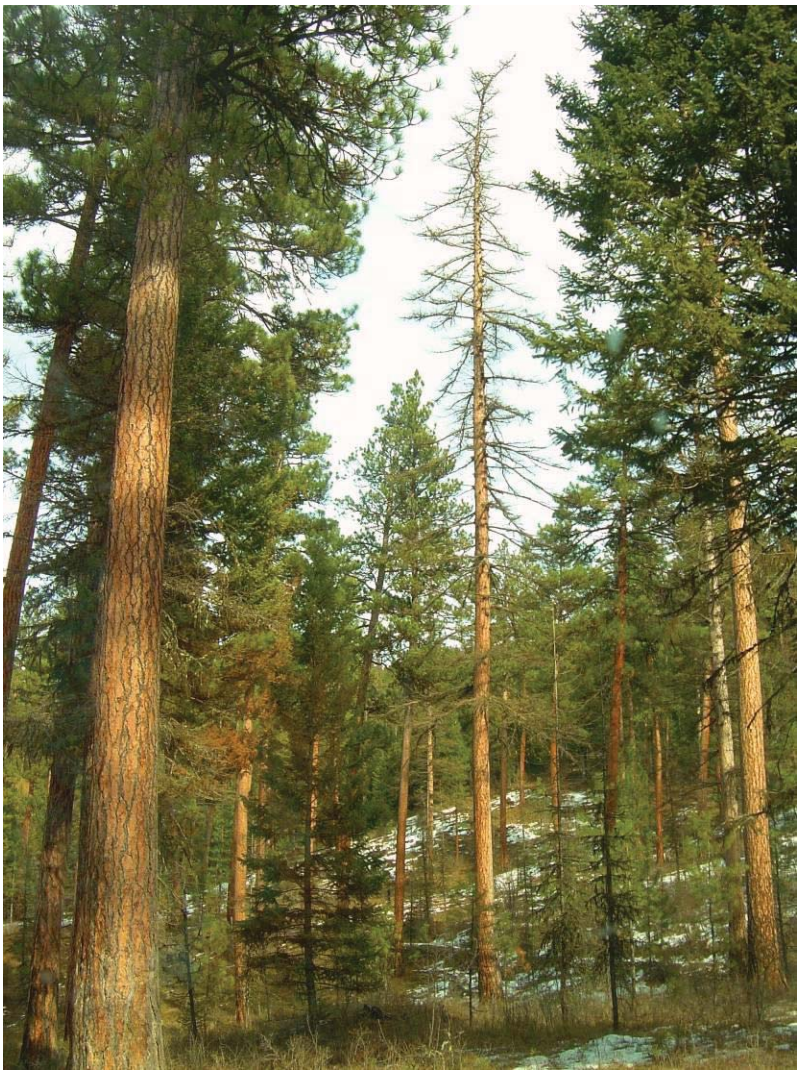
DEER CREEK
TIMBER SALE
Environmental Assessment



May 24, 2010
Montana Department of Natural Resources and Conservation
Southwestern Land Office
Missoula Unit

FINDING
DEER CREEK TIMBER SALE

An interdisciplinary team (ID Team) has completed the Environmental Assessment (EA) for the Deer Creek Timber Sale prepared by the Montana Department of Natural Resources and Conservation (DNRC). After review of the EA, project file, public correspondence, Department Administrative Rules, policies, and the State Forest Land Management Plan (SFLMP), I have made the following decisions:

1. ALTERNATIVE SELECTED

Two alternatives were presented and the effects of each alternative were fully analyzed in the EA:

1. The No Action Alternative
2. The Action Alternative

The Action Alternative proposes to harvest approximately 2.8 million board feet (MMBF) of timber on 338 acres. The No Action Alternative does not include the harvest of any timber. Subsequent review determined that the alternatives, as presented, constituted a reasonable range of potential activities.

For the following reasons, I have selected the Action Alternative without additional modifications:

a) The Action Alternative meets the Project Need and the specific Objectives of the Proposed Action (Desired Outcomes and Conditions) as described on pages 1 and 2 of the EA. The Action Alternative would produce an estimated $270,000 ($97/MBF) return to the Public Building (PB) Trust, while providing a mechanism whereby the existing timber stands would be moved towards conditions more like those which existed historically.

b) The analysis of identified issues did not disclose any reason compelling the DNRC to not implement the timber sale.

c) The Action Alternative includes mitigation activities to address environmental concerns identified during both the Public Scoping phase and the project analysis.

2. SIGNIFICANCE OF IMPACTS

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

a) **Soils –** With the implementation of BMPs and the recommended mitigation measures, the proposed harvest operations present a low risk of detrimental impacts to soils. Existing roads would be improved to meet BMPs. Leaving 5 – 15 tons of large, woody debris on site will provide for long-term soil productivity. Harvest mitigation measures such as skid trail planning and season of use limitations will limit the potential for severe soil impacts

b) **Water Quality –** There would be a low risk of direct or indirect impacts to water quality or downslope beneficial uses within the watershed. There is very low risk of cumulative impacts to water quality or beneficial uses from increases in water yield or sediment delivery. Water Quality Best Management Practices for Montana Forests (BMPs) and the Streamside Management Zone (SMZ) law will be strictly adhered to during all operations involved with the implementation of the Action Alternative.

