over time, increasing connectivity. Thus, since: 1) no appreciable change in the abundance, patch size, or suitability of mature forested habitat would occur, 2) no changes in open or restricted road density would occur, and 3) no changes in the availability of travel corridors would occur; no direct or indirect effects to mature forested habitat abundance, suitability, or connectivity would be anticipated as a result of the No-Action Alternative.

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

The proposed activities would occur in 375 (88.9%) of the 422 acres of mature stands available in the project area (*TABLE W-3 –MATURE FOREST*). The seed tree with reserves (125 acres) and shelterwood with reserves (250 acres) treatments proposed for these stands would retain approximately 2-5%, and 5-10% mature canopy cover, respectively. The majority of these stands were likely open ponderosa pine and Douglas-fir forest types pre-settlement, and the intent of these prescriptions is to favor these species and to move the stands toward historic conditions. Average patch size would decrease by 97 acres and mature forest stands would be retained mostly in riparian areas and other portions of the project area that are difficult to access. Approximately 3.1 miles of road are proposed for construction; however, these roads would be closed to the public post-harvest. Approximately 9 acres of riparian habitat associated with streams in Section 22 would be harvested; however, a travel corridor centered on the stream at least 100-feet wide would be retained, maintain some connectivity. See WATER RESOURCES section in this document for additional information. Connectivity of upland mature forest within the proposed project area would be reduced, especially in sections 14 and 6 where there are not any streams. Thus, since: 1) the abundance of mature forested habitat would decrease by 375 acres (88.9% of existing mature forest); 2) average patch size of mature forested habitat would decrease by 97 acres; 3) approximately 3.1 miles of restricted roads would be constructed; 4) 9 acres of riparian habitat would be harvested, but corridors along these streams would be retained; and 5) overall connectivity of mature forested habitat would decrease; high adverse direct or indirect effects to mature forested habitat abundance, suitability, or connectivity would be anticipated as a result of the Action Alternative.

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

None of the proposed forest management activities would occur. Forests in the project area would continue to age, and dense stands of shade-tolerant trees would continue to develop. Connectivity would not be affected under this alternative. Other proposed or ongoing activities within the Wildlife CEAA could affect the abundance, suitability, and connectivity of mature forested habitats. Thus, since: 1) no appreciable change in the abundance, patch size, or suitability of mature forested habitat would occur associated with this alternative, 2) no changes in open or restricted road density would occur, and 3) no changes in the availability of travel corridors would occur; no additional cumulative effects to mature forested habitat abundance, suitability or connectivity would be anticipated as a result of the No-Action Alternative.

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

The proposed activities would affect 375 acres of the 5,403 acres (6.9%) of mature forested habitat available in the Wildlife CEAA. The proposed activities would open the timber stands to 2-10% canopy cover and would favor the retention of ponderosa pine, Douglas-fir, and western larch. Reductions in the availability of suitable mature forested habitat would be additive to

harvest activities that are proposed or ongoing in the Wildlife CEAA (see ***ANALYSIS METHODS*** section of the Introduction for a detailed description of projects). However, the only ongoing timber sale in the area is focusing on trees burned in the Blacktail Ridge Fire of 2012 and is not anticipated to affect mature forested habitat or connectivity. Additionally, these projects would not occur concurrently. Approximately 3.1 miles of restricted roads are proposed for construction in the project area and 9 acres of riparian habitat associated with streams would be harvested (see WATER RESOURCES section in this document for additional information). Due to the effect of land ownership patterns in the Wildlife CEAA, the proposed activities would not fragment mature forest stands by isolating stands. The scattered parcels in the project area are mostly adjacent to Plum Creek lands, where little mature forested habitat has been retained; thus, the effect of the proposed harvest on overall connectivity would be minor. Thus, since: 1) the abundance of mature forested habitat would decrease by 375 acres (6.9% of existing mature forest); 2) average patch size of mature forest would decrease by 16 acres; 3) 3.1 miles of restricted roads are proposed for construction; 4) 9 acres of riparian habitat associated with streams would be harvested; and 5) overall connectivity of mature forested habitat would decrease; minor adverse cumulative effects to mature forested habitat abundance, suitability, or connectivity would be anticipated as a result of the Action Alternative.

SNAGS AND COARSE WOODY DEBRIS

Issue: The proposed activities could reduce the availability of snags and coarse woody debris and increase human access for firewood harvesting, which could adversely affect the quality of wildlife habitat.

Introduction

Snags and coarse woody debris are important components of forest ecosystems that provide the following functions: 1) increase structural diversity, 2) alter the canopy microenvironment, 3) promote biological diversity, 4) provide important habitat substrates for wildlife, and 5) act as storehouses for nutrient and organic matter recycling agents (*Parks and Shaw 1996*). Coarse woody debris, snags, and defective trees (i.e., partially dead, spike top, broken top) are used by a wide variety of wildlife species for foraging, nesting, roosting, and cover. Primary cavity users (i.e., woodpeckers) excavate nesting and roosting cavities in snags. These cavities are used as nesting, roosting, and resting sites by a variety of secondary cavity users, such as small mammals and birds, which are unable to excavate their own cavities. Habitat value of snags for wildlife varies according to tree species, diameter, and snag density. Thick-barked species (e.g., western larch and ponderosa pine) tend to provide high quality snag habitat. Snag diameter is important because many species that nest in smaller diameter snags will also use large snags; however, the opposite is not true. Coarse woody debris habitat value varies according to size, length, decay, and distribution. Single, scattered downed trees may provide access under the snow for small mammals and weasels, while log piles may provide secure areas for snowshoe hares. Timber harvest may affect the abundance and spatial distribution of snags and coarse woody debris by direct removal for commercial value or for human safety purposes, or indirectly by increasing human access for firewood harvesting.

Analysis Areas

The analysis area for direct and indirect effects is the 462-acre project area (*FIGURE W-1 – ANALYSIS AREAS*). The analysis area for cumulative effects is the 17,514-acre Wildlife CEAA described in *TABLE W-1 –ANALYSIS AREAS* and depicted in *FIGURE W-1 –ANALYSIS AREAS*. The Wildlife CEAA is defined by geographic features and represents an area large enough to support a diversity of species that use coarse woody debris and snags.

Analysis Methods

The abundance of snags and coarse-woody debris was quantitatively estimated in the project area using 9 systematically-placed fixed plots (each 100 feet x 66 feet). Coarse woody debris tons/acre was estimated for material ≥3 in diameter where it intersected the 100-ft transect line according to methods described by Brown (*1974*). Snags per acre were estimated by recording all snags ≥8 in dbh and ≥6 ft tall located within in each plot. Factors considered in the analysis include: 1) the level of harvesting, 2) availability of snags and coarse woody debris, and 3) risk of firewood harvesting.

Existing Conditions

During field assessments, 9 snags/acre ≥8 inches dbh were observed (range: 0-26 snags/acre) and 2 snags >21 inches dbh occurred within sample plots. The majority of snags observed were Douglas-fir and ponderosa pine and wildlife use of snags was observed throughout the project area. Coarse woody debris levels ranged from 1-30 tons/acre across the project area, but averaged 7 tons/acre. Firewood harvesting has likely reduced the availability of coarse woody debris and snags along open roads in the project area. Overall, firewood cutting risk is currently moderate due to accessibility of the project area (1.9 miles/square mile open road density, 2.8 miles/square mile total road density).

In the Wildlife CEAA, snag and coarse woody debris levels on surrounding parcels vary widely depending on motorized access, harvest history, and natural disturbance history. Snag and coarse woody debris availability is likely somewhat limited on 10,841 acres (61.8% of the Wildlife CEAA) that are privately owned and have history of timber harvest. Snags and coarse woody debris are frequently collected for firewood in the Wildlife CEAA, especially near open roads. Thus snag and coarse-woody debris availability is likely highest in the Miller Creek drainage where there are few open roads. Overall, road density in the Wildlife CEAA is high (3.1 miles/square mile open road density, 4.6 miles/square mile total road density) and provides accessibility for firewood cutting.

Environmental Effects

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

None of the proposed forest management activities would occur. Existing snags would continue to provide wildlife habitat, and new snags would be recruited as trees die. Thus, since: 1) no timber harvesting would alter present or future snag or coarse woody debris abundance, and 2) no changes to human access for firewood harvesting would occur; no direct or indirect effects to snags and coarse woody debris availability or associated wildlife habitat quality would be anticipated as a result of the No-Action Alternative.

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

Some existing snags and snag recruits would be removed from 406 acres within the project area due to timber felling operations. Additional recruitment trees and snags may also be lost following timber harvest due to wind throw. Given operability and human safety constraints, existing non-merchantable snags would be left standing where possible. Across the project area, at least 2 large snags and 2 large recruitment trees (>21 inches dbh) per acre would be retained within DNRC harvest units (*ARM 36.11.411*). If such large trees and snags are absent, the largest available snags and/or recruitment trees would be retained. Additionally, 10-20 tons/acre of coarse woody debris would be retained according to DNRC Forest Management Rules (*ARM 26.11.414*). Firewood cutting risk in the project area would not change following the proposed harvest because no additional open roads are proposed for construction. Thus,

since: 1) proposed actions would remove some snags and minimally influence the amount of coarse woody debris on 406 acres (87.9% of project area), 2) accessibility for firewood harvesting would not change, and 3) snags and coarse woody debris would be retained to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*); minor adverse direct and indirect effects to snags and coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the Action Alternative.

Cumulative Effects of the No-Action Alternative on Snags and Coarse Woody Debris
None of the proposed forest management activities would occur. No changes in the availability of snags and coarse woody debris would be expected. Existing snags would continue to provide habitat attributes, and new snags would be recruited as trees die. Ongoing and proposed forest management activities may affect the availability of snags and coarse woody debris in the Wildlife CEAA; however, no changes would be expected within the project area under the No-Action alternative. Thus, since: 1) no timber harvesting on DNRC lands would alter present or future snag or coarse woody debris abundance, and 2) no changes to human access for firewood harvesting would occur; no additional cumulative effects to snags and coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Snags and Coarse Woody Debris
Some existing snags and snag recruits would be removed from the 406 acres (2.3% of analysis area) proposed for harvest within the Wildlife CEAA, but retention measures would apply (*ARM 36.11.411, ARM 26.11.414*). Reductions in the availability of coarse woody debris and snags would be additive to forest management activities occurring in the CEAA (see ***ANALYSIS METHODS*** section of the Introduction for a detailed description of recent projects). Ongoing and proposed DNRC Timber Sales are anticipated to affect approximately 485 acres within the Wildlife CEAA (2.8% of the Wildlife CEAA). Additional timber sales may occur on privately owned lands in the Wildlife CEAA, although DNRC is currently unaware of any proposed activities. Firewood cutting risk in the large CEAA would not change due to DNRC activities under the Action Alternative because no additional open roads are proposed for construction. Thus, since: 1) proposed actions would be additive to ongoing and proposed activities that would remove snags, snag recruits, and coarse woody debris from up to 485 acres (2.3% of the Wildlife CEAA); 2) accessibility for firewood harvesting would not change; and 3) snags and coarse woody debris would be retained in amounts required to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*); minor adverse cumulative effects to snags and coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the Action Alternative.

FINE-FILTER WILDLIFE ANALYSIS

The fine-filter wildlife analysis discloses the existing conditions of wildlife resources and the anticipated direct, indirect, and cumulative effects that may result from the No-Action and Action alternatives. Wildlife species considered include: 1) species listed as threatened or endangered under the Endangered Species Act of 1973, 2) species listed as sensitive by DNRC, and 3) species managed as big game by DFWP. TABLE W-4 –FINE-FILTER provides an analysis of the anticipated effects for each species.

TABLE W-4 –FINE-FILTER. Anticipated effects of the Combest Parcels Timber Sale on wildlife species. For several species, more detailed analysis is provided below where indicated.

SPECIES/HABITAT	EFFECTS ASSESSMENT

THREATENED & ENDANGERED SPECIES	
Canada lynx (*Felis lynx*) Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zones	***Detailed Analysis Provided Below*** – The project area contains 231 acres of suitable lynx habitat.
Grizzly bear (*Ursus arctos*) Habitat: Recovery areas, security from human activity	The project area is located outside of recovery zone and non-recovery occupied habitat (*USFWS 1993, Wittinger 2002*) and grizzly bears have not been observed in the vicinity of the project area (*MNHP data, Oct. 15, 2013*).
SENSITIVE SPECIES	
Bald eagles (*Haliaeetus leucocephalus*) Habitat: Late-successional forest less than 1 mile from open water	The project area is located within the home range of two bald eagle territories around nests located on the Clark Fork River, both of which were active as of April 2013. The project area is located > 2.2 miles from the nest sites and outside of the more sensitive nest area and primary use management zones and outside of preferred eagle habitat located along the Clark Fork River. New open roads would not be constructed in the portions of the project area that coincide with the bald eagle home ranges and large emergent snags and trees would be retained throughout the project area. Considering the distance between the nests and the proposed harvest units, and the lack of preferred eagle habitat in the project area, negligible adverse direct, indirect, and cumulative effects to bald eagles would be anticipated as a result of the proposed activities.
Black-backed woodpeckers (*Picoides arcticus*) Habitat: Mature to old burned or beetle-infested forest	The project area is located within 0.25 miles of forest burned in the Blacktail Ridge Fire of 2012. No burned timber is proposed for harvest and the project area is located outside of the burn perimeter. To minimize disturbance to nesting black-backed woodpeckers, mechanized activity within 0.25 miles of burned forested stands would be restricted from April 15- July 1st. Thus, considering that burned timber would not be affected and a timing restriction would minimize the potential for disturbing black-backed woodpeckers, negligible adverse direct, indirect, or cumulative effects to black-backed woodpeckers would be anticipated.
Coeur d'Alene salamanders (*Plethodon idahoensis*) Habitat: Waterfall spray zones, talus near cascading streams	No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.

Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*) Habitat: Grassland, shrubland, riparian, agriculture	No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
Common loons (*Gavia immer*) Habitat: Cold mountain lakes, nest in emergent vegetation	No suitable lake habitat occurs within 500 feet of the project area. Thus, no direct, indirect, or cumulative effects to common loons would be expected to occur as a result of either alternative.
Fishers (*Martes pennanti*) Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	***Detailed Analysis Provided Below*** – Approximately 165 acres of suitable fisher habitat occur within the project area.
Flammulated owls (*Otus flammeolus*) Habitat: Late-successional ponderosa pine and Douglas-fir forest	***Detailed Analysis Provided Below*** – Approximately 231 acres of flammulated owl preferred cover types occur within the project area.
Gray wolves (*Canis lupus*) Habitat: Ample big game populations, security from human activities	No rendezvous or den sites are located within 1 mile of the project area (*K. Laudon, DFWP, wolf management specialist, pers. comm., November 22, 2013*) and wolf home ranges are not located within 5 miles of the project area (*DFWP wolf pack data, 2012*). Thus, no direct, indirect, or cumulative effects to gray wolves would be expected to occur as a result of either alternative.
Harlequin ducks (*Histrionicus histrionicus*) Habitat: White-water streams, boulder and cobble substrates	Potentially suitable high-gradient stream habitat does not occur within 0.5 miles of the project area. Thus, no direct, indirect or cumulative effects to harlequin ducks would be anticipated.
Northern bog lemmings (*Synaptomys borealis*) Habitat: Sphagnum meadows, bogs, fens with thick moss mats	Potentially suitable wetlands do not occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
Peregrine falcons (*Falco peregrinus*) Habitat: Cliff features near open foraging areas and/or wetlands	Suitable cliffs/rock outcrops for nest sites were not observed in the project area or within 0.5 miles of the project area. Additionally, peregrine eyries have not been documented in the vicinity of the project area (*MNHP data, Oct. 15, 2013*). If a nest is documented in the project area timing restrictions would apply. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.