c) **Cumulative Watershed Effects –** Estimated increases in annual water yield for the proposed action has been determined to be negligible by the DNRC Hydrologist. Increases in sediment yield are expected to be negligible due to the amount of area treated, location along the landscape, replacement and/or improvement of existing culverts and mitigations designed to minimize erosion.

d) **Noxious Weeds –** Equipment will be cleaned prior to entering the project area, which will reduce the likelihood of weed seeds being introduced onto treated areas. The DNRC will monitor the project area for two years after harvest and will use an Integrated Weed Management strategy to control wee infestations should they occur.

e) **Forest Conditions and Forest Health –** Implementation of the Action Alternative would reduce stocking levels, Mountain Pine Beetle infestations and dwarf mistletoe infection rates within treated stands. The remaining stands would likely emulate those conditions which existed prior to European settlement, with seral species dominant. Stand productivity would be expected to increase.

f) **Cold Water Fisheries –** Implementation of the SMZ law and Rules, Best Management Practices and site-specific recommendations of the DNRC Soil Scientist and Hydrologists would minimize impacts to downstream perennial stream channels.

g) **Air Quality –** Full compliance with applicable air quality laws would be achieved by securing approval from the Montana-Idaho state airshed group prior to any burning operations. Burning associated with slash disposal would only be done on days with good to excellent smoke dispersion.

h) **Visual Quality –** Reduced stocking levels, fresh slash and skid trails could affect the appearance of the project area. Following treatment, all stands would have a more open appearance.

i) **Urban Interface Fire Hazard –** Commercial thinning and slash burning would reduce fuel levels and fire hazard adjacent to homes. The risk of high intensity wildfire would be greatly reduced.

j) **Log Truck Use of Public Roads –** There will be increased truck traffic on the county maintained Deer Creek Road to East Missoula. Decking and loading of logs on the county road would be prohibited thereby reducing the likelihood of any traffic delays.

k) **Wildlife –** The proposed harvest operations present a minimal likelihood of negative impacts to Threatened and Endangered Species. Those potential impacts that do exist have been mitigated to levels within acceptable thresholds. The same is true for those species that have been identified as "sensitive" by the DNRC. The effects of the proposed action on Big Game species would be low due to habitat not being a limiting factor in the project area.

3. PRECEDENT SETTING AND CUMULATIVE IMPACTS

The project area is located on State- owned lands, which are "principally valuable for the timber that is on them or for growing timber or for watershed" (**MCA 77-1-402**). The proposed action is similar to past projects that have occurred in the area. Since the EA does not identify future actions that are new or unusual, the proposed timber harvest is not setting precedence for a future action with significant impacts.

Taken individually and cumulatively, the identified impacts of the proposed timber sale are within established threshold limits. Proposed timber sale activities are common practices and none of the project activities are being conducted on fragile or unique sites.

The proposed timber sale conforms to the management philosophy adopted by DNRC and is in compliance with existing laws, policies, guidelines, and standards applicable to this type of action.

4. SHOULD DNRC PREPARE AN ENVIRONMENTAL IMPACT STATEMENT (EIS)?

Based on the following, I find that an EIS does not need to be prepared:

a) The EA adequately addressed the issues identified during project development, and displayed the information needed to make the pertinent decisions.

b) Evaluation of the potential impacts of the proposed timber sale indicates that significant impacts to the human environment will not occur as a result of the implementation of The Action Alternative.

c) The ID Team provided opportunities for public review and comment during project development and analysis.

__\s\ Jonathan Hansen_____
Jonathan Hansen
Missoula Unit Manager-Decision Maker
June 2, 2010

Deer Creek
Environmental Assessment

Cover Sheet

Proposed Action: The Montana Department of Natural Resources and Conservation (DNRC) proposes to conduct forest management work in sections 6, 8 and 18, T12N, R18W. This work would consist of the following: harvesting of approximately 18,000 tons (2.8 MMBF) of sawtimber from 338 acres by commercial thinning and selection cut treatment. Prescribed burning of piles and jackpots of slash would be done on approximately 200 acres.
Revenue generated for this project would be for the Public Building (PB) grant. The proposed action would be implemented as early as July 2010 and could be completed by December 2013. Slash work and burning associated with the sale may not be completed until 2013. These dates are approximate.

Lead agency: Montana Department of Natural Resources and Conservation (DNRC)

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Special Note: Comments received in response to this Environmental Assessment will be available for public inspection and will be released in their entirety if requested pursuant to the Montana Constitution.

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How to Read this EA
(Environmental Assessment)

To read this EA more effectively, carefully study this page. Following State regulations, we have designed and written this EA (1) **to provide** the Project Decision Maker with sufficient information to make an informed, reasoned decision concerning the proposed Deer Creek Timber Sale and (2) **to inform** members of the affected and interested public of this project so that they may express their opinions to the Project Decision Maker.

This EA follows the organization and content established by the Administrative Rules of Montana (ARM 36.2.521-36.2.543). The EA consists of the following chapters.

1.0 Purpose and Need for Action
2.0 Alternatives, Including the Proposed Action
3.0 Affected Environment
4.0 Environmental Consequences
5.0 List of Agencies and Persons Consulted
6.0 References
7.0 Appendix

Chapters 1 and 2 together serve as an Executive Summary. We have written these two chapters so that non-technical readers can understand the potential environmental, technical, economic, and social consequences of **taking** and of **not taking** action.