Pileated woodpeckers (*Dryocopus pileatus*) Habitat: Late-successional ponderosa pine and larch-fir forest	***Detailed Analysis Provided Below*** – Approximately 111 acres of suitable pileated woodpecker habitat occur in the project area.
Townsend's big-eared bats (*Plecotus townsendii*) Habitat: Caves, caverns, old mines	No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats would be expected to occur as a result of either alternative.
Wolverine (*Gulo gulo*) Habitat: Alpine tundra and high-elevation boreal and coniferous forests that maintain deep persistent snow into late spring	No high-elevation habitat with persistent spring snow pack occurs in the project area. Thus, no direct, indirect or cumulative effects to wolverines would be expected to occur as a result of either alternative.
BIG GAME	
Elk (*Cervus canadensis*)	***Detailed Analysis Provided Below*** – The project area contains potential elk, mule deer, and white-tailed deer winter range habitat as identified by DFWP (*DFWP 2008*).
Mule Deer (*Odocoileus hemionus*)	
White-tailed Deer (*Odocoileus virginianus*)	

THREATENED AND ENDANGERED SPECIES

CANADA LYNX

Issue: The proposed activities could reduce landscape connectivity and the availability of suitable Canada lynx habitat, reducing the capacity of the area to support Canada lynx.

Introduction

Canada lynx are medium-size cats that prey primarily on snowshoe hares (*Ruediger et al. 2000*). Lynx foraging habitat in western Montana consists of a mosaic of young coniferous stands and mature forested stands with high levels of horizontal cover, which provide snowshoe hare habitat (*Squires et al. 2010*). Additionally, lynx typically avoid large openings in overhead canopy cover in the winter; hence, densely forested cover that is well connected is important for travel and security (*Squires et al. 2010*). Canada lynx are federally listed as a threatened species. Forest management considerations for lynx include providing a mosaic of well-connected young and mature forest stands.

Analysis Areas

The analysis area for direct and indirect effects is the 462-acre project area (*FIGURE W-1 – ANALYSIS AREAS*). The analysis area for cumulative effects is the, 17,514-acre Wildlife CEAA described in *TABLE W-1 –ANALYSIS AREAS* and depicted in *FIGURE W-1 –ANALYSIS AREAS*. The Wildlife CEAA is defined by topographic features and incorporates the project

area, providing a reasonable analysis area for lynx that could be affected by project related activities.

Analysis Methods

Analysis methods include field evaluations, aerial photograph interpretation, and GIS analysis of SLI data and suitable lynx habitat. Lynx habitat was subdivided into the following habitat classes: 1) winter foraging, 2) summer foraging, 3) other suitable, and 4) temporary non-habitat. Habitat classes were classified according to lynx habitat mapping protocols (*USFWS and DNRC 2010*) based upon a variety of vegetation characteristics important to lynx and snowshoe hares (i.e., forest habitat type, canopy cover, stand age class, stems/acre, etc.). Other suitable lynx habitat is defined as habitat that has the potential to provide connectivity and lower quality foraging habitat, but does not contain the necessary attributes to be classified as winter or summer foraging habitat classes. The temporary non-habitat category consists of forested stands that are not expected to be used by lynx until suitable horizontal cover develops. Factors considered in the analysis include: 1) the level of harvesting, 2) the availability of suitable lynx habitat classes, and 3) landscape connectivity.

Existing Conditions

The project area contains 231acres of suitable lynx habitat (*TABLE W-5–LYNX HABITAT*). The acres of suitable lynx habitat consist primarily of grand fir and western red cedar stands occurring on cool, relatively moist, stream bottoms and north-facing slopes. The remaining 231 acres consists of dry ponderosa pine and Douglas-fir stands that are not preferred lynx cover types. Riparian habitat associated with streams in the project area likely provides some habitat connectivity for lynx (see *MATURE FORESTED COVER AND CONNECTIVITY* in the coarse filter analysis section for further information).

The Wildlife CEAA contains a total of 5,183 acres of suitable lynx habitats (29.6% of Wildlife CEAA) including 426 acres on DNRC-managed lands (TABLE W-5 –LYNX HABITAT) and 4,721 acres of mature forested habitat on other ownerships. The remaining 12,358 acres in the Wildlife CEAA consists primarily of stands that are not preferred lynx cover types and young stands that may not contain suitable structure for lynx use. Lynx were observed in the vicinity of the CEAA in the 1980s (*MNHP data, Oct. 31, 2013*). However, considering that less than 10 square miles of lynx habitat is available to support survival and reproduction, the area is not likely to support lynx (*Ruedinger et al. 2000*), although lynx may travel through the area. Additionally, the Wildlife CEAA historically, as well as currently, contains a large proportion of dry ponderosa pine and Douglas-fir habitat, which is unlikely to provide stand structure necessary for lynx use. Travel corridors exist in the Miller and Combest Creek drainages, although these riparian areas are narrow (<100 feet wide) in some locations. Connectivity is highest on USFS lands where mature forested habitat is intact and where shade-tolerant tree species are more likely to occur due to the higher elevation. Connectivity decreases at the northern end of the project area adjacent to the Clark Fork Valley where more open dry stand types occur and more intensive forest management has occurred.

TABLE W-5–LYNX HABITAT. Estimates of existing lynx habitat and lynx habitat that would remain post-harvest on DNRC lands in the project area and Wildlife CEAA. Values in parentheses refer to the percentages of each lynx habitat category of total potential lynx habitat[a] on DNRC-managed lands.

LYNX HABITAT CATEGORY	ACRES OF LYNX HABITAT (percent of total potential DNRC-managed lynx habitat)	
	Project Area	Wildlife CEAA

	Existing	Post-Harvest	Existing	Post-Harvest
Summer Forage	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Winter Forage	231 (100%)	38 (16.4%)	426 (96%)	234 (52.6%)
Other Suitable	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Temporary non-habitat	0 (0%)	193 (83.6%)	18 (4%)	211 (47.4%)
Grand Total - Suitable Lynx Habitat[b]	231 (100%)	38 (16.4%)	426 (96%)	234 (52.6%)

[a]Total potential lynx habitat describes all areas that contain appropriate habitat types for lynx (i.e., sum of summer forage, winter forage, other suitable, and temporary non-suitable lynx habitat classes) on DNRC lands.

[b]Total suitable lynx habitat describes all lynx habitat categories that contain structural attributes necessary for lynx use (i.e., sum of summer forage, winter forage, other suitable lynx habitat classes) on DNRC lands.

Environmental Effects

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

None of the proposed forest management activities would occur. Lynx habitat availability and habitat connectivity would not change. Thus, since: 1) no changes to lynx habitat availability would occur, and 2) no changes to landscape connectivity would occur; no adverse direct or indirect effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Canada Lynx

The proposed activities would affect 193 acres (83.6%) of the 231 acres of suitable lynx habitat available in the project area. After harvest, these acres would be reclassified as temporary non-suitable habitat due to lack of canopy cover in the understory and overstory (TABLE W-5LYNX HABITAT). Retention of ponderosa pine, Douglas-fir, and western larch would be emphasized to return the stands to forest types that were likely present in the area historically (see VEGETATION section in this document). To ensure that forest structural attributes preferred by snowshoe hares remain following harvest, dense patches of advanced regeneration would be retained where possible, especially within lynx winter forage habitat. Additionally, 10-20 tons/acre of coarse woody debris would be retained in accordance with DNRC Forest Management Rules (*ARM 36.11.414)* and retention of downed logs ≥15 inch diameter would be emphasized. Lynx habitat connectivity would be reduced due to the transition of 193 acres of suitable lynx habitat to temporary non-suitable habitat. However, some connectivity would be retained due to the retention of riparian vegetation in Section 22 (see the WATER RESOURCES section in this document for additional information). In the other parcels in the project area, existing lynx habitat would be removed, but considering that these parcels are isolated, surrounded by Plum Creek lands, and located in dry areas suitable for ponderosa pine forest types, connectivity would be minimally affected. If present in the vicinity of the project area, lynx could be temporarily displaced by forest management activities for up to 3 years due to disturbance caused by motorized activities. Thus, since: 1) lynx suitable habitat availability would be reduced by 83.6%; 2) patches of advanced regeneration would be retained where feasible, especially in winter forage habitat; 3) landscape connectivity would be reduced, but

effects to connectivity would be low due to the scattered distribution of the project area and the fragmented occurrence of suitable lynx habitat types; moderate adverse direct and indirect effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the Action Alternative.

Cumulative Effects of the No-Action Alternative on Canada Lynx
None of the proposed forest management activities would occur. Ongoing and proposed forest management activities may change the availability of suitable lynx habitats and landscape connectivity in the Wildlife CEAA. Thus, since: 1) no additional changes to lynx habitat type availability would occur, and 2) no additional changes to landscape connectivity would occur on DNRC lands, no additional cumulative effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Canada Lynx
The proposed activities would affect 193 acres (3.7%) of the 5,183 acres of potentially suitable lynx habitat available in the Wildlife CEAA. After harvest these acres would be considered temporary non-habitat due to lack of canopy cover in the understory and overstory. Dense patches of advanced regeneration would be retained where possible, especially within lynx winter foraging habitat. Approximately 10-20 tons/acre of coarse woody debris would be retained in accordance with DNRC Forest Management Rules (*ARM 36.11.414)* and retention of downed logs ≥15 inch diameter would be emphasized. Lynx habitat connectivity would be slightly reduced due to the transition of 193 acres of suitable lynx habitat to temporary non-suitable habitat. However, due to the low availability of lynx habitat and prevalence of dry open forest types in the Wildlife CEAA, overall connectivity would be minimally affected. Changes to lynx habitat type availability and habitat connectivity would be additive to proposed and ongoing projects (see ***ANALYSIS METHODS*** section of the Introduction for a detailed description of projects). However, the ongoing DNRC salvage of burned trees would not affect lynx habitat and would not occur concurrently with the proposed Combest Parcels Timber Sale. Lynx could be temporarily displaced by forest management activities associated with the Combest Parcels Timber Sale for up to 3 years. Thus, since: 1) lynx suitable habitat availability would be reduced by up to 193 acres (8.7% of potentially suitable lynx habitat in the Wildlife CEAA); 2) patches of advanced regeneration and shade-tolerant understory trees would be retained where feasible, especially in winter forage habitat; 3) given the lack of suitable habitat in the area and vegetation retention measures within riparian areas, effects to connectivity of lynx habitat would be minor; 4) due to the prevalence of open dry forest types and low availability of lynx habitat the area is not likely to support lynx home ranges; minor adverse cumulative effects to Canada lynx associated with landscape connectivity and suitable habitat type availability would be anticipated as a result of the Action Alternative.

SENSITIVE SPECIES

FISHERS

Issue: The proposed activities could reduce the availability and connectivity of suitable fisher habitat and increase human access, which could reduce habitat suitability and increase trapping mortality.

Introduction

In the Rocky Mountains, fishers prefer mesic late-successional forests with complex vertical and horizontal structure, large-diameter trees, and relatively dense canopies (*Schwartz et al. 2013;*

Raley et al. 2012). Fishers generally avoid large openings, clearcuts, and ponderosa pine and lodgepole pine stands (*Schwartz et al. 2013*). Fishers prey upon snowshoe hares, ungulate carrion, birds, and small mammals. Forest-management considerations for fishers involve providing upland and riparian resting and denning habitat, maintaining a network of travel corridors, and reducing trapping risk associated with motorized access.

Analysis Areas

The analysis area for direct and indirect effects is the 462-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the 17,514-acre Wildlife CEAA described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The CEAA is centered on the project area and is defined according to geographic features (i.e., ridgelines), which are likely to influence movements of fishers in the vicinity of the project area, providing a reasonable analysis area for fishers that could be influenced by project-related activities.

Analysis Methods

Analysis methods include field evaluations, aerial photograph interpretation, and GIS analysis of travel corridors, preferred fisher cover types (*ARM 36.11.403(60)*), and habitat structure. Fisher habitat classifications considered in the analysis include: 1) upland fisher habitat, and 2) riparian fisher habitat, which are defined according to proximity of the stand to streams. Riparian fisher habitat is located within 100 feet of Class 1 streams or within 50 feet of Class 2 streams (*ARM 36.11.440(b)*). The remaining fisher habitat is considered upland fisher habitat. Habitat structure considered appropriate for fisher use includes stands with 40-100% total stocking density. Potential fisher habitat (riparian, upland) on other ownerships was identified by examining mature forested habitat below 6,500 feet elevation and the proximity of mature forested habitat (≥40% cover, trees >9 inches dbh average) to perennial and intermittent streams. Factors considered in the analysis include: 1) the degree of harvesting, 2) availability and structure of preferred fisher habitats (upland, riparian), 3) landscape connectivity, and 4) human access.

Existing Conditions

The project area contains 165 acres (35.6% of project area) of preferred fisher cover types including 27 acres of riparian fisher habitat associated with Class 1 and 2 streams. All of these acres of preferred fisher habitat types in the project area contain structure necessary for fisher use (i.e., sawtimber size class ≥9 inches dbh, 40-100% crown density) and are considered suitable fisher habitat. The remaining acres in the project area consist of xeric ponderosa pine forest types that are avoided by fishers. Mature forested habitat present on 91.3% of the project area is continuous within each of the four parcels that make up the project area; however the connectivity of moist forest types preferred by fishers is low and likely has a limited capacity to support fisher populations. The density of open roads is 1.9 miles/square mile and total road density is 2.8 miles/square mile, thus there is moderate level of access that could facilitate trapping.

The Wildlife CEAA contains approximately 5,063 acres of fisher habitat (28.9% of analysis area), including 306 acres of suitable fisher habitat on DNRC-managed lands and an additional 4,757 acres of mature forested habitat on other ownerships located below 6,500 feet elevation, which are likely to provide suitable fisher habitat. Of these acres of potential fisher habitat, approximately 637 acres are riparian fisher habitat. The remaining 12,451 acres in the Wildlife CEAA consist primarily of young stands or poorly stocked stands that are unsuitable for fisher use. Fisher habitat is continuous in the southern portion of the Wildlife CEAA where USFS lands occur and is more fragmented in the northern portion of the analysis area where timber

stands tend to consist primarily of open, dry ponderosa pine and where there is more private land ownership; thus habitat is more fragmented in this area. According to trapping records, fishers have been documented in the vicinity of the Wildlife CEAA, although there are no records inside the Wildlife CEAA (*MNHP data, Oct. 31, 2013*). The density of open and seasonally restricted roads is 3.1 miles/square mile and total road density is 4.6 miles/square mile, thus there is a high level of access that could facilitate trapping at this scale.