- **Chapter 1** introduces the Deer Creek Project. It provides a very brief description of the proposed Deer Creek Project and then explains three key things about the project:

  (1) the relevant environmental issues,

  (2) the decisions that the Project Decision Maker must make concerning this project, and

  (3) the relevant laws, regulations, and consultations with which the DNRC must comply.

- **Chapter 2** serves as the ***heart*** of this EA. It provides detailed descriptions of Alternative A: No Action and Alternative B: Action. Most important, it includes a **summary comparison** of the predicted effects of these two alternatives on the human environment, providing a clear basis for choice between the two alternatives for the Project Decision Maker and the Public.

- **Chapter 3** briefly describes the past and current conditions of the relevant resources (*issues*) in the project area that would be meaningfully affected, establishing a part of the baseline used for the comparison of the predicted effects of the alternatives.

- **Chapter 4** presents the detailed, analytic predictions of the consequences of implementing Alternative A: No Action and Alternative B: Action. These predictions include the direct, indirect and cumulative effects of implementing the alternatives.

Chapter 1: Purpose and Need for Action

1.1 Proposed Action

The Montana Department of Natural Resources and Conservation, (DNRC), proposes to conduct forest management work in sections 6, 8 and 18 of T12N, R18W. in the Deer Creek drainage of Missoula County. These parcels are located 3 to 5 miles east of Missoula, in Missoula County. This work would consist of: Harvesting an estimated 18,000 tons (2.8 MMBF) of sawtimber from 338 acres using a commercial thinning and selection cut treatment. Revenue generated from this project would be for the Public Building (PB) grant. The proposed action would be implemented as early as July 2010 and could be completed by December 2013. Slash work and burning associated with the sale may not be completed until 2013. These dates are approximate.

1.2 Need for Action

The lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions. These include public schools, state colleges and universities, and other specific state institutions such as the School for the Deaf and Blind (Enabling Act, February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and DNRC are required by law to administer these Trust Lands to produce the largest measure of reasonable and legitimate advantage over the long run for these beneficiary institutions (Section 77-1-202, MCA). The sections in this timber sale all contain stands of timber infested with mistletoe and beetles which need to be treated. These factors contribute to an overall unhealthy stand of timber which is contributing to heavy fuel loading within the Wildland Urban Interface. All forested lands involved in the proposed project would be managed in accordance with DNRC's State Forest Management Plan (SFLMP), Administrative Rules for Forest Management (ARMs:ARM 36.11.401 – 456), and other applicable state and federal laws. This project is planned and developed under these Laws and Rules.

1.3 Objectives of the Action

In order to fulfill the goals of the management philosophy adopted through programmatic review in the State Forest Land Management Plan and the ARMs for Forest Management, the Department has set the following specific project objectives:

Objective #1:

Continue to generate revenue for the Public Building Trust Account through harvesting timber in a manner to produce a sustainable timber yield over the long run.

Objective #2:

Reduce the incidents of Dwarf Mistletoe in the Douglas fir and beetle infestation in the Lodgepole Pine which would promote the health and vigor of the existing healthy Douglas fir, Ponderosa Pine and Western Larch.

Objective #3:
Reduce heavy fuel accumulations in the wildland/urban interface on the Trust lands in the Deer Creek Drainage.

1.4 Decisions to be Made

- Determine if alternatives meet the project objectives.
- Determine which alternative should be selected.
- Determine if the selected alternative would cause significant effect(s) to the human environment.
- Determine if the selected alternative should be implemented or an Environmental Impact Statement (EIS) should be prepared.

1.5 Relevant Plans and Regulations

The State Forest Land Management Plan (DNRC, 1996) established the agency's philosophy for the management of forested Trust Lands which states:

> "Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream…In the foreseeable future timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives (DNRC, SFLMP Record of Decision 1996 [ROD-1])"

The management direction provided in the SFLMP and Rules comprises the framework within which specific project planning and activities take place. DNRC's ARM for Forest Mangement are the specific legal resource management standards and measures under which DNRC implements the SFLMP and subsequently its forest management program.

The proposed action is limited to specific management activities, which are needed to implement the timber sale and provide resource protection. This assessment documents site-specific analysis and is not a general management plan or a programmatic analysis of the area. The scope of this environmental analysis (EA) was determined through DNRC interdisciplinary analysis and public involvement.

1.6 Public Involvement - Agencies, Individuals or Groups Contacted

Comments from the general public, interest groups and agency specialists were solicited from March of 2005 through April of 2005. A Legal Notice was run in the Missoulian from March 3, 2005 to March 27, 2005. Scoping letters were mailed to 32 organizations and individuals; (a list of the organizations/individuals contacted is available in the project file). Written comments were received from the following individuals and organizations: Alan S. Charters, homeowner in the East Fork of the Deer Creek Drainage; Shawn D Modula, homeowner in the East Fork of the Deer Creek drainage and Mack Long of Region 2 of the Montana Department of Fish, Wildlife and Parks. Gary

Gullard, a homeowner in the East Fork of the Deer Creek Drainage, called on the telephone several times to lend his support and voice his concerns.