Environmental Effects

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

None of the proposed forest management activities would occur. No changes to fisher habitat amounts or habitat connectivity would occur in the project area and no additional risk associated with trapping would be expected. Thus, since: 1) no change in the amounts or structure of preferred fisher habitats would occur, 2) no change in landscape connectivity would occur, and 3) no changes to human access would occur that would facilitate trapping; no direct or indirect effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Fishers

The proposed activities would affect 141 acres (86.0%) of the 165 acres of suitable fisher habitat present in the project area. Post-harvest, these stands would not retain adequate stocking density for fisher use. The availability of some important habitat characteristics (i.e., snags, coarse woody debris) could be reduced by harvest activities; although retention of dead-woody material and live snag recruitment trees would meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*). Approximately 8 acres of fisher riparian habitat would be affected by the proposed activities, and 7 of these acres would not contain structure suitable for fisher use post-harvest. However, a riparian corridor at least 100 feet wide would remain intact on all streams in the project area (see WATER RESOURCES for additional information). Approximately 3.1 miles of restricted, gated, roads would be constructed. Considering the extensive network of open roads already present in the vicinity of the proposed roads, accessibility of the area and trapping risk associated with human access would be minimally affected. Connectivity of mature forested habitat suitable for fisher use would decrease under the Action Alternative; however, the existing distribution of fisher habitat is patchy and travel corridors associated with riparian habitat would remain post-harvest. If present in the vicinity of the project area, fishers could be temporarily displaced by forest management activities for up 3 years. Thus, since: 1) fisher habitat availability would be reduced by 141 acres (86.0%), but some snags and coarse woody debris would be retained (*ARM 36.11.411, ARM 26.11.414);* 2) 8 acres of fisher riparian habitat would be affected, and 7 of these acres would not retain suitable structural attributes for fisher use; 3) landscape connectivity would be reduced, but riparian travel corridors would remain intact; 4) restricted roads would be constructed, but trapping risk would be unlikely to increase much considering the existing network of open roads; and 5) the project area and surrounding area was historically dominated by forest types typically avoided by fishers and currently contains little suitable habitat; moderate adverse direct and indirect effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the Action Alternative.

Cumulative Effects of the No-Action Alternative on Fishers

None of the proposed forest management activities would occur. Ongoing and proposed forest management projects within the Wildlife CEAA may influence fisher habitat availability, habitat structure, and landscape connectivity. Thus, since: 1) no change in the amount or structure of preferred fisher habitats would occur, 2) no change in landscape connectivity would occur, and 3) no changes to human access would occur that would facilitate trapping; no additional

cumulative effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Fishers

The proposed activities would affect 141 acres (2.8%) of the 5,062 acres of potential fisher habitat available in the Wildlife CEAA. These acres would not be suitable for fisher use post-harvest. The availability of some important habitat characteristics (i.e., snags, coarse woody debris) would be reduced by harvest activities, although retention of some dead material and live snag recruitment trees would be required to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*). Approximately 8 acres of fisher riparian habitat would be affected by the proposed activities, and 7 of these acres would not contain structure suitable for fisher use post-harvest. Connectivity of fisher habitat would be reduced; however, due to the low availability of fisher habitat on neighboring ownerships and the prevalence of dry, open forest types that are avoided by fishers, effects to connectivity would be minor. Additionally, travel corridors at least 100-feet wide would remain post-harvest along streams. Any adverse affects to fisher would be additive to proposed or ongoing sales in the Wildlife CEAA (see ***ANALYSIS METHODS*** section of the Introduction for a detailed description of projects). However, the ongoing DNRC Blacktail Ridge Salvage project would not affect fisher habitat and would not occur concurrently with the proposed Combest Parcels Timber Sale. Fishers could be temporarily displaced by forest management activities associated with the proposed Combest Parcels Timber Sale and any other activities in the Wildlife CEAA for up to 3 years. Thus, since: 1) fisher habitat availability would decrease by 141 acres (2.8%) following implementation of the Combest Parcels Timber Sale, 2) 8 acres of fisher riparian habitat would be affected and 7 of these acres would not be suitable for fisher use post-harvest; 3) given the lack of suitable habitat in the area and vegetation retention measures within riparian areas, connectivity of fisher habitat would be minimally affected; and 4) restricted roads would be constructed, but affects to trapping risk would be minimal considering the network of open roads in the vicinity of the new roads; minor adverse cumulative effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the Action Alternative.

FLAMMULATED OWLS

Issue: The proposed activities could alter the structure of flammulated owl preferred habitat, which could reduce habitat suitability for flammulated owls.

Introduction

Flammulated owls are small, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States (*McCallum 1994*). Flammulated owls are secondary cavity nesters, and typically nest in 12-25 inch dbh aspen, ponderosa pine, or Douglas-fir cavities excavated by pileated woodpeckers or northern flickers. Forest management considerations for flammulated owls include providing open, dry stands of ponderosa pine and Douglas-fir and retaining snags for nesting. Timber harvest may affect the structure of timber stands and reduce the availability of snags, potentially reducing habitat suitability for flammulated owls.

Analysis Area

The analysis area for direct and indirect effects is the 462-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the 17,514-acre Wildlife CEAA described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The Wildlife CEAA is defined according to geographic features (i.e., ridgelines) which may influence movements of local flammulated owls in the vicinity of the project area and

provides a reasonable analysis area for local flammulated owls that could be affected by project-related activities.

Analysis Methods

Analysis methods include field evaluations, aerial photograph interpretation, and GIS analysis of available habitat. In the project area, SLI data were used to identify preferred flammulated owl habitat types (*ARM 36.11.403(28*)). Stands were considered suitable for flammulated owl use if the stocking density of trees >9 inches dbh was in the poorly-stocked class (10-39% canopy cover). On non-DNRC lands, data identifying suitable flammulated owl habitat are not readily available. Therefore, GIS analysis of aerial-photographs was used to identify stands containing 10-39% canopy cover that were composed primarily of trees >9 inches dbh below 6,500 feet. These stands are likely to contain habitat types preferred by flammulated owls as well as matrix habitat. Factors considered in the analysis include: 1) the degree of harvesting, and 2) the structure of flammulated owl preferred habitat.

Existing Conditions

Flammulated Owls

The project area contains 231 acres (50.1% of project area) of cover types preferred by flammulated owls. This habitat is composed primarily of Douglas-fir and ponderosa pine stands. Approximately 7 acres (1.5% of project area) of the preferred flammulated owl cover types are poorly-stocked (10-39% canopy cover) and are likely to provide habitat attributes suitable for flammulated owl use. The remaining 224 acres of preferred flammulated owl cover types in the project area are not likely to provide suitable structural attributes for use by flammulated owls due to high stocking density of trees. Snag density in the project area is currently moderate, suggesting that nesting trees are available in portions of the project area (see *SNAGS AND COARSE WOODY DEBRIS* in the coarse-filter analysis section for additional information).

The Wildlife CEAA contains approximately 2,217 acres (12.7% of Wildlife CEAA) of mature open forested conditions (10-39% canopy cover, 9 inches dbh average), which includes 248 acres of DNRC-managed flammulated owl habitat and 1,969 acres of open mature forested habitat on other ownerships. The remaining acres consist of approximately 5,403 acres (32.0% of analysis area) of mature forest that are too dense for appreciable flammulated owl use, 9,360 acres (53.4% of analysis area) of young stands with <10% mature canopy cover, and 624 acres (3.6% of analysis area) of open permanent non-forest areas. Open and seasonally restricted road density in the CEAA is high (3.1 miles/square mile) and total road density is high (4.6 miles/square mile). Due to motorized access and the harvesting history in the CEAA, average stand age is young and snag availability for flammulated owl nesting is likely limited.

Environmental Effects

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

None of the proposed forest management activities would occur. Timber harvest would not occur in preferred flammulated owl habitat. Thus, since there would be no change in the structure of preferred flammulated owl habitat, no direct or indirect effects to flammulated owl habitat suitability would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Flammulated Owls

Timber harvest would occur in 213 of the 231 acres (92.2%) of preferred flammulated owl cover types available in the project area. The proposed activities would open stands to 2-10% canopy cover, which is more open than what is ideal for flammulated owls, but the treatments would improve stand structure suitability in stands that are currently well-stocked. Additionally, the proposed harvest would focus on returning the stand to historic forest types and would favor

leaving ponderosa pine and Douglas-fir while removing shade-tolerant trees and retaining regenerating conifers, which is preferable for flammulated owls (*ARM 36.11.437(b)*). Some snags could be removed by the proposed harvest, but at least 2 large snag and 2 large snag recruitment tree per acre (>21 inches dbh) would be retained (*ARM 36.11.411*). Flammulated owls are tolerant of human disturbance (*McCallum 1994*), however disturbance associated with harvesting could adversely affect flammulated owls for up to 3 years, should they be present in the project area. Thus, since: 1) changes in structure and cover type would generally increase flammulated owl habitat suitability, and 2) snags would be retained to meet DNRC administrative rules (*ARM 36.11.411*), minor beneficial direct and indirect effects to flammulated owl habitat suitability would be anticipated as a result of the No-Action Alternative

Cumulative Effects of the No-Action Alternative on Flammulated Owls
None of the proposed forest management activities would occur. Flammulated owl habitat availability and structure would remain the same in the project area, but may change on other ownerships. Thus, since no change in the structure of preferred flammulated owl habitat would occur, no cumulative effects to flammulated owl habitat suitability would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Flammulated Owls
The proposed activities would occur in 213 acres of preferred flammulated owl cover types available in the project area. The proposed activities would open stands to 2-10% canopy cover, favor retention of ponderosa pine and Douglas-fir, and retain patches of regenerating conifers where feasible. Overall the proposed activities would improve stand suitability for flammulated owls, although stand structure would be more open than what is preferable for flammulated owls (*ARM 36.11.437(b)*). Changes in flammulated owl habitat suitability would be additive to proposed and ongoing activities occurring in the Wildlife CEAA (see ***ANALYSIS METHODS*** section of the Introduction for a detailed description of projects). However, the DNRC Blacktail Ridge Salvage project would not affect flammulated owl habitat and would not occur concurrently with the proposed Combest Parcels Timber Sale. The proposed activities could disturb flammulated owls for up to 3 years should they be present in the vicinity of the project area. Thus, since 1) changes in structure and cover type would generally increase flammulated owl habitat suitability, and 2) snags would be retained to meet DNRC administrative rules (*ARM 36.11.411*), minor beneficial cumulative effects to flammulated owl habitat suitability would be anticipated as a result of the No-Action Alternative.

PILEATED WOODPECKER

Issue: The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers.

Introduction

Pileated woodpeckers require mature forest stands with large dead or defective trees for nesting and foraging and the density of pileated woodpeckers is positively correlated with the amount of dead and dying wood in a stand (*McClelland 1979*). The diet of the pileated woodpecker consists primarily of carpenter ants, which inhabit large downed logs, stumps, and snags. Pileated woodpeckers prefer to nest in large cavities excavated in ≥20 inch dbh western larch, ponderosa pine, cottonwood, or quaking aspen. Cavities created by pileated woodpeckers are ecologically important and are often used in subsequent years by a variety of wildlife species for nesting and roosting. Forest management considerations for pileated woodpeckers include retaining dense patches of old and mature coniferous forest with abundant large snags and coarse-woody debris.

Analysis Areas

The analysis area for direct and indirect effects is the 462-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the 17,514-acre Wildlife CEAA described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The Wildlife CEAA is centered on the project area and defined according to geographic features (i.e., ridgelines) and provides a reasonable analysis area for pileated woodpeckers that could be influenced by project-related activities. This scale provides a sufficient area to support multiple pairs of pileated woodpeckers (*Bull and Jackson 1995*).

Analysis Methods

Analysis methods include field evaluation, aerial photograph interpretation, and GIS analysis of available habitats. SLI data were used to identify preferred pileated woodpecker habitat (*ARM 36.11.403(58*)). To assess potential pileated woodpecker habitat on DNRC lands, sawtimber stands ≥100 years old within preferred pileated cover types (*ARM 36.11.403(58)*) with ≥40% or greater canopy closure were considered potential pileated woodpecker habitat. On non-DNRC lands, the stands considered potential suitable habitat for pileated woodpeckers were mature forest stands (≥40% canopy cover, >9 inches dbh average) below 6,500 feet elevation. Factors considered in the analysis include: 1) the degree of harvesting and 2) the structure of pileated woodpecker preferred habitat types.

Existing Conditions

The project area contains 111 acres (24.0% of project area) of suitable pileated woodpecker habitat. This habitat is composed primarily of Douglas-fir, western larch, and ponderosa pine stands located in scattered stands across the four parcels that make up the project area. The remaining acres in the project area consist primarily of relatively young stands <100 years in age (307 acres, 66.4% project area). Snag availability in the project is moderate at 9 snags snags/acre ≥8 inches dbh and coarse woody debris was low at 7 tons/acre (see *SNAGS AND COARSE WOODY DEBRIS* in the Coarse Filter Analysis section for additional information). These existing attributes likely facilitate limited use of existing habitat in the project area for pileated woodpecker nesting and foraging.

The Wildlife CEAA contains 5,058 acres (28.9% of CEAA) of potential pileated woodpecker habitat, which includes 301 acres of DNRC-managed pileated woodpecker habitats and an additional 4,757 acres of mature forested habitat (<6,500 feet elevation) on other ownerships. The remaining acres in the project area consist primarily of young stands due to the history of timber harvest on surrounding ownerships. Overall, road density in the Wildlife CEAA is high (3.1 miles/square mile open and seasonally restricted road density, 4.6 miles/square mile total road density) and provides a high level of accessibility for firewood cutting. Considering the high open road density and land ownership patterns, there are likely limited amounts of snags and coarse-woody debris available in the Wildlife CEAA.

Environmental Effects

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

Timber harvest would not occur in DNRC-managed pileated woodpecker habitat in the project area. Thus, since no change in the structure of pileated woodpecker habitat would occur, no direct or indirect effects to pileated woodpecker habitat suitability would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers

The proposed activities would occur in 95 acres (85.7%) of the 111 acres of pileated woodpecker habitat available in the project area. The proposed activities would open stands to 2-10% canopy cover and would favor the retention of ponderosa pine, Douglas-fir, and western larch. The structure of these stands would be unsuitable for appreciable use by pileated woodpeckers post-harvest, although pileated woodpeckers do prefer seral tree species for nesting. Snags would be removed by the proposed harvest, but at least 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh) would be retained (*ARM 36.11.411*). Disturbance associated with harvesting could adversely affect pileated woodpeckers on portions of the project area for up to 3 years, should they be present in the project area. Thus, since: 1) forest structural changes would occur, but mitigation would include retention of snags and coarse woody debris (*ARM 36.11.411, ARM 36.11.414*); and 2) harvesting would reduce pileated woodpecker suitable habitat availability by 95 acres (85.7%) within the project area, high adverse direct and indirect effects to pileated woodpecker habitat suitability in the project area would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers
None of the proposed forest management activities would occur. Ongoing and proposed forest management projects within the Wildlife CEAA could change pileated woodpecker habitat availability. Thus, since no change in the structure of pileated woodpecker habitat would occur, no additional cumulative effects to pileated woodpecker habitat suitability would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Pileated Woodpeckers
The proposed activities would occur in 95 acres (1.9%) of the 5,058 acres of potential pileated woodpecker habitat in the Wildlife CEAA. The proposed activities would open stands to 2-10% canopy cover, causing habitat structure to become unsuitable for pileated woodpecker use, although tree species preferred for pileated woodpecker nesting would be retained. Snags would be removed by the proposed harvest, but at least 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh) would be retained (*ARM 36.11.411*). Changes in pileated woodpecker habitat suitability would be additive to proposed and ongoing activities occurring in the Wildlife CEAA (see ***ANALYSIS METHODS*** section of the Introduction for a detailed description of projects). However the DNRC Blacktail Ridge project will not affect pileated woodpecker habitat and the project would not occur concurrently with the Combest Parcels Timber Sale. Thus, since: 1) structural changes would occur, but mitigation would include retention of snags and coarse woody debris; 2) harvesting would reduce pileated woodpecker suitable habitat availability by 95 acres (1.9%) within the Wildlife CEAA, and 3) given the lack of available habitat on surrounding ownership the area is not likely to proved high quality habitat for pileated woodpeckers; minor adverse cumulative effects to pileated woodpecker habitat suitability would be anticipated as a result of the Action Alternative.