The following DNRC resource specialists were involved in the project design, assessment of potential impacts, and development of mitigation measures:

Jonathan Hansen	Missoula Unit Manager
Jeff Rupkalvis	Forester, Missoula Unit
Mike McGrath	Wildlife Biologist, Southwest Land Office
Jeff Collins	Hydrologist, Southwest Land Office
Dana Boruch	Right of Way Specialist, Southwest Land Office
Renee Myers	Hydrologist, Southwest Land Office
Patrick Rennie	Archeologist, Agriculture and Grazing Management Bureau

1.7 Other Environmental Assessments (EAs) Related To This Project

Table 1.1: OTHER DNRC ACTIVITES

Project Name	Air miles from Deer Creek	Year of Proposed Activity	Description of proposed Activity
Fournier Creek	9	2007	Fire Salvage
Roman – Sixmile	9	2008	Commercial Thinning
Evaro Thinning	9	2009	Precommercial Thinning
Roman Thinning	9	2009	Precommercial Thinning
Mill Creek	20	2010	Selection
Dry Gulch	30	2010	Shelterwood

1.8 Permits, Licenses, and Other Authorizations Required

The project area is bordered by lands owned by the Lolo National Forest and The Nature Conservancy (formerly Plum Creek Timber Company owned lands). The DNRC is in the process of obtaining a temporary road use permit from the Lolo National Forest while pursuing a cost share agreement for road use with the Forest Service. There is an agreement in place with The Nature Conservancy for road use through the Around Missoula Reciprocal Access Agreement acquired from the Plum Creek Timber Company.

The 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 the limitations and conditions of the permit.

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

1.9 Issues

The following issues were identified during the scoping process. They constitute the basis for the formation of project specifications, development of mitigation measures, and assessment of environmental impacts.

1.9.1 Issues Studied in Detail

The following includes an existing condition and anticipated indirect, direct and cumulative effects assessment for water resources, soils and noxious weed management for the proposed Deer Creek Timber Sale Environmental Assessment. The following issue statements were developed from internal and public scoping regarding the effects of proposed timber harvest and road systems to water resources, fisheries, soils and noxious weeds.

WATER QUALITY

There is a concern that the proposed forest management activities may cause impacts to water quality as a result of increased erosion and sediment delivery to streams.

CUMULATIVE WATERSHED EFFECTS

There is a concern that the proposed timber harvest may cause or contribute to cumulative watershed impacts as a result of increased water yields.

SOIL RESOURCES

Timber harvest activities may result in increased erosion and reduced soil productivity due to excessive disturbance, compaction and displacement, or loss of nutrients depending on area and degree of harvest effects.

COLD WATER FISHERIES

The proposed forest management actions may have effects on fisheries and fish habitat features on project site streams that include: sedimentation, habitat connectivity, woody debris recruitment and increased stream temperature. Deer Creek is an important westslope cutthroat trout stream and comments were received encouraging avoiding timber harvest in the SMZ.

NOXIOUS WEEDS

There is a concern that the proposed forest management activities may introduce or spread noxious weeds.

AIR QUALITY
Prescribed burning of logging slash could produce large amounts of smoke that may adversely impact air quality. This is of particular concern adjacent to populated areas such as Missoula that are subject to cold air inversions, which trap pollutants in the valley bottom.

FOREST CONDITIONS AND FOREST HEALTH
Due to extensive timber harvesting near the turn of the century and decades of effective fire exclusion, the timber stands in the project area today are very different in structure and species composition than those which occupied the site prior to European settlement.

VISUAL QUALITY
Timber harvesting and road construction associated with the proposed action could adversely affect the visual quality of this area.

ECONOMIC BENEFITS AND PROJECT REVENUE
How much revenue would this project yield for the Public Building trust beneficiaries?

URBAN INTERFACE FIRE HAZARD
Dense timber stands and fuel accumulations adjacent to area homes currently present a fire hazard. Slash resulting from timber harvesting can also increase the fire hazard adjacent to these homes.

LOGGING EQUIPMENT BLOCKING ROADS
Blocked roads due to logging activity have the potential to cause economic loss and emergency services delays for residents.

THREATENED AND ENDANGERED SPECIES
The proposed action may negatively impact Threatened and Endangered species:

Canada Lynx
Grizzly Bear

SENSITIVE SPECIES
The proposed action may negatively impact Sensitive species:

Pileated Woodpecker
Flammulated Owl
Fisher

1.9.2 Issues Eliminated from Further Study

Gray Wolves— There is concern that timber harvest activities would alter gray wolf habitat or provide unnecessary disturbance. The project area is approximately 2.5 miles north of the nearest known wolf territory, and it is located in an area of high recreational

use (Pattee Canyon). Thus, due to the distance between the territory and project area, and high recreational use, there would be low risk of direct, indirect, or cumulative effects to gray wolves as a result of the proposed action.

Bald Eagle— There is concern that timber harvest activities would alter bald eagle habitat or provide unnecessary disturbance. The project area is approximately 2.2 miles southwest of the nearest known bald eagle nest. Thus, due to the distance between the nest and project area, there would be low risk of direct, indirect, or cumulative effects to bald eagles as a result of the proposed action.

Big Game—There is concern that timber harvest activities would alter big game habitat. Currently, the area is utilized by elk, mule deer, and white-tailed deer for spring, summer, and fall habitat, with winter range along the Clark Fork River. Because spring, summer, and fall habitat is not a limiting resource for these species, there would likely be a low risk of direct, indirect, or cumulative effects to them as a result of the proposed action.

The following species were considered but eliminated from detailed study due to lack of habitat present: Peregrine Falcon, black-backed woodpeckers, Harlequin Duck, common loon, Townsend's Big-eared Bat, Coeur d'Alene Salamander, Northern Bog Lemming, Mountain Plover, and Columbian Sharp-tailed Grouse.