BIG GAME WINTER RANGE

Issue: The proposed activities could reduce cover, which could reduce the quality of big game winter range habitat.

Introduction

Big game, including elk, mule deer, and white-tailed deer require areas with adequate amounts of cover and forage at lower elevations during winter. Effective big game winter range contains ample mid-story and overstory, which can ameliorate severe winter conditions by reducing wind velocity and providing snow intercept, enabling big game to move across the landscape, and by improving access to forage with less energy expenditure. Forest management considerations

for big game include providing adequate hiding cover and ample overstory, which ameliorate the effects of harsh weather conditions in winter.

Analysis Areas

The analysis area for direct and indirect effects is the 462-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the 17,514-acre Wildlife CEAA described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The Wildlife CEAA is defined according to geographic features including watershed boundaries (i.e. ridgelines), which, provides a reasonable biological analysis unit for local big game animals that could be influenced by project-related activities.

Analysis Methods

Analysis methods include field evaluations, aerial photograph interpretation, and GIS analysis of available big game winter range (*DFWP 2008*). The availability of mature forested habitat (≥40% canopy cover, >9 inch dbh average) was used to assess the quality of big game winter range in the Wildlife CEAA. Factors considered in the analysis include: 1) the degree of timber harvesting, and 2) the availability and structure of big game winter range.

Existing Conditions

The project area contains elk, mule deer, and white-tailed deer winter range (*DFWP 2008*) (TABLE W-6–BIG GAME) and is a part of a winter range extending north into the Clark Fork Valley. Approximately 422 acres (91.3%) of the project area contains mature canopy cover (≥40% canopy cover, 9 inch dbh average) composed primarily of Douglas-fir, larch, ponderosa pine, and grand fir stands. This habitat consists of primarily of moderately stocked forest stands with approximately 200 acres of dense canopy cover (70%). Desirable winter range habitat attributes found in the area include low-elevation slopes below 4,200 feet, steep slopes, and appreciable amounts of canopy cover. The general aspect of the project area is north-facing, although some southwest facing slopes are available.

The Wildlife CEAA contains winter range as described in TABLE W-6–BIG GAME (*DFWP 2008*). Desirable winter range habitat attributes found across the Wildlife CEAA include steep slopes, and appreciable amounts of canopy cover in the southern portion of the CEAA, as well as some southwest facing slopes. Approximately 5,403 acres (30.9% of CEAA) of mature forested habitat (≥40% canopy cover, >9 inch dbh average) exists in the Wildlife CEAA and likely provides some thermal protection for big game. The majority of this cover is located higher in the Miller Creek drainage on USFS lands located in the southern portion of the analysis area. In the northern portion of the Wildlife CEAA timber management on private lands greatly reduced the availability of thermal cover, with most cover limited to riparian corridors. Additionally the Blacktail Ridge Fire of 2012 burned 299 acres in the Miller and Combest drainages, reducing the availability of thermal cover in the Wildlife CEAA. The majority of the Wildlife CEAA is managed for timber harvest, although there are some subdivisions in the southern portion of the CEAA adjacent to the Clark Fork River Valley, which could displace wintering big game or reduce the quality of these areas (*Vore 2012*).

TABLE W-6–BIG GAME. Existing big game winter range as identified by DFWP (2008) in the project and Wildlife CEAA and acres that would be affected by the proposed activities.

SPECIES	ACRES OF MAPPED WINTER RANGE			
	Project Area		Wildlife CEAA	
	Existing[a]	Acres Affected[b]	Existing[a]	Acres Affected[b]
Elk	462	406	14,474	406

	100.0%	88.0%	82.6%	2.8%
Mule deer	422 91.3%	382 90.6%	8,963 51.2%	382 4.3%
White-tailed deer	462 100.0%	406 88.0%	14,474 82.6%	406 2.8%

[a]*Acreage and percentage estimates reflect the amounts of each analysis area considered winter range by DFWP.*
[b]*Acreage and percentage estimates reflect the amounts of existing winter range that would be affected in each analysis area by the proposed activities.*

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Big Game Winter Range
None of the proposed forest management activities would occur. Mature forested habitat in the project area providing thermal cover in the project area would not be affected. Thus, since the structure of existing big game winter range would not change, no direct and indirect effects to big game winter range quality and wintering animals would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Big Game Winter Range
Big game winter range would be affected by the proposed activities (TABLE W-6–BIG GAME). The proposed activities would reduce canopy cover on 375 acres (88.9%) of the 422 acres of mature forested habitat currently providing thermal cover. The proposed activities would open stands to 2-10% canopy, reducing the capacity of these areas to provide snow intercept and reduce wind velocity. The proposed activities would retain ponderosa pine, Douglas-fir, and western larch to move the stands toward historic stand structure. The majority of harvest units consist of small patches of mature forested habitat that are isolated by young stands on surrounding ownerships. Thus, removing these stands would not affect the connectivity of mature forested habitat on surrounding ownerships. However, connectivity of mature forested habitat on adjacent USFS lands would be retained along tributaries to Combest Creek. Advanced regenerating conifers (>6 feet height) would be retained throughout the harvest units, providing some residual cover. Winter logging may occur, but would not be required. Wintering animals could be displaced for up to 3 winters by the proposed activities. Thus, since: 1) canopy cover would be removed on 375 acres (88.9%) of available thermal cover, 2) some canopy cover and regenerating conifers would be retained, and 3) displacement of big game would be temporary (up to 3 years) and across a relatively small area, 4) connectivity of mature forested habitat would be retained on lands adjacent to the USFS, high adverse direct and indirect effects to big game winter range quality and wintering animals would be anticipated as a result of the Action Alternative.

Cumulative Effects of the No-Action Alternative on Big Game Winter Range
None of the proposed forest management activities would occur. Big game thermal cover would not be affected, but may change on other ownerships where ongoing projects are occurring. Thus, since the structure of existing big game winter range would not change, no additional cumulative effects to big game winter range quality and wintering animals would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Big Game Winter Range
Big game winter range would be affected by the proposed activities (TABLE W-6–BIG GAME). The proposed harvest would reduce canopy cover to 2-10% within 375 (6.9%) of the 5,403 acres of mature habitat available in the Wildlife CEAA. Advanced regenerating conifers (>6 feet height) would be retained, providing visual screening and some wind intercept. Reductions in

thermal cover would be additive to any proposed and ongoing activities in the Wildlife CEAA (see ***ANALYSIS METHODS*** section of the Introduction for a detailed description of projects). The DNRC Blacktail Ridge Salvage would occur in the Wildlife CEAA, but would focus on salvaging burned trees and would not occur concurrently with the Combest Parcels Timber Sale. Big game could be displaced for up to 3 years by forest management activities associated with the Combest Parcels timber sale and any ongoing timber sales on other ownerships. Thus, since: 1) canopy cover would be removed, reducing the quality of big game winter range on 375 acres (6.9% of available thermal cover), 2) some canopy cover and regenerating conifers would be retained, and 3) displacement of big game would be temporary across a relatively small area, 4) connectivity of mature forested habitat would be maintained along USFS lands, minor adverse cumulative effects to big game winter range quality and wintering animals would be anticipated as a result of the Action Alternative.

LIST OF MITIGATIONS

- If a threatened or endangered species is encountered, consult a DNRC biologist and develop additional mitigations that are consistent with the Forest Management Rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*).
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per ARM 36.11.444(2) and *GB-PR2* (*USFWS and DNRC 2010)*.
- Contractors must adhere to food storage and sanitation requirements as per GB-PR3 (*USFWS and DNRC 2010*).
- Within Canada lynx winter foraging habitat, retain up to 10% of the stand area in patches of advanced regeneration of shade-tolerant trees (grand fir, subalpine fir, and spruce) as per LY-HB4 (*USFWS and DNRC 2010).*
- Minimize mechanized activity within 0.25 miles of burned forested stands in the project area between April 15- July 1st to minimize disturbance to black-backed woodpeckers.
- Retain 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh) particularly favoring ponderosa pine and western larch.
- Retain 10-20 tons/acre coarse woody debris as consistent with Graham et al (*1994*). Emphasize the retention of downed logs ≥15 inches dbh where they occur as per LY-HB2 (*USFWS and DNRC 2010).*
- Use a combination of topography, group retention, and roadside vegetation to reduce sight distances within harvest units where feasible.

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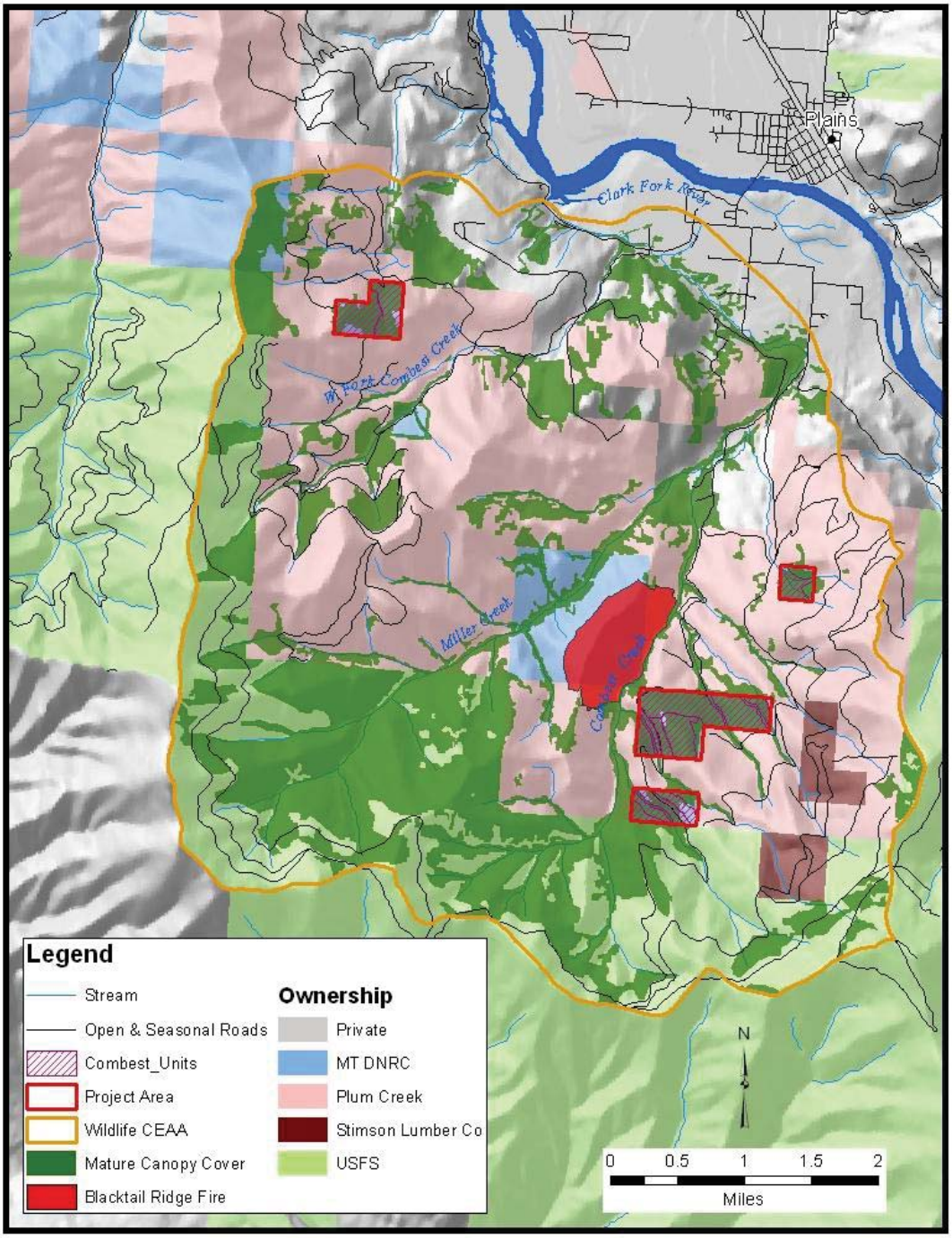
FIGURE W-1 –ANALYSIS AREAS. Wildlife analysis areas for the proposed Combest Parcels Timber Sale.



COMBEST PARCELS TIMBER SALE PROPOSAL
WATER RESOURCES ANALYSIS
November 12, 2013

INTRODUCTION

This analysis is designed to disclose the existing condition of the hydrologic and fisheries resources and describe the anticipated effects that may result from each alternative of this proposal. During the initial scoping, no issues were identified regarding water-quality, water-quantity, or fisheries resources from the public. Internally within DNRC, issue statements were developed to measure application of Forest Management Rule criteria. The following issue statements were compiled from internal discussions regarding the effects of the proposed timber harvesting:

- *Timber harvesting and road construction activities may increase sediment delivery into streams and affect water quality.*
- *Cumulative effects from timber harvest may affect channel stability by increasing annual water yields.*

These issues will be addressed by addressing by assessing the risk of sediment delivery to water bodies from roads and harvest units; assessing the risk of destabilizing channels from annual water yield increases.

ISSUES DISMISSED FROM FURTHER ANALYSIS

Issues related to potentially affected fisheries resources were dropped from further analysis for the following reasons:

1) No fish species occur within any portion of the project area. Downstream fish-bearing reaches occur within 1,000 feet of project area road-stream crossings.
2) Stream shading and temperature in perennial reaches upstream of occupied habitats: As described in the Montana DNRC Forested Trust Lands Habitat Conservation Plan Final EIS (USFWS and DNRC 2010), a no-harvest zone of 50 feet immediately adjacent to this stream type is expected to retain a level of stream shading similar to pre-harvest conditions. The RMZ buffers proposed under this alternative would maintain all of the trees within 50 feet of Class 1 streams and remove a maximum of 50 percent of the merchantable trees in the remaining RMZ width. Therefore, stream shading post-project is expected to maintain a low risk of increasing stream temperatures due to timber harvesting.
3) Sedimentation to reaches upstream of occupied habitats: Road-stream crossing construction on 2 intermittent streams and other project-level road construction and maintenance would generate short-term sedimentation to streams; long-term sedimentation would be negligible or very low. These effects would not be expected to cause detectable or measureable impacts to sediments in downstream fish-bearing reaches.
4) Changes to flow regime: The proposed actions may cause a minor increase in water yield to downstream fish-bearing reaches; however, this effect is also expected to be well within the historic range of variability.
5) Fish passage: No changes to fish passage are proposed with the project.

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

ANALYSIS METHOD

Sediment Delivery

The methods applied to the project area to evaluate potential direct, indirect, and cumulative effects include a field review of potential sediment sources from haul routes. Stream crossings and roads were evaluated to determine existing sources of introduced sediment from existing and proposed roads.

Potential sediment delivery from harvest units will be evaluated from a risk assessment. This risk assessment will use the soil information provided in the *SOILS ANALYSIS* and the results from soil monitoring on past DNRC timber sales.

Water Yield

Visual inspection of runoff patterns and stream channel stability in the project area along with aerial photo interpretation will be used to determine the impacts and extent of past management in the analysis area. Impacts from increases in annual water yield will be discussed qualitatively in this document.

ANALYSIS AREA

Sediment Delivery

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

Water Yield

The analysis area for annual water yield will include the Combest Creek watershed from the confluence with Miller Creek to the headwaters. Additional harvest is proposed outside of this watershed, but due to the lack of stream channels, well-drained soils and relatively small harvest areas the risk of adverse effects would be very low and likely immeasurable.

WATER USES AND REGULATORY FRAMEWORK

WATER QUALITY STANDARDS

This portion of the Clark Fork River basin is classified as B-1 by the DEQ, as stated in the ARM 17.30.607(a). Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases over natural turbidity. "Naturally occurring," as defined by *ARM 17.30.602* (*19*), includes conditions or materials present during runoff from developed land where all reasonable land, soil, and water conservation practices (commonly called Best Management Practices or BMPs) have been applied. The State of Montana has adopted BMPs through its non-point source management plan (*MDEQ, 2007*) as the principle means of meeting the Water Quality Standards. Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of activities that could create impacts.

WATER QUALITY LIMITED WATERBODIES

None of the streams in the project area are considered impaired waterbodies and listed on the 2012 303(d) list (*MDEQ 2012*).

STREAMSIDE MANAGEMENT ZONE LAW (SMZ)

All rules and regulations pertaining to the SMZ Law are to be followed. An SMZ width of 100 feet is required on Class 1 and 2 streams and lakes when the slope is greater than 35 percent. An SMZ width of 50 feet is required for Class 1 and 2 streams when the slope is less than 35 percent and for all Class 3 streams.

STREAM PROTECTION ACT (124 Permit)

All rules and regulations pertaining to the Stream Protection Act are to be followed. This law requires a permit to implement activities "*including the construction of new facilities or the modification, operation, and maintenance of an existing facility that may affect the natural existing shape and form of any stream or its banks or tributaries*." (DNRC 2014)

FOREST MANAGEMENT RULES AND HABITAT CONSERVATION PLAN (HCP)

In 2003, DNRC drafted Administrative Rules for Forest Management. The portion of those rules applicable to watershed and hydrology resources include ARM 36.11.422 through 426 and 470 through 471. The HCP was adopted in December 2011 and all conservation commitments covered by the HCP are also to be applied to this project. All applicable rules will be implemented if they are relevant to activities proposed with this project.

WATER RIGHTS

No water rights are present on the state parcel, however water rights for livestock watering (direct from the source), irrigation, and domestic use are present within three miles downstream of project parcels.

EXISTING CONDITION

GENERAL DESCRIPTION

The project area consists of four separate parcels located in three sections of T19N, R26W. No streams were identified on the parcels in sections 6 or 14, however the parcels in section 22 have Class 1 and Class 2 tributaries to Combest Creek. The Combest Creek watershed above Miller Creek (see **Figure WR-1**) is approximately 5,495 acres in size. Average precipitation in this watershed is approximately 22 inches per year. Combest Creek at the lower end of the watershed generally flows less than 6 months of the year, however, upper reaches of the main channel and several of its tributaries flow year-round and provide habitat for westslope cutthroat trout. Within the state parcels, streams and draws were reviewed during field reconnaissance and each location documented with a GPS unit.

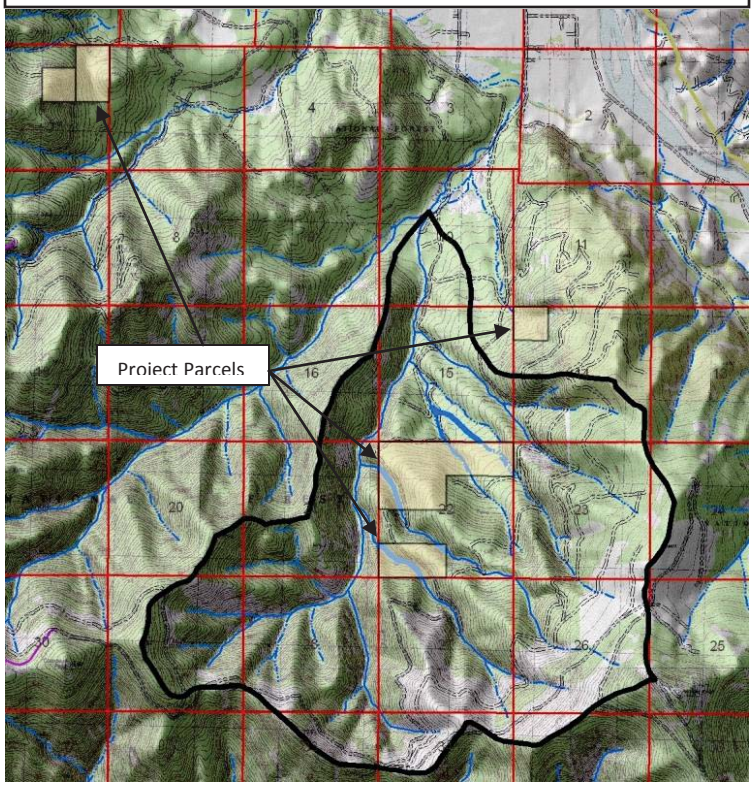
The scoured channels are protected by the Streamside Management Zone Law (ARM 36.11.301 through ARM 36.11.312). Streams are generally stable indicative by the moss found on substrate. No large, active sediment sources were found during field reconnaissance although the middle stream in section 22 has eroded a draw-bottom skid road over the last 50 years. This skid road is stable and shows evidence of recent erosion only as outcurves and constrictions which would be typical of most streams in the area. No areas of mass erosion were noted during fieldwork.

SEDIMENT DELIVERY

A field review of the haul route during May 2012 did not identify and direct sediment delivery to streams from roads. Road drainage in the project area is sufficient to avoid rilling on existing road surfaces; however some surface drainage structures are in need of maintenance to continue functioning properly.

The erosion risk for landtypes in the project area with proposed timber harvest proposed is low to moderate. No mass wasting sites or unstable soils were observed in any of the proposed harvest areas.

FIGURE WR 1: Combest Creek Watershed above Miller Creek



WATER YIELD

A review of the harvest history for the project area watersheds was conducted for this project using aerial photos, timber sale contracts, and section record cards. Additionally, a field review of stream channels was completed in spring 2012, summer 2012 and summer 2013.

Past harvesting operations in the project area include harvests since the 1920's with the largest harvests implemented during 1928 (2.6 mmbf) and 1946-47(397 mbf). A few smaller harvests occurred up through the early 1970's. Other forest product removals include fence posts and rails, firewood, and commercial/individual Christmas tree harvest. A list of harvesting on state parcels in the project area can be found in the project file.

Past harvesting on other ownerships in the Combest Creek analysis area was observed using aerial photographs and also during field reconnaissance. A majority of the watershed has had some level of harvest over the last century, but regeneration effort appear to have been successful as indicated by the stocking levels in past harvest units. A review of streams showed that channels are generally stable with no evidence of adverse impacts that can be attributed to annual water yield increases associated with timber harvest.

ENVIRONMENTAL EFFECTS

DESCRIPTION OF ALTERNATIVES

- *No-Action Alternative*

  No timber harvesting or associated activities would occur under this alternative.

- *Action Alternative*

  Units totaling approximately 406 acres would be commercially harvested under this alternative. All of the proposed harvest would be a regeneration harvest (shelterwood or modified seed tree) that would maintain approximately 10 to 25 overstory trees per acre. Approximately 7 acres of RMZ harvest would occur. Diseased and damaged submerchantable trees would be slashed. Mechanical

scarification would take place on all units, if feasible. Harvesting would be conducted using conventional ground-based equipment on approximately 267 acres; cable yarding methods would be applied to approximately 139 acres. Approximate miles of road activities include:

- 3. 3 miles of new construction including two stream crossing installations
- 13.4 miles would be maintained or have drainage improvements installed as necessary to protect water quality.

Existing activities such as recreational use, individual Christmas tree harvesting, and firewood gathering would continue.

DIRECT AND INDIRECT EFFECTS

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

Sediment Delivery

Under this alternative, no timber harvesting or related activities would occur. Sediment from all sources would continue as described in the existing condition.

Water Yield

No increased risk of increases or reductions in annual water yield would result from this alternative.

- ***Direct and Indirect Effects of the Action Alternative to Water Resources***

Sediment Delivery

Past monitoring of DNRC timber harvests has shown erosion on approximately 6 percent of the sites monitored, although no water-quality impacts from the erosion were found (*DNRC 2011*). These sites were harvested during the summer period, and the erosion was attributed to inadequate skid-trail drainage. Displacement was limited to main skid trails that occupy less than 2% of the harvest units." (*DNRC 2011*). By minimizing displacement, less erosion would likely occur compared to other harvest methods with more extensive disturbance (*DNRC 2011*).

During a review of BMP effectiveness, including stream buffer effectiveness, *Raskin et. al.* 2006 found that 95 percent of erosion features (disturbed soil) greater than 10 meters (approximately 33 feet) from the stream did not deliver sediment to the stream. Their findings indicated that the main reasons stream buffers are effective include 1) keeping active erosion sites away from the stream, and 2) stream buffers may intercept and filter runoff from upland sites as long as the runoff is not concentrated in gullies or similar features (*Raskin et. al. 2006*). This alternative is designed with 50-foot no-harvest buffers on class 1 and class 2 streams. By maintaining the no-harvest buffer, the risk of sediment delivery to streams from harvest units would be low.

Existing roads would have minor drainage improvements and BMP upgrades implemented under this alternative to maintain a low risk of sediment delivery to streams. Minor drainage improvements include reshaping drain dips or flappers, cleaning ditches, or placing energy dissipaters at culvert outlets to reduce the risk of in-channel erosion.

New road construction would include two stream crossings on non-fish bearing, intermittent class 2 streams; one would be a corrugated metal pipe and the second would be an armored ford. While the work would be completed under dry conditions and follow requirement of the Stream Protection Act (124 permit), some sediment may be delivered to the stream channel during construction. The amount of sediment in the channel would be minimized by implementing Forestry BMPs and therefore would have a low risk of adversely impacting beneficial uses.

Because DNRC would incorporate BMPs into the project design as required by *ARM 36.11.422 (2)* and all laws pertaining to SMZs would be followed, a low risk of sediment from timber-harvesting activities would result from the implementation of this alternative. Therefore, the risk of long-term adverse direct or indirect effects to water quality or beneficial uses due to increased sediment would be low.

Water Yield

Approximately 274 acres would be harvested in the Combest Creek analysis area using conventional ground-based and cable yarding methods. The proposed harvest would be regeneration harvest that would remove most of the overstory except for seedtrees. Up to 20 seedtrees per acre would be retained. Additional variable retention of advanced regeneration and submerchantable trees is included in the project.

The proposed harvest area is approximately 5 percent of the analysis area. The reduction in vegetation in the proposed harvest units may slightly increase annual water yield but would not be expected to destabilize channels and measurably increase in-stream erosion. Therefore the risk of unacceptable adverse impacts from annual water yield increases would be low.

CUMULATIVE EFFECTS

- ***Cumulative Effects of the No-Action Alternative to Water Resources***

Sediment Delivery

No additional cumulative impacts from sediment delivery would be expected.

Water Yield

No increase in water yield would be associated with this alternative. No measureable changes to annual water yield or stream channel impacts would be expected.

Cumulative Effects Summary - No-Action Alternative

Because no timber harvesting or associated activities would occur under this alternative, cumulative effects would be limited to the existing conditions.

Cumulative Effects of the Action Alternative to Water Resources

Sediment Delivery

Under this alternative, the proposed timber-harvesting and road-construction activities would occur. A cumulative increase in sediment delivery as a result of timber harvesting would have a very low risk of occurring. A short-term sediment increase during construction of two stream crossings would be expected but, because of the existing road improvements, BMP application and landtypes in the project area a low risk of adverse cumulative impacts to beneficial uses would be expected.

Water Yield

Adverse cumulative impacts to stream channels in project area from cumulative annual water yield increases would have a low risk of occurring because of the stability of stream channels and the low level of additional vegetation removal in relation to the Combest Creek analysis area.

- ***Cumulative Effects Summary – Action Alternative***

Because all timber-harvesting activities would follow BMPs as required by *ARM 36.11.422* and the direct and indirect effects would have a low risk of impacts, a low risk of additional adverse cumulative effects would be expected to occur under this alternative. Because BMPs would be

implemented during timber-harvesting and road-construction operations, the risk of adverse cumulative impacts to water quality and beneficial uses would be low.

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COMBEST PARCELS TIMBER SALE PROPOSAL
SOILS ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the soil resources and present the anticipated effects that may result from each alternative of this proposal. During the public scoping, no issues regarding soil impacts were identified by the public. The following issue statements were compiled from internal discussions regarding the effects of the proposed timber harvesting:

- *Ground based harvest techniques can displace and compact soils which can adversely affect the hydrologic function, soil structure and long-term productivity of the impacted area.*

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

The project area for this proposal includes approximately 462 acres. Because harvesting is proposed on just a portion of the project area, the analysis area will be smaller and include the proposed harvest units and road locations.

REGULATORY DOCUMENTS

The project area is covered by the Forest Management Rules section of the Administrative Rules of Montana. The Forest Management Rules were generally derived from recommendations in the State Forest Land Management Plan (DNRC 1996). In addition, part of the project area is included in the recent Habitat Conservation Plan adopted by the Montana Board of Land Commissioners.

PAST FOREST MANAGEMENT

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

Cumulative effects from past and current forest management in the proposed harvest units are as a result of skid trails and landings. Records show evidence of harvest dating as early as the 1928 and continuing through 1987. Two large (>250mbf) timber harvests occurred on the project area: one from 1928, and another in 1948. Impact from skid trails and landings from this time period have been reduced through freeze-thaw cycles and root mass penetrating the soil. While many of the impacts have ameliorated over time, a skid trails are still visible in the proposed harvest units. These skid trails do not appear to be eroding more than the surrounding un-trailed areas. A list of harvesting in the project area can be found in the project file. Other forest product removals include fence posts and rails, firewood, and individual and commercial Christmas tree harvests throughout the last 75 years.

Nutrient Cycling

Coarse and fine woody debris provide a crucial component in forested environments through nutrient cycling, microbial habitat, moisture retention and protection from mineral soil erosion. (Harmon et al 1986). While coarse woody debris decays at various rates due to local climatic conditions, the advanced stages of decay contains many nutrients and holds substantial amounts of moisture for vegetation during

dry periods (Larson et al. 1978, Wicklow et al. 1973). Forest management can affect the volumes of fine and coarse woody debris through timber harvesting and result in changes to the available nutrients for long term forest production. The method for quantifying the coarse woody debris is described in the *Handbook for Inventorying Downed Woody Material* (Brown, 1974)

DESCRIPTION OF ALTERNATIVES

- *No-Action Alternative*

  No timber harvesting or associated activities would occur under this alternative.

- *Action Alternative*

  Units totaling approximately 406 acres would be commercially harvested under this alternative. All of the proposed harvest would be a regeneration harvest (shelterwood or modified seed tree) that would maintain approximately 10 to 25 overstory trees per acre. Diseased and damaged submerchantable trees would be slashed. Mechanical scarification would take place on all units, if feasible. Harvesting would be conducted using conventional ground-based equipment on approximately 267 acres; cable yarding methods would be applied to approximately 139 acres. Approximate miles of road activities include:

  - 3.3 miles of new construction including two stream crossing installations
  - 13.4 miles would be maintained or have drainage improvements installed as necessary to protect water quality.