OLD GROWTH

DNRC has adopted the minimum criteria described by Green et al (1992) to define old growth on State lands. This definition is based on the number of trees per acre of a specified age and size based on habitat type and cover type. DNRC's Stand Level Inventory (SLI) provides an initial classification of old growth stands on State lands and these stands are verified through field reconnaissance and/or the collection of field data during project preparation. The field verification process may, in some cases, identify old growth stands that were not classified as old growth in the SLI, and in other cases may change stands that were identified as old growth in the SLI to a non old growth classification.

Field surveys of the proposed harvest units did not identify any old growth stands; therefore, this issue was not considered for further analysis.

Chapter 2: Alternatives

2.1 Introduction

Chapter 2, Alternatives, is the heart of this EA. The purpose of Chapter 2 is to describe and compare the alternatives by summarizing the environmental consequences. Alternatives were planned through scoping and development of issues, input from Interdisciplinary Team (IDT) specialists, and guidance from the Montana Administrative Rules for Forest Management. In addition, compliance with trust mandates helped to shape alternatives. This chapter describes the activities of Alternative A: No Action and Alternative B: Action. Then, based on the descriptions of the relevant resources in Chapter 3: Affected Environment and the predicted effects of all alternatives in Chapter 4: Environmental Consequences, this chapter presents the predicted attainment of project objectives and the predicted effects of all alternatives on the quality of the human environment in **comparative** form, providing **a clear basis for choice among the options for the Decision Maker.**

This chapter has three sections:

- Description of Proposed Alternatives
- Summary Comparison of Project Objective Achievement
- Summary Comparison of Environmental Effects

2.2 Description of Alternatives

Alternative A: No Action

Under this alternative, land management activities would not be implemented. No revenue would be generated for the Public Buildings trust. Trees on the site would not be thinned. Dead and dying trees would be adding to the fuel load. Fire hazard to homes adjacent to state land would not be reduced but an increase in fuels would be realized potentially increasing the fire hazard.

Alternative B: Action

Timber harvesting would remove approximately 18,034 tons of saw timber, from approximately 338 acres, as shown in Figure 2-1, 2-2 and 2-3, (Alternative B: Project maps). Timber harvesting would be a combination of commercial thinning and a selection cut. These treatments would also serve to increase the growth rates of the trees remaining on the site. Harvesting would remove approximately 30-50% of the tree canopy cover in harvest units. The residual stands would be a mix of ponderosa pine, Douglas fir and western larch. Dominant healthy trees would be retained. The majority of ponderosa pine and western larch over 20” diameter breast height (DBH) would also be retained. 114 acres of harvesting would be done with ground based harvesting

equipment. 224 acres comprised of steep slopes would be harvested utilizing a cable yarding system.

All logging and thinning slash within 200 feet of private property would be piled and burned following harvesting. Logging slash in the remainder of the project area would be piled and burned or jackpot burned after harvest is completed. For further discussion on this topic see Silvicultural Prescription.

This alternative would provide $140,000-$270,000 in revenue to the Public Building trust (PB). This is based on a bid range of $7.50/ton to $15.00/ton.

2–1: Map of Alternative B: Harvest: Timber Harvest Units, Logging Methods, and Roads in Section 6, T12N – R18W.