Recommended Mitigation Measures and Contract Clauses

ARM 36.11.422 (2) and *(2) (a)* state that appropriate BMPs shall be determined during project design and incorporated into implementation. To ensure that the incorporated BMPs are implemented, the specific requirements would be incorporated into the DNRC Timber Sale Contract. As part of this alternative design, the following BMPs are considered appropriate and, would be implemented during harvesting operations:

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

2) On ground-based units, the logger and sale administrator would agree to a skidding plan prior to equipment operations. Skid-trail planning would identify which main trails to use and how many additional trails are needed. Trails that do not comply with BMPs (i.e. trails in draw bottoms) would not be used unless impacts can be adequately mitigated. Regardless of use, these trails may be closed with additional drainage installed, where needed, or grass-seeded to stabilize the site and control erosion.

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

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

5) Slash disposal: Limit the combination of disturbance and scarification to 30 to 40 percent of the harvest units. No dozer piling on slopes over 35 percent; no excavator piling on slopes over 40 percent, unless the operation can be completed without causing excessive impacts (compaction, displacement and/erosion). Consider lopping and scattering or jack-pot burning on the steeper slopes. Consider disturbance incurred during skidding operations to, at least, partially provide scarification for regeneration.

6) Retain 10 to 20 tons of large woody debris (depending on habitat type) and a feasible majority of all fine litter following harvesting operations. On units where whole tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves slash on site; 2) for whole-tree harvesting, return-skid slash and evenly distribute within the harvest area; or 3) cut tops from every third bundle of logs so that tops are dispersed as skidding progresses.

ENVIRONMENTAL EFFECTS

Table S1 below summarizes the soils analysis for the Combest Parcels Timber Sale. Included in the table are the issues, analysis methods, analysis area, existing condition and expected impacts. The impacts include direct, indirect and cumulative impacts.

TABLE S 1: SOILS ANALYSIS SUMMARY

Issue Statement	Analysis Methods & Analysis Area	Existing Condition	Direct, Indirect and Cumulative Effects	
			No Action Alternative	Action Alternative
Ground based harvest techniques can displace and compact soils which can adversely affect the hydrologic function, soil structure and long-term productivity of the impacted area.	Methods for disclosing impacts include using general soil descriptions and the management limitations for each soil type. This analysis will qualitatively assess the risk of negative effects to soils from erosion, compaction, and displacement from each alternative, using insight from previously collected soils-monitoring data from over 90 DNRC postharvest monitoring projects. (DNRC, 2011). The analysis area will be the proposed harvest units and road locations.	All landtypes in the parcels have low to moderate erosion potential and sediment delivery efficiency. During reconnaissance and field data collection for this project, impacts from skid trails and recreation use is estimated to cover less than 5 percent of the project area. Impacts from past timber harvest projects on similar soils has resulted in average impacts of less than 10 percent.	No timber harvesting 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.	The action alternative would be expected to have a high risk of mid- to long term soil impacts due to compaction, displacement and/or erosion on approximately 10% of the harvest area. Cumulative effects would be managed at acceptable levels by reusing existing skid trails where appropriate. A list of mitigation measures and contract clauses are listed that would help minimize cumulative impacts.
Removal of both coarse and fine woody material off site during timber harvest operations can reduce nutrient pools required for future forest stands and can affect the long-term productivity of the site.	Coarse woody material will be addressed by, first, disclosing existing levels from transect data collected during field reconnaissance. The transect data will be compared with scientific literature as required by ARM 36.11.414 (2). If the action alternative is selected, this assessment will assist in developing contract requirements and mitigation measures necessary to ensure post project levels of CWD adequately meet the recommendations of relevant literature, primarily Graham et al (1994). Fine woody material will be addressed solely through contract language that minimized removal (ARM 36.11.410). The analysis area will be the proposed harvest units.	A total of 10 transects were measured in the proposed harvest units. The average tons per acre were 7 with a minimum of 0.4 and a maximum of 29.7 tons per acre. Recommended levels for general habitat types in the proposed harvest units are estimated at 10 to 20 tons per acre. Nine of the ten transects were below the recommended level.	No changes to coarse woody material would result from this alternative. Coarse woody debris levels and nutrient cycling would continue as dictated by natural events.	An increase in coarse woody debris would result from the action alternative; however an overall reduction in recruitable fine material would be expected due to fewer trees remaining per acre until stocking levels are increased. Both fine and large woody debris would be retained for nutrient cycling for long-term soil productivity. By following research recommendations on the levels of coarse and fine material left on site, the risk of long-term cumulative impacts to forest productivity from nutrient pool loss would be low.

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Attachment III

Silvicultural Prescriptions

Combest Parcels Timber Sale

SILVICULTURAL PRESCRIPTIONS

Unit Number: 6-1 **Location:** S6 T19N R26W **Acres:** 56

Elevation: 3260 – 4040 **Slope:** 45 – 60% **Aspect(s):** NE

Habitat types: PSME/ PHMA - PHMA (261), ABGR / LIBO – XETE (592).

Soils: Combest gravelly ashy silt loam

Current Condition: Ponderosa Pine **Desired future conditions**: Ponderosa Pine

Trust Grant: Common Schools 70%, Public Buildings 30%

Description of stand(s):

This harvest unit is bordered to the north, west and south by state property lines and to the east by a slope break transition to tractor harvest unit 6-2.

This mid slope to ridge top harvest unit incorporates areas of three distinct stands as described by the Stand Level Inventory (SLI). The north and east facing slopes are characterized by the *Pseudotsuga menziesii/Physocarpus malvaceus* (Douglas-fir/ninebark) habitat type. These areas exhibit moderate to high timber productivity, although in this harvest unit there are prominent rocky outcroppings. These areas are expected to advance to a climax stage of Douglas-fir / ninebark without disturbance or management; this can be witnessed by the lack of ponderosa pine regeneration in the stand. The portions of the harvest unit with east and southeast aspects are characterized as *Abies grandis/Linnaea borealis* (grand fir/twinflower) habitat type. These areas exhibit high timber productivity, due to the higher available soil moisture. These habitat types are expected to advance to a climax stage of grand fir / twinflower without disturbance or management; this can be observed by the abundance of grand fir regeneration in the understory. (Pfister, Kovalchik, Arno, & Presby, 1997)

This harvest unit is currently comprised of 40% ponderosa pine with a mean DBH of 20”, 36% Douglas-fir with a mean DBH of 17”, 20% western larch with a mean DBH of 12”, and 4% grand fir with a mean DBH of 14”. The current multistoried storied stand has a closed canopy and regeneration is limited to shade tolerant species, and pockets of Douglas-fir. Trees ages range from 60 – 90 years in the mid-story and 100 – 200 years in the over-story. Tree heights range from 40 – 60 feet in the mid-story to 75 – 90 feet in the over-story. Insects and disease are active in the stand, primarily; dwarf mistletoe (*Arceuthobium spp.*) in the Douglas-fir and western larch, root rot in the Douglas-fir, and western pine beetle (Dendroctonus brevicomis) in the ponderosa pine. (Hagle, Gibson, & Tunnock, 2003)

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Common Schools and Public Buildings Trust Grants by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Seed-tree harvest with regeneration retention where appropriate.
- Skyline operations with whole tree yarding.
- Leave tree marked: 10 – 12 trees per acre, 50 – 60' spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Accumulated slash would be piled at landings for burning.

Nutrient Cycling:

- Nutrient cycling would be achieved through top and limb breakage, as well as slashing logging damaged and mistletoe infected sub-merchantable trees.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.

- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 6-2 **Location:** S6 T19N R26W **Acres:** 50

Elevation: 3080 - 3400 **Slope:** 5 – 35% **Aspect(s):** NE

Habitat type: PSME / PHMA – CARU (262). **Soils:** Winkler gravely sandy loam

Current Condition: Ponderosa Pine **Desired future conditions**: Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

This harvest unit is bordered on the north, south and east by state property lines and on the west by a slope break transition to skyline harvesting unit 6-1.

This bench top harvest unit incorporates areas of three separate SLI stands, with a common habitat type. The *Pseudotsuga menziesii/Physocarpus malvaceus* (Douglas-fir/ninebark) habitat type occurs predominately on cool north and east facing slopes. These areas exhibit moderate to high timber productivity, although this can be hampered by severe mistletoe infestation. These areas are expected to advance to a climax stage of Douglas-fir / ninebark without disturbance or management; this can be witnessed by the lack of ponderosa pine regeneration in the stand. (Pfister, Kovalchik, Arno, & Presby, 1997)

This stand is currently comprised of 67% Douglas-fir with a mean DBH of 13”, 33% ponderosa pine with a mean DBH of 17”, and scattered western larch and grand fir. The current multistoried storied stand has a closed canopy and regeneration is limited to shade tolerant species, primarily grand fir. Trees ages range from 50 - 90 years in the mid-story and 100 – 200 years in the over-story with scattered individuals 200+. Tree heights range from 50 – 70 feet in the mid-story to 75 – 110 feet in the over-story.

Insects and disease are active in the stand, primarily; dwarf mistletoe (*Arceuthobium spp.)* in the Douglas-fir and western larch, Pini rot (*Phellinus pini*) in the western larch and western pine beetle (*Dendroctonus brevicomis)* in the ponderosa pine. (Hagle, Gibson, & Tunnock, 2003)

The stand represents a high fire danger due to excessive fuel loading and high instance of ladder fuels.

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Shelterwood harvest with regeneration retention.
- Ground based harvesting with cut to length, whole tree or tree length skidding.
- Leave tree marked: 15 - 20 trees per acre, 40 – 50' spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Slash in excess of down woody material requirements would be piled and burned at landings.

Nutrient Cycling:

- Return skid a majority of tops to unit for nutrient cycling.
- Retain a majority of needles and limbs on the unit for approximately one year.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.
- Opportunities for machine piling and scarification following harvest to promote natural regeneration would be considered.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 14-1 **Location:** S14 T19N R26W **Acres:** 26

Elevation: 3160 - 3560 **Slope:** 20 – 40% **Aspect(s):** North

Habitat type: PSME/ PHMA - PHMA (261), PSME / PHMA – CARU (262).

Soils: Winkler gravely sandy loam, Combest gravely ashy silt loam

Current Condition: Ponderosa Pine **Desired future conditions**: Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

This harvest unit is bordered on the west and south by state property lines and on the east and north by slopes >45% and rocky outcrops.

This mid slope harvest unit incorporates areas of two separate SLI stands. The habitat types *Pseudotsuga menziesii/Physocarpus malvaceus* (Douglas-fir/ninebark) and *Pseudotsuga menziesii/Physocarpus malvaceus-Calamagrostis rubescens* (Douglas-fir/ninebark – pinegrass phase) occur predominately on cool slopes. These areas exhibit moderate to high timber productivity. These areas are expected to advance to a climax stage of Douglas-fir / ninebark without disturbance or management; this is evidenced by the lack of ponderosa pine regeneration in the stand. (Pfister, Kovalchik, Arno, & Presby, 1997)

This stand is currently comprised of 87% Douglas-fir with a mean DBH of 12”, 8% ponderosa pine with a mean DBH of 14” and 5% western larch with a mean DBH of 15”. The current two storied stand has a closed canopy and regeneration is limited to pockets of shade tolerant species, primarily Douglas-fir. Trees ages range from 50 - 90 years in the mid-story and 91 – 150 years in the over-story. Tree heights range from 50 – 74 feet in the mid-story to 75 – 90 feet in the over-story.

Insects and disease are active in the stand, primarily: dwarf mistletoe (*Arceuthobium spp.)* in the Douglas-fir, root rot in the Douglas-fir, and western pine beetle (*Dendroctonus brevicomis)* in the ponderosa pine. (Hagle, Gibson, & Tunnock, 2003)

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Shelterwood harvest with regeneration retention.
- Ground based harvesting with cut to length, or whole tree skidding.
- Leave tree marked: 15 - 20 trees per acre, 40 – 50' spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Slash in excess of down woody material requirements would be piled and burned at landings.

Nutrient Cycling:

- Return skid a majority of tops to unit for nutrient cycling.
- Retain a majority of needles and limbs on the unit for approximately one year.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.
- Opportunities for machine piling and scarification following harvest to promote natural regeneration would be considered.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-1 **Location:** S22 T19N R26W **Acres:** 61

Elevation: 3320 - 3640 **Slope:** 10 – 45% **Aspect(s):** N

Habitat types: ABGR / LIBO – LIBO (591), PSME / PHMA – CARU (262), ABGR/CLUN – CLUN (521), PSME / CARU – ARUV (322)

Soils: Mitten gravelly ashy silt loam**,** Winkler gravely sandy loam

Current Condition: Ponderosa Pine (76%), western larch / Douglas-fir (24%)

Desired future conditions: Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

This harvest unit is bordered on the north and west by state property lines. A small, 1 acre portion of this harvest unit lays north of the Combest Creek Rd. USFS#508; the remainder of the unit is south and east of the road. The harvest unit is bordered on the south by a slope break transition to skyline harvest unit 22-6, a proposed road / harvest unit boundary to 22-2, and to the east by a Class II SMZ.

Harvest unit 22-1 incorporates portions of four SLI. The *Abies grandis/Linnaea borealis* (grand fir/twinflower) habitat type dominates the harvest unit, and is common locally on north slopes. These areas exhibit high timber productivity, due to the high available soil moisture. These habitat types are expected to advance to a climax stage of grand fir / twinflower without disturbance or management; this can be observed by the abundance of grand fir regeneration in the understory. The *Pseudotsuga menziesii/Physocarpus malvaceus* (Douglas-fir/ninebark) habitat type occurs on the west facing slope of the harvest unit, and exemplifies a slightly drier environment. These areas exhibit moderate to high timber productivity. These areas are expected to advance to a climax stage of Douglas-fir / ninebark without disturbance or management. The *Abies grandis/Clintonia uniflora* (grand fir/queencup beadlily) habitat type occures along the Class II SMZ in the east portion of the harvest unit. These areas exhibit high to very high timber productivity, although instances of Indian paint fungus (*Echinodontium tinctorum)* can greatly reduce productivity of grand fir. This habitat type can be expected to reach a climax condition of grand fir / queencup beadlily without disturbance or management. A minor component of the harvest unit is located on a warm well drained ridge, classified as *Pseudotsuga menziesii/Calamagrostis rubescens* (Douglas-fir/pinegrass) habitat type. This habitat type generally exhibits low to moderate timber productivity, with seed tree and shelterwood harvests favoring regeneration of seral species. This habitat type is expected to advance to a climax condition of Douglas fir/pinegrass without disturbance or management. (Pfister, Kovalchik, Arno, & Presby, 1997)

This stand is currently comprised of 58% Douglas-fir with a mean DBH of 12”, 25% ponderosa pine with a mean DBH of 15” and 17% western larch with a mean DBH of 11”, with scattered grand fir and an occasional western red cedar. The current multistoried stand has a closed canopy and regeneration is limited to pockets of shade tolerant species, primarily grand fir and Douglas-fir. Trees ages range from 40 - 90 years in the mid-story and 91 – 150 years in the over-story. Tree heights range from 50 – 74 feet in the mid-story to 75 – 110 feet in the over-story.

Insects and disease are active in the stand, primarily: dwarf mistletoe (*Arceuthobium spp.)* in the Douglas-fir and western larch, root rot in the Douglas-fir, Pini rot (*Phellinus pini*) in the western

larch, and Indian paint fungus (*Echindotium tinctorium*)in the grand fir. (Hagle, Gibson, & Tunnock, 2003)

The stand represents a high fire danger due to excessive fuel loading and high instance of ladder fuels. This stand is adjacent to a well traveled open road; snags are under-represented in the stand due to active fire wood harvesting.