Figure1

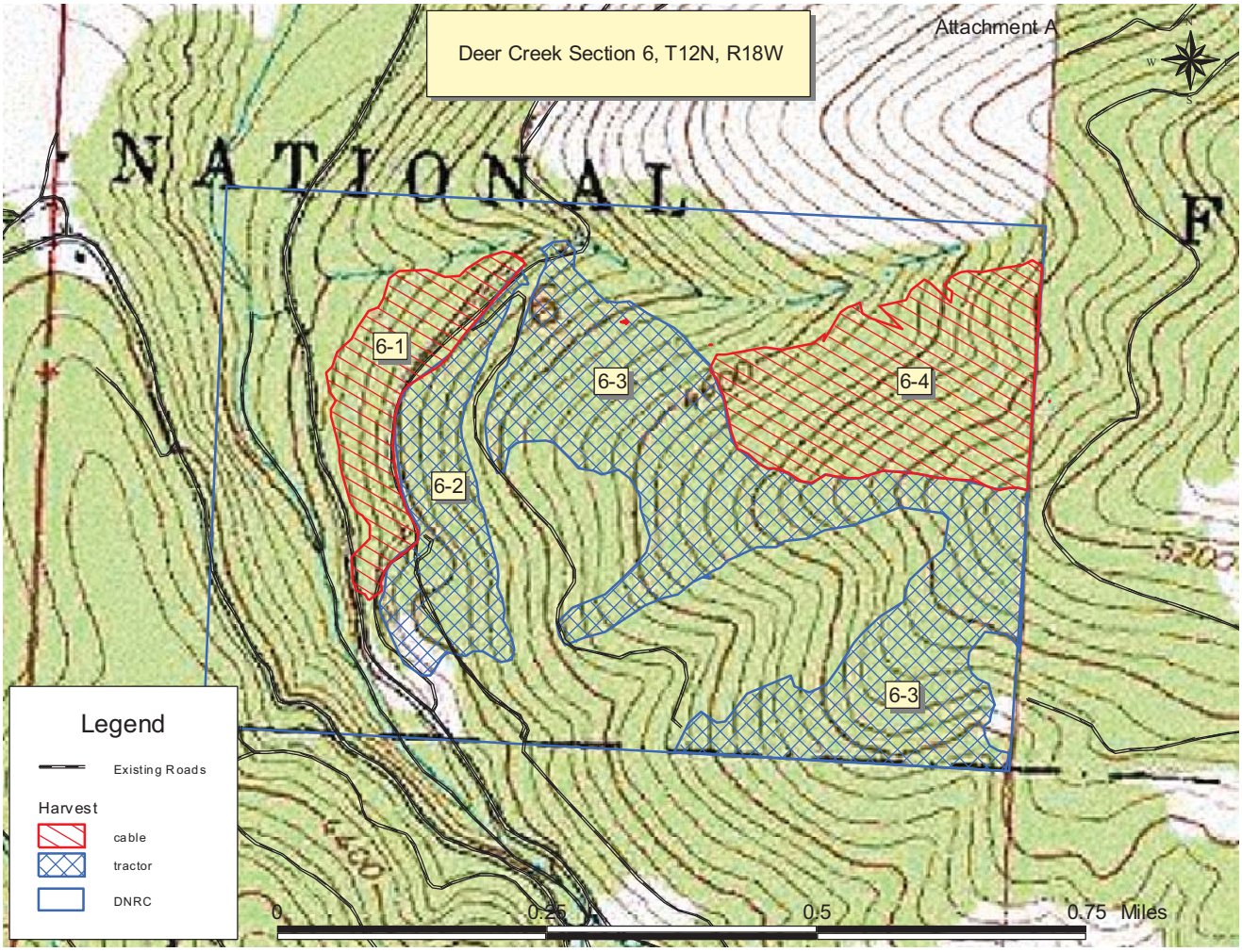


Figure 2-2: Map of Alternative B: Harvest: Timber Harvest Units, Logging Methods and Roads in Section 8, T12N – R18W.