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Shelterwood harvest with regeneration retention.
- Ground based harvesting with cut to length, or whole tree skidding.
- Leave tree marked: 15 - 20 trees per acre, 40 – 50’ spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Slash in excess of down woody material requirements would be piled and burned at landings.

Nutrient Cycling:

- Return skid a majority of tops to unit for nutrient cycling.
- Retain a majority of needles and limbs on the unit for approximately one year.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.
- Opportunities for machine piling and scarification following harvest to promote natural regeneration would be considered.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-2 **Location:** S22 T19N R26W **Acres:** 60

Elevation: 3640 - 4000 **Slope:** 10 – 35% **Aspect(s):** N, NW

Habitat type: ABGR/CLUN – CLUN (521), ABGR / LIBO – LIBO (591), PSME / CARU – ARUV (322), PSME / PHMA – CARU (262).

Soils: Mitten gravelly ashy silt loam**,** Winkler gravely sandy loam

Current Condition: ponderosa pine (57%), western larch / Douglas-fir (43%),

Desired future conditions: Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

This harvest unit is bordered on the north by a proposed road and harvest unit boundary with unit 22-1, to the west by a proposed road and slope break transition to skyline harvest unit 22-7, to the south by the state property line and to the east by a slope break and talus rock outcroppings.

This harvest unit incorporates areas of four different SLI stands as indicated by the four different habitat types listed above. The *Abies grandis/Clintonia uniflora* (grand fir/queencup beadlily) habitat type occurs on the moist northeast aspect of the harvest unit. These areas exhibit high to very high timber productivity, although instances of Indian paint fungus (*Echinodontium tinctorum)* can greatly reduce productivity of the grand fir. This habitat type can be expected to reach a climax condition of grand fir / queencup beadlily without disturbance or management, as indicated by the dense thickets of grand fir regeneration found in the harvest unit. The *Abies grandis/Linnaea borealis* (grand fir/twinflower) habitat type occurs on the on moist areas of north aspects and benches. This habitat type exhibits high timber productivity. These areas are expected to reach a climax condition of grand fir / twinflower without disturbance or management. This can be recognized by the abundance of grand fir regeneration in the stand. The *Pseudotsuga menziesi/Calamagrostis rubescens* (Douglas-fir/pinegrass) habitat type occurs on warm moderately dry well drained slopes. This represents the ridge line area of this harvest unit. Timber production is classified as moderate, with regeneration harvests benefiting early seral species. These areas are expected to reach a climax condition of Douglas-fir /

pinegrass without management or disturbance. The *Pseudotsuga menziesii/Physocarpus malvaceus-Calamagrostis rubescens* (Douglas-fir/ninebark – pinegrass phase) habitat type occurs on the cool northwest slope of the ridge. This habitat type is characterized by moderate to high timber productivity and regeneration harvests enhance recruitment of early seral species. (Pfister, Kovalchik, Arno, & Presby, 1997)

This stand is currently comprised of 66% Douglas-fir with a mean DBH of 12", 23% ponderosa pine with a mean DBH of 14" and 11% western larch with a mean DBH of 12", with scattered grand fir. The current multistoried stand has a closed canopy and regeneration is limited to pockets of shade tolerant species, primarily grand fir and Douglas-fir. Trees ages range from 40 - 90 years in the mid-story and 91 – 150 years in the over-story. Tree heights range from 50 – 74 feet in the mid-story to 75 – 110 feet in the over-story. Snags are underrepresented in this harvest unit, due to active fire wood cutting.

Insects and disease are active in the stand, primarily: dwarf mistletoe (*Arceuthobium spp.)* in the Douglas-fir and western larch, root rot in the Douglas-fir, western pine beetle (*Dendroctonus brevicomis)* in the ponderosa pine, and Indian paint fungus (*Echindotium tinctorium*) in the grand fir. (Hagle, Gibson, & Tunnock, 2003)

The stand represents a high fire danger due to excessive fuel loading and high instance of ladder fuels, adjacent to an open road.

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Shelterwood harvest with regeneration retention.
- Ground based harvesting with cut to length, or whole tree skidding.
- Leave tree marked: 15 - 20 trees per acre, 40 – 50' spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Slash in excess of down woody material requirements would be piled and burned at landings.

Nutrient Cycling:

- Return skid a majority of tops to unit for nutrient cycling.
- Retain a majority of needles and limbs on the unit for approximately one year.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.
- Opportunities for machine piling and scarification following harvest to promote natural regeneration would be considered.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-3 **Location:** S22 T19N R26W **Acres:** 43

Elevation: 33600 - 3680 **Slope:** 10 – 25% **Aspect(s):** NW

Habitat type: ABGR / LIBO – LIBO (591), PSME / PHMA – CARU (262).

Soils: Mitten gravelly ashy silt loam**,** Winkler gravely sandy loam

Current Condition: ponderosa pine **Desired future conditions**: Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

This harvest unit is bordered on the north and south by state property lines and on the east and west by Class II SMZ no harvest buffers.

Harvest unit 22-3 encompasses portions of two distinct stands as defined by the SLI. The *Abies grandis/Linnaea borealis* (grand fir/twinflower) habitat type occurs on the areas of north aspects. This habitat type generally exhibits high timber productivity. These areas are expected to reach a climax condition of grand fir / twinflower without disturbance or management. This can be recognized by the abundance of grand fir regeneration in the stand. The *Pseudotsuga menziesii/Physocarpus malvaceus-Calamagrostis rubescens* (Douglas-fir/ninebark – pinegrass

phase) habitat type occurs on the west slope of the ridge. This habitat type is characterized by moderate to high timber productivity and regeneration harvests enhance recruitment of early seral species. Much of this harvest unit is nearing its climax condition of Douglas-fir / ninebark without disturbance or management. (Pfister, Kovalchik, Arno, & Presby, 1997)

This harvest unit is currently comprised of 46% Douglas-fir with a mean DBH of 12", 42% ponderosa pine with a mean DBH of 13", 10% western larch with a mean DBH of 14", and approximately 1% grand fir with a mean DBH of 20". The current multistoried stand has a closed canopy and regeneration is limited to pockets of shade tolerant species, primarily grand fir and Douglas-fir. Trees ages range from 40 - 75 years in the mid-story and 75 – 100 years in the over-story with scattered individuals > 120 years. Tree heights range from 50 – 74 feet in the mid-story to 75 – 110 feet in the over-story.

Insects and disease are active in the stand, primarily: dwarf mistletoe (*Arceuthobium spp.)* in the Douglas-fir and western larch, root rot in the Douglas-fir, Pini rot (*Phellinus pini*) in the western larch and Indian paint fungus (*Echindotium tinctorium*) in the grand fir. (Hagle, Gibson, & Tunnock, 2003)

The stand represents a high fire danger due to excessive fuel loading and high instance of ladder fuels.

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Shelterwood harvest with regeneration retention.
- Ground based harvesting with cut to length, or whole tree skidding.
- Leave tree marked: 15 - 20 trees per acre, 40 – 50' spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Slash in excess of down woody material requirements would be piled and burned at landings.

Nutrient Cycling:

- Return skid a majority of tops to unit for nutrient cycling.
- Retain a majority of needles and limbs on the unit for approximately one year.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.
- Opportunities for machine piling and scarification following harvest to promote natural regeneration would be considered.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-4 **Location:** S22 T19N R26W **Acres:** 11

Elevation: 3480 - 3720 **Slope:** 10 – 35% **Aspect(s):** NW

Habitat type: ABGR / LIBO – LIBO (591) **Soils:** Mitten gravelly ashy silt loam

Current Condition: ponderosa pine **Desired future conditions**: Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

Harvest unit 22-4 is bordered on the north by the state section line, on the west and south by a Class II SMZ, and on the east by a slope break unit boundary.

This harvest unit is comprised of one stand as described by the SLI. The *Abies grandis/Linnaea borealis* (grand fir/twinflower) habitat type occurs throughout the harvest unit. This habitat type generally exhibits high timber productivity. These areas are expected to reach a climax condition of grand fir / twinflower without disturbance or management. (Pfister, Kovalchik, Arno, & Presby, 1997)

This stand is currently comprised of 46% Douglas-fir with a mean DBH of 12”, 42% ponderosa pine with a mean DBH of 13”, 10% western larch with a mean DBH of 14”, and approximately

1% grand fir with a mean DBH of 20". The current multistoried stand has a closed canopy and regeneration is limited to pockets of shade tolerant species, primarily grand fir and Douglas-fir. Trees ages range from 40 - 75 years in the mid-story and 75 – 100 years in the over-story with scattered individuals > 120 years. Tree heights range from 50 – 74 feet in the mid-story to 75 – 110 feet in the over-story.

Insects and disease are active in the stand, primarily: dwarf mistletoe (*Arceuthobium spp.)* in the Douglas-fir and western larch, root rot in the Douglas-fir, Pini rot (*Phellinus pini*) in the western larch and Indian paint fungus (*Echindotium tinctorium*) in the grand fir. (Hagle, Gibson, & Tunnock, 2003)

The stand represents a high fire danger due to excessive fuel loading and high instance of ladder fuels.

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Shelterwood harvest with regeneration retention.
- Ground based harvesting with cut to length, or whole tree skidding.
- Leave tree marked: 15 - 20 trees per acre, 40 – 50' spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Slash in excess of down woody material requirements would be piled and burned at landings.

Nutrient Cycling:

- Return skid a majority of tops to unit for nutrient cycling.
- Retain a majority of needles and limbs on the unit for approximately one year.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.
- Opportunities for machine piling and scarification following harvest to promote natural regeneration would be considered.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-5 **Location:** S22 T19N R26W **Acres:** 17

Elevation: 3920 - 4200 **Slope:** 10 – 35% **Aspect(s):** W- N

Habitat type: PSME / PHMA – CARU (262), THPL/CLUN – CLUN (531).

Soils: Combest gravely ashy silt loam

Current Condition: 77% ponderosa pine, 23% mixed conifer

Desired future conditions: Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

This ridge top harvest unit is bordered on the north by the state property line, on the west by a proposed road on the slope break, on the south by the section line and on the east by a slope break harvest unit boundary.

This harvest unit exhibits poorer growing conditions and shorter tree heights than the surrounding draws and slopes. The harvest unit wraps over the ridge, incorporating west and north aspects, the dual habitat types and current cover type illustrates this change. The dryer west aspect is a *Pseudotsuga menziesii / Physocarpus malvaceus* (Douglas-fir / ninebark) habitat type. Timber productivity is moderate to high in this habitat type, although productivity can be greatly reduced by dwarf mistletoe. This habitat type is expected to reach a climax condition of Douglas-fir ninebark without disturbance or management. The wetter north aspect of this harvest unit is a *Thuja plicatta / Clintonia uniflora* (western red cedar / queencup beadlily) habitat type. Timber productivity is generally high to very high in this habitat type, although

intensive management is required to achieve full potential. (Pfister, Kovalchik, Arno, & Presby, 1997)

The stand is currently comprised of 48% ponderosa pine with a mean DBH of 14", 33% Douglas-fir with a mean DBH of 10", 12% grand fir with a mean DBH of 11", and scattered large western larch with a mean DBH of 25". The current multistoried stand has a partly closed canopy and regeneration is generally limited to pockets of shade tolerant species, primarily grand fir and Douglas-fir. Trees ages range from 40 - 75 years in the mid-story and 75 – 100 years in the over-story with scattered individuals > 150 years. Tree heights range from 40 – 60 feet in the mid-story to 60 – 90 feet in the over-story.

Insects and disease are active in the stand, primarily: heavy infestations of dwarf mistletoe (*Arceuthobium douglasii*) in the Douglas-fir, pini rot (*Phellinus pini*) in the western larch, and western pine beetle (*Dendroctonus brevicomis)* in the ponderosa pine. (Hagle, Gibson, & Tunnock, 2003)

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Shelterwood harvest with regeneration retention.
- Ground based harvesting with cut to length, or whole tree skidding.
- Leave tree marked: 15 - 20 trees per acre, 40 – 50' spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Slash in excess of down woody material requirements would be piled and burned at landings.

Nutrient Cycling:

- Return skid a majority of tops to unit for nutrient cycling.
- Retain a majority of needles and limbs on the unit for approximately one year.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.
- Opportunities for machine piling and scarification following harvest to promote natural regeneration would be considered.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-6 **Location:** S22 T19N R26W **Acres:** 10

Elevation: 3560 - 3800 **Slope:** 40 - 60% **Aspect(s):** W

Habitat type: PSME / PHMA – CARU (262)

Soils: Winkler gravely sandy loam, Winkler cool-Sharrott, cool-Rubble land complex.

Current Condition: ponderosa pine **Desired future conditions**: Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

This west aspect mid slope harvest unit is bordered to the north by a slope break transition to tractor skidding, to the west by the Combest Creek Rd. USFS #508, to the south by the state property line and to the east of a proposed road on the slope break transition to tractor skidding.

This harvest unit is comprised of one habitat type as described by the SLI. This relatively dry west aspect is a *Pseudotsuga menziesii / Physocarpus malvaceus* (Douglas-fir / ninebark) habitat type. Timber productivity is moderate to high in this habitat type, although productivity can be greatly reduced by dwarf mistletoe. This habitat type is expected to reach a climax condition of Douglas-fir/ninebark without disturbance or management. (Pfister, Kovalchik, Arno, & Presby, 1997)

This stand is currently comprised of 66% Douglas-fir with a mean DBH of 11”, 34% ponderosa pine with a mean DBH of 11’, and scattered western larch. The current two storied stand has a

generally closed canopy and regeneration is limited to dense pockets of Douglas-fir. Trees ages range from 50 – 100 years in the over-story with scattered individuals > 150 years. Tree heights range from 40 – 90 feet in the over-story. Snags are unrepresented in this stand do to active fire wood cutting.

Insects and disease are active in the stand, primarily: western pine beetle (*Dendroctonus brevicomis)* in the ponderosa pine. (Hagle, Gibson, & Tunnock, 2003)

The stand represents a high fire danger due to fuel loading and ladder fuels adjacent to an open road.

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Common Schools and Public Buildings Trust Grants by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Seed-tree harvest with regeneration protection where appropriate.
- Skyline operations with whole tree yarding.
- Leave tree marked: 10 – 12 trees per acre, 50 – 60' spacing spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Accumulated slash would be piled at landings for burning.

Nutrient Cycling:

- Nutrient cycling would be achieved through top and limb breakage, as well as slashing logging damaged and mistletoe infected sub-merchantable trees.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-7 **Location:** S22 T19N R26W **Acres:** 26

Elevation: 3440 - 3760 **Slope:** 40 - 65% **Aspect(s):** NE - NW

Habitat type: THPL/CLUN – CLUN (531), ABGR / LIBO – LIBO (591)

Soils: Mitten gravelly ashy silt loam, Combest gravely ashy silt loam

Current Condition: 65% Mixed Conifer, 35% ponderosa pine

Desired future conditions: 100% Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

This harvest unit is bordered to the west and south by state property lines and to the east and north by the Combest Creek Rd. USFS #508. A class I stream bisects the unit running se – nw.

This harvest unit incorporates portions of two distinct stands as described by the SLI. The wetter portions of this harvest unit are a *Thuja plicatta/Clintonia uniflora* (western red cedar/queencup beadlily) habitat type. Timber productivity is generally high to very high in this habitat type, although intensive management is required to achieve full potential. These areas have a current condition of mixed conifer. The comparatively drier portions of this harvest unit are an *Abies grandis/linnaea borealis* (grand fir/twinflower) habitat type. This habitat type generally exhibits high timber productivity. These areas are expected to reach a climax condition of grand fir / twinflower without disturbance or management, as illustrated by the dense stands of *Abies grandis* regeneration in the stand. The current cover type for this portion of the harvest unit is ponderosa pine. (Pfister, Kovalchik, Arno, & Presby, 1997)

This stand is currently comprised of 53% Douglas-fir with a mean DBH of 11”, 35% ponderosa pine with a mean DBH of 16’, and 8% western larch with a mean DBH of 12, and scattered grand fir and western red cedar. The current two storied stand has a generally closed canopy and regeneration is limited to dense pockets of Douglas-fir and grand fir. Trees ages range from 50 – 100 years in the over-story with scattered individuals > 150 years. Tree heights range from 40 – 90 feet in the over-story with individuals >110’.

Insects and disease are active in the stand, including: heavy infestations of dwarf mistletoe (*Arceuthobium douglasii*) and root disease in the Douglas-fir. (Hagle, Gibson, & Tunnock, 2003)

The stand represents a high fire danger due to fuel loading and ladder fuels adjacent to an open road.

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Seed-tree harvest with regeneration protection where appropriate.
- Skyline operations with whole tree yarding.
- Leave tree marked: 10 – 12 trees per acre, 50 – 60' spacing spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

RMZ Harvest

- Total area: approximately 2 acres.
- Leave tree marked: 50% of the volume >8" DBH in the outer 30 – 50' of the RMZ.
- All timber would be felled away from the stream channel; no slash may enter the stream.
- Protect sub-merchantable material to the greatest extent possible.
- The inner 50' (closer to the stream channel) is a No Cut Area.

Hazard Reduction:

- Accumulated slash would be piled at landings for burning.

Nutrient Cycling:

- Nutrient cycling would be achieved through top and limb breakage, as well as slashing logging damaged and mistletoe infected sub-merchantable trees.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-8 **Location:** S22 T19N R26W **Acres:** 22

Elevation: 3720 – 4120 ft. **Slope:** 45 - 60% **Aspect(s):** W

Habitat type: THPL/CLUN – CLUN (531), PSME / PHMA – CARU (262)

Soils: Winkler cool-Sharrott, cool-Rubble land complex,

Current Condition: ponderosa pine, Mixed Conifer

Desired future conditions: Ponderosa Pine

Trust Grant: Public Buildings

Description of stand(s):

This harvest unit is bordered to the north and south by state property lines, to the west by a Class I SMZ (Combest Creek) and to the east by a proposed new road on the slope break transition to tractor skidding. The Combest Creek Rd. USFS #508 bisects the harvest unit from north to south.

This harvest unit is comprised of two stands as described by the SLI. The majority of the harvest unit is a *Pseudotsuga menziesii/Physocarpus malvaceus* (Douglas-fir/ninebark)

habitat type. Timber productivity is moderate to high in this habitat type, although productivity can be greatly reduced by dwarf mistletoe. This habitat type is expected to reach a climax condition of Douglas-fir ninebark without disturbance or management. The Current Condition of this stand is ponderosa pine. The wetter portions of this harvest unit are a *Thuja plicatta/Clintonia uniflora* (western red cedar/queencup beadlily) habitat type. Timber productivity is generally high to very high in this habitat type, although intensive management is required to achieve full potential. These areas have a Current Condition of mixed conifer. (Pfister, Kovalchik, Arno, & Presby, 1997)

This harvest unit is currently comprised of 60% ponderosa pine with a mean DBH of 13', 40% Douglas-fir with a mean DBH of 14" and scattered western larch and grand fir. The current two storied stand has a patchy canopy and regeneration is limited to Douglas-fir and grand fir in the bottom 1/3 of the slope. Trees ages range from 50 – 100 years in the over-story with scattered individuals > 150 years. Tree heights range from 50 – 100 feet in the over-story with individuals >110'.

Insects and disease are active in the stand, including: heavy infestations of dwarf mistletoe (*Arceuthobium spp.*) in Douglas-fir and western larch and root disease in the Douglas-fir, and western pine beetle (*Dendroctonus brevicomis)* in the ponderosa pine. (Hagle, Gibson, & Tunnock, 2003)

The stand represents a high fire danger due to fuel loading and ladder fuels adjacent to an open road.

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Seed-tree harvest with regeneration protection where appropriate.
- Skyline operations with whole tree yarding.
- Leave tree marked: 10 – 12 trees per acre, 50 – 60' spacing spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

RMZ Harvest

- Total area: 2.5 acres
- Leave tree marked: 50% of the volume >8" DBH in the outer 30 – 50' of the RMZ.
- All timber would be felled away from the stream channel; no slash may enter the stream.
- Protect sub-merchantable material to the greatest extent possible.
- The inner 50' (closer to the stream channel) is a No Cut Area.

Hazard Reduction:

- Accumulated slash would be piled at landings for burning.

Nutrient Cycling:

- Nutrient cycling would be achieved through top and limb breakage, as well as slashing logging damaged and mistletoe infected sub-merchantable trees.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-9 **Location:** S22 T19N R26W **Acres:** 12

Elevation: 3680 - 3920 **Slope:** 30 - 60% **Aspect(s):** NE

Habitat type: THPL/CLUN – CLUN (531) **Soils:** Mitten gravelly ashy silt loam

Current Condition: Mixed Conifer

Desired future conditions: western larch / Douglas-fir

Trust Grant: Public Buildings

Description of stand(s):

This harvest unit is bordered to the north and east by Combest Creek, a Class I SMZ; to the south and west by state property lines and to the southwest by the optional harvest unit 22-10.

This harvest unit incorporates one stand as described by the SLI. The stand is a *Thuja plicatta/Clintonia uniflora* (western red cedar/queencup beadlily) habitat type. Timber productivity is generally high to very high in this habitat type, although intensive management is required to achieve full potential. This stand is nearing its climax condition of western red cedar / queencup beadlily due to lack of management or disturbance. (Pfister, Kovalchik, Arno, & Presby, 1997)

This stand is currently comprised of 60% ponderosa pine with a mean DBH of 13', 40% Douglas-fir with a mean DBH of 14" and scattered western larch and grand fir and lodge pole pine. Lodge pole pine was once a major component of this stand but much as expired and is now forming a deep layer of jackstraw on the forest floor. The current two storied stand has a patchy canopy and regeneration is limited to Douglas-fir and grand fir. Trees ages range from 50 – 100 years in the over-story with scattered individuals > 150 years. Tree heights range from 50 – 100 feet in the over-story with individuals >110'.

Insects and disease are active in the stand, including: heavy infestations of dwarf mistletoe (*Arceuthobium spp.*) in the Douglas-fir and western larch, Pini rot (*Phellinus pini)* in the western larch and Indian paint fungus (*Echindotium tinctorium*) in the grand fir. (Hagle, Gibson, & Tunnock, 2003)

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

- Seed-tree harvest with regeneration protection where appropriate.
- Skyline operations with full suspension whole tree yarding.
- Leave tree marked: 10 – 12 trees per acre, 50 – 60' spacing spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

RMZ Harvest

- Total area: 2.5 acres
- Leave tree marked: 50% of the volume >8" DBH in the outer 30 – 50' of the RMZ.
- All timber would be felled away from the stream channel; no slash may enter the stream.
- Protect sub-merchantable material to the greatest extent possible.
- The inner 50' (closer to the stream channel) is a No Cut Area.

Hazard Reduction:

- Accumulated slash would be piled at landings for burning.

Nutrient Cycling:

- Nutrient cycling would be achieved through top and limb breakage, as well as slashing logging damaged and mistletoe infected sub-merchantable trees.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Unit Number: 22-10 **Location:** S22 T19N R26W **Acres:** 13

Elevation: 3800 - 4000 **Slope:** 30 - 60% **Aspect(s):** NE

Habitat type: THPL/CLUN – CLUN (531) **Soils:** Mitten gravelly ashy silt loam

Current Condition: mixed conifer

Desired future conditions: western larch / Douglas-fir

Trust Grant: Public Buildings

Description of stand(s):

This optional harvest unit is bordered by Combest Creek, a Class I SMZ on the north and east; and by the state property line on the west and south.

This harvest unit incorporates one stand as described by the SLI. The stand is a *Thuja plicatta/Clintonia uniflora* (western red cedar/queencup beadlily) habitat type. Timber productivity is generally high to very high in this habitat type, although intensive management is required to achieve full potential. This stand is nearing its climax condition of western red cedar / queencup beadlily due to lack of management or disturbance. (Pfister, Kovalchik, Arno, & Presby, 1997)

This stand is currently comprised of 55% grand fir with a mean DBH of 12', 20% Douglas-fir with a mean DBH of 11", 10% ponderosa pine with a mean DBH of 29", 7% western red cedar with a mean diameter of 10", and small quantities of lodge pole pine and western larch. Lodge pole

pine was once a major component of this stand but much as expired and is now forming a deep layer of jackstraw on the forest floor. The current multi storied stand has a closed canopy and regeneration is limited to dense pockets of grand fir. Trees ages range from 50 – 100 years in the over-story with scattered individuals > 150 years. Tree heights range from 50 – 100 feet in the over-story with individuals >110'.

Insects and disease are active in the stand. Such as: dwarf mistletoe (*Arceuthobium spp.*) in the Douglas-fir and western larch, root disease in the Douglas-fir, Pini rot (*Phellinus pini)* in the western larch and Indian paint fungus (*Echindotium tinctorium*) in the grand fir. (Hagle, Gibson, & Tunnock, 2003)

Treatment Objectives:

- Minimize losses in merchantable timber volume, and generate income for the Public Buildings Trust Grant by removing unhealthy, poorly formed, overcrowded, diseased and dying trees from the stand.
- Reduce overall fire hazard of the stand by removing diseased and dying trees and ladder fuels, and adequately spacing healthy residual trees.
- Promote long term forest health, insect and disease resistance and promote continued regeneration of desired future condition species.

Prescribed Treatment:

This unit is optional and thus the timber is not marked. If the purchaser chose to harvest this unit, the following harvest prescription would be used:

- Seed-tree harvest with regeneration protection where appropriate.
- Skyline operations with full suspension whole tree yarding.
- Retain 10 – 12 trees per acre, 50 – 60' spacing.
- Retain 2 snags and 2 snag recruits per acre of the largest size class available.
- Preferred retention species are ponderosa pine, western larch and Douglas-fir.
- Retain healthy, disease free trees with good crown and bark characteristics.
- Slash logging damaged and mistletoe infected sub-merchantable trees.

Hazard Reduction:

- Accumulated slash would be piled at landings for burning.

Nutrient Cycling:

- Nutrient cycling would be achieved through top and limb breakage, as well as slashing logging damaged and mistletoe infected sub-merchantable trees.

Site Preparation and Regeneration:

- Spatial openings created by the proposed treatment should provide opportunities for establishment of natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of harvest, and the need for supplemental planting determined.
- The stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 15 - 20 years from time of harvest.
- The stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire, or other unanticipated circumstances on a case by case basis.

Works Cited

Hagle, S. K., Gibson, K. E., & Tunnock, S. (2003). *Field Guide to Diseases and Insect Pests of Northern and Central Rocky Mounain Conifers.* Missoula: United States Department of Agriculture Forest Service .

Pfister, R. D., Kovalchik, B. L., Arno, S. F., & Presby, R. C. (1997). *Forest Habitat Types of Montana.* Missoula: Intermountain Forest and Range Experiment Station.

ATTACHMENT IV

MITIGATIONS

The following mitigation measures have been incorporated into the proposed project design.

Roads:

- A transportation system minimizing road miles and meeting all Best Management Practices (BMP) has been designed by DNRC Foresters.
- New construction, reconditioned and improved roads would have drainage installed, and would be grass seeded and fertilized at the direction of the Forest Officer. Restricted access roads would be closed to vehicle traffic following harvesting.
- Upon completion of road work, all haul roads would meet BMP standards.

Wildlife

- If a threatened or endangered species is encountered, consult a DNRC biologist and develop additional mitigations that are consistent with the Forest Management Rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*).
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per ARM 36.11.444(2) and *GB-PR2* (*USFWS and DNRC 2010)*.
- Contractors must adhere to food storage and sanitation requirements as per GB-PR3 (*USFWS and DNRC 2010*).
- Within Canada lynx winter foraging habitat, retain up to 10% of the stand area in patches of advanced regeneration of shade-tolerant trees (grand fir, subalpine fir, and spruce) as per LY-HB4 (*USFWS and DNRC 2010).*
- Minimize mechanized activity within 0.25 miles of burned forested stands in the project area between April 15- July 1st to minimize disturbance to black-backed woodpeckers.
- Retain 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh) particularly favoring ponderosa pine and western larch.
- Retain 10-20 tons/acre coarse woody debris as consistent with Graham et al (*1994*). Emphasize the retention of downed logs ≥15 inches dbh where they occur as per LY-HB2 (*USFWS and DNRC 2010).*
- Use a combination of topography, group retention, and roadside vegetation to reduce sight distances within harvest units where feasible.

Soils:

- Limit equipment operations to periods when soils are relatively dry, (less than 20 percent of oven-dried weight), frozen, or snow-covered to in order to minimize soil compaction and rutting, and maintain drainage features. Check soil moisture conditions prior to equipment start-up.
- On ground-based units, the logger and sale administrator would agree to a skidding plan prior to equipment operations. Skid-trail planning would identify which main trails to use and how many additional trails are needed. Trails that do not comply with BMPs (i.e. trails in draw bottoms) would not be used unless impacts can be adequately mitigated. Regardless of use, these trails 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 of less than 40 percent unless the operation can be completed without causing excessive displacement or erosion. Based on site review, short, steep slopes may require a combination of mitigation measures, such as adverse skidding to a ridge or winchline, and skidding from more moderate slopes of less than 40 percent.
- Keep skid trails to 20 percent or less of the harvest unit acreage. Provide for drainage in skid trails and roads concurrently with operations.
- Slash disposal: Limit the combination of disturbance and scarification to 30 to 40 percent of the harvest units. No dozer piling on slopes over 35 percent; no excavator piling on slopes over 40 percent, unless the operation can be completed without causing excessive erosion. Consider lopping and scattering or jackpot burning on the steeper slopes. Consider disturbance incurred during skidding operations to, at least, partially provide scarification for regeneration.
- Retain 10 to 20 tons of large woody debris (depending on habitat type) and a feasible majority of all fine litter following harvesting operations. On units where whole tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves slash on site; 2) for whole-tree harvesting, return-skid slash and evenly distribute within the harvest area; or 3) cut tops from every third bundle of logs so that tops are dispersed as skidding progresses.

Regeneration:

- Silvicultural prescriptions designed to promote natural regeneration of desired future conditions and historic timber types have been incorporated into the project design.
- Seedlings of the desired future condition species would be planted where soil conditions allow and there is little or no seed source as determined by Forest Officer.

Hydrology:

- All rules and regulations pertaining to the Streamside Management Zone (SMZ) Law would be followed.

Noxious Weed Management:

- Newly constructed roads and skid trail approaches would be seeded and fertilized following construction and project completion. Prior to entering the site, off-road logging equipment would be cleaned and inspected through the timber sale contact to avoid seed migration. Restricted entry roads would be closed following the sale to avoid migration of weed seed into the area. Post-harvest, the area would be included in the Plains Unit's integrated weed management program.

Attachment V

Consultants and References

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