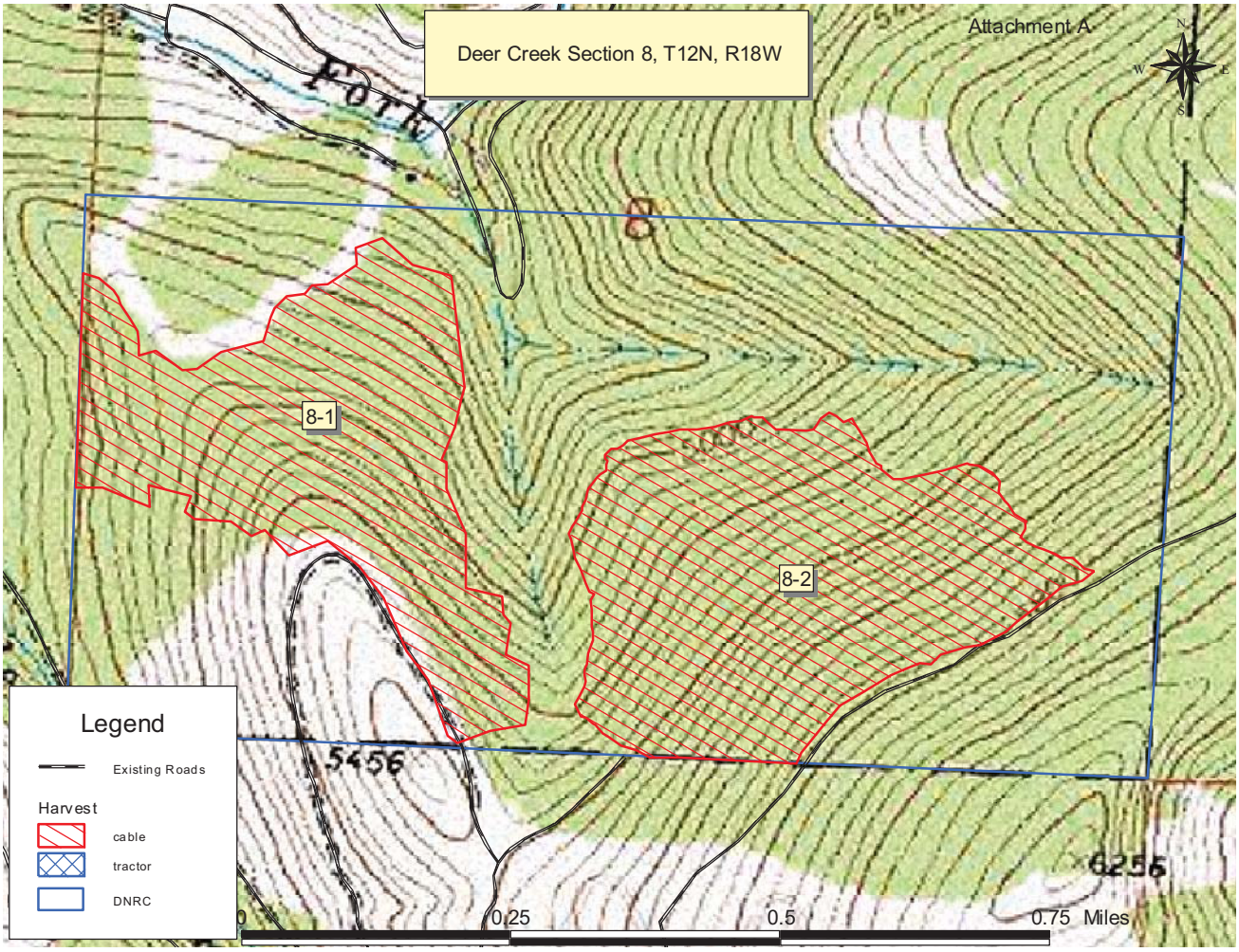
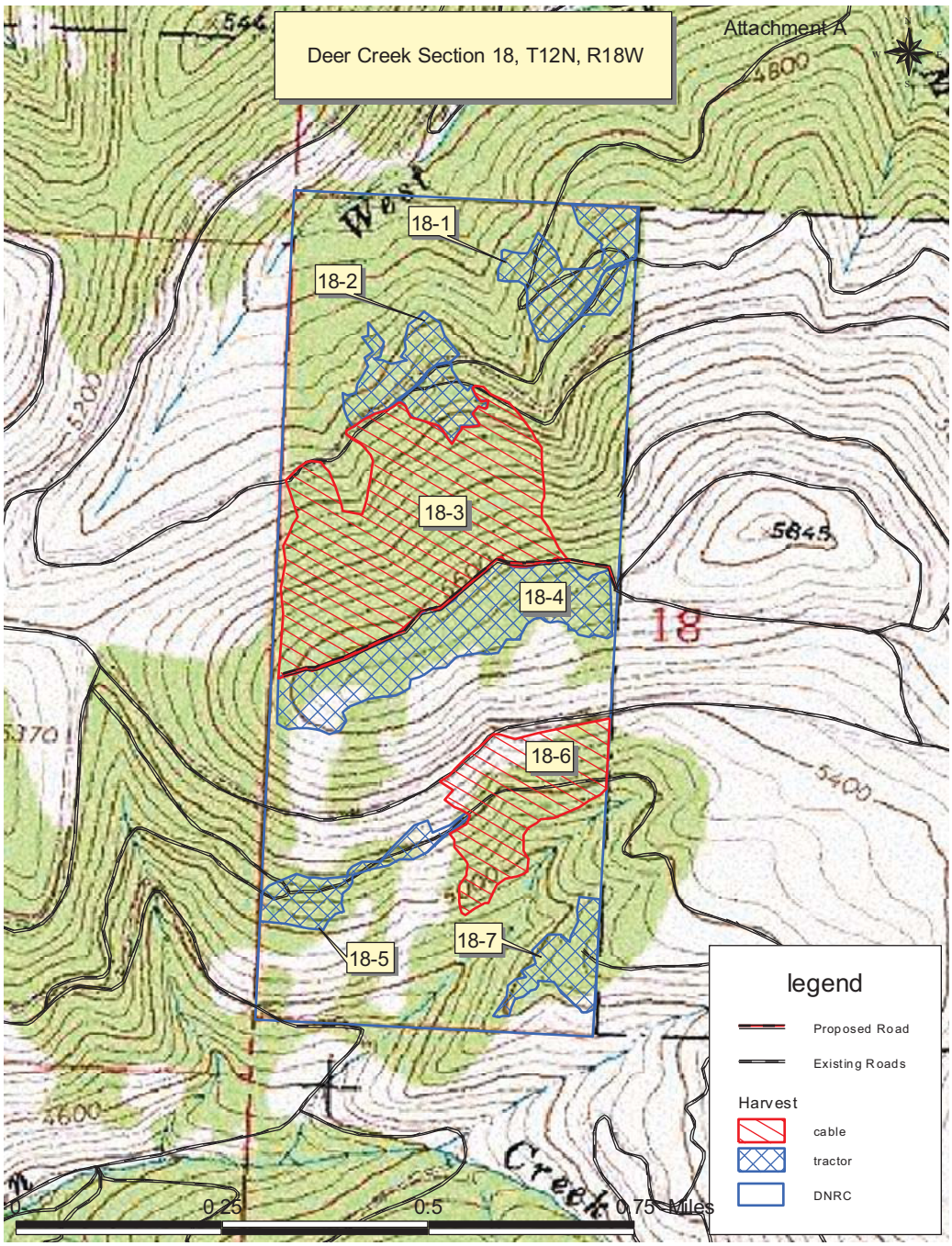


Figure 2-3: Map of Alternative B: Harvest: Timber Harvest Units, Logging Methods and Roads in Section 18, T12N – 18W.



Mitigation Measures of Alternative B: Action

General Road Design Mitigation Measures

Revegetate and stabilize temporary roads following use.

Improve existing roads to meet BMP standards.

Require rock armor over the inlet and outlet of culvert and construct slash filter windrows to filter road sediment for new culvert installation.

Install sediment control features on those sites, where direct sediment delivery to the stream channel is present.

Mitigations for Protection of Water quality, Soils & Noxious Weed Management

DNRC would implement all applicable BMP's, SMZ's, RMZ's, WMZ's and Montana Administrative Rules for Forest Management and reasonable mitigation and erosion control practices during timber harvest, road maintenance, and road construction and road use activities.

The logger and sale administrator would agree to a general skidding plan prior to equipment operations on complex terrain or draw crossings. Ground based skidding would be limited to slopes of 45% or less. Cable operations would be used on slopes over 45%.

Equipment operations would be limited to periods when soils are relatively dry, frozen or snow covered to minimize soil rutting, compaction and maintain drainage features. Ground conditions would be checked prior to operations.

On moderate to densely stocked stands, whole tree skidding can reduce slash hazard, but also remove a portion of nutrients from growing sites. Target woody debris levels would be to retain 5-15 tons/acre (old and new) well distributed on site while meeting the requirements of the slash law. On sites with lower basal area, large woody debris would be retained as feasible since it may not be possible to retain 5 tons/acre and the emphasis would be on providing additional CWD in the future. For fire safety the amount of CWD would be treated to lower levels along a strip of land near main open roads.

Install or restore adequate road drainage such as drain-dips on existing and new roads as needed to control erosion concurrent with harvest activities. All temporary spur roads would have adequate drainage installed and maintained during use prior to closure. For ground based operations, slash distributed on trails or temporary roads should be adequate to control erosion and prevent unauthorized use.

Road use would be limited to relatively dry or frozen ground conditions to reduce rutting and erosion. New road construction, including drainage features must be completed in the fall prior to freeze-up.

New roads would be closed to motor vehicles upon completion of harvest activities and existing road closures would be maintained. Slash would be placed on main skid trails to protect soils and reduce erosion potential and potential unauthorized ATV use as needed.

Weed & Erosion Control: All road construction and harvest equipment would be cleaned of plant parts, mud and weed seed to prevent the introduction of noxious weeds. Equipment would be subject to inspection by the forest officer prior to moving on-site.

All newly disturbed soils on temporary road cuts and fills will be promptly reseeded to site adapted grasses that include native species to reduce weed encroachment and stabilize roads from erosion.

DNRC would monitor the project area for noxious weeds as part of on-going timber sale administration. If new noxious weeds were to occur following the harvest, a control plan would be developed and implemented that may include herbicide treatments. If herbicides are used, application would be done by a licensed applicator in accordance with label directions, State laws, and rules of the Missoula County Weed District.

Harvest Unit General Design Mitigation Measures

Control cumulative impacts by limiting the total soil disturbance area in a unit to 15% or less. This would be accomplished by using existing trails, skid trail planning and design and maintaining nutrient cycling by retaining woody debris and foliage in the harvest unit.

Skidding would be limited to slopes of 45% or less, except on sensitive soils, where slope limitations could be 35% or less.

Equipment operations would be limited to moderate slopes and periods when soils are dry, frozen or snow covered, to minimize disturbance that results in compaction, displacement, rutting and erosion.

Surface drainage features would be installed on skid trails, landings and roads to minimize erosion.

Localized sensitive soils, steep slopes and moist areas would be protected by equipment restriction zones.

Noxious Weed Mitigation Measures
To reduce current noxious weed infestations and limit the spread of weeds, the following integrated weed management mitigation measures of prevention and control would be implemented:

Clean all road construction and harvest equipment of plant material, mud, and weed seed to prevent the introduction of noxious weeds. Forest Officer would inspect equipment prior to moving on site.

Promptly revegetate all newly disturbed soils on road cuts and fills with site-adapted grasses (including native species) to reduce weed encroachment and stabilize roads to reduce erosion. Grass seeding would be concurrent with road construction.

Weed treatment measures would include herbicide applications along portions of project roads and accessible sites with a priority on spot outbreaks of noxious weeds and as designated by the Forest Officer. Any restricted use herbicide treatments would be applied by a certified applicator according to herbicide label directions.

Air Quality Mitigation Measures
Burning would only be conducted during periods of good to excellent smoke dispersion.

Burning would be done under appropriate weather and fuel conditions so that smoldering combustion is kept to a minimum.

Visual Quality Mitigation Measures
Retain 20 to 65 of the biggest trees per acre to maintain a forested landscape on over 80% of the project area, with no unnatural appearing openings or clearcuts.

Locate access roads so they are not highly visible to populated areas.

Keep new roads off of steep slopes to the greatest extent possible, so they would be less visible.

Threatened and Endangered Species Mitigation Measures

If any threatened or endangered species were encountered during the project planning or implementation periods, cease all project-related activities that would potentially affect that species and inform a DNRC wildlife biologist immediately. Design and implement additional habitat protection measures where appropriate.

If active den sites or nest sites of threatened, endangered, sensitive species, or raptors were located within the Project Area, cease activities until a qualified biologist can review the site and develop species appropriate protective measures.

Should an active wolf den be located within a one-mile radius, or a suspected rendezvous site be located within 0.5 miles of the proposed action, all mechanized activities would be

suspended until such time as wolves are known to have vacated the site or it has been determined that resumption of activities would not present conflicts with wolf use.

Sensitive Species Mitigation Measures

Should nesting raptors be encountered, all operations would cease, and a DNRC Biologist would be consulted to develop additional mitigation measures to ensure the security of the nest site and specific animals, consistent with the Migratory Bird Treaty Act.

2.3 Summary Comparison of Project Activities, Objectives, and Predicted Effects

The following tables show the activities, objectives, and effects that would occur if Alternative A or Alternative B were implemented.

Table 2-1: SUMMARY OF PROJECT ACTIVITIES, ALTERNATIVES A AND B

Activity	Alt. A	Alt. B
Area Harvested (acres)	0	338
Tractor yarding (acres)	0	114
Cable yarding (acres)	0	224
Road construction (miles)	0	0.5
Prescribed Burning – Landing Piles (acres)	0	338

Table 2-2: SUMMARY OF PROJECT OBJECTIVES ACHIEVEMENT

Objective	Indicator	Alt. A	Alt. B
Objective #1: Generate revenue for the Public Building Trust Account through harvesting timber in a manner to produce a sustainable timber yield over the long run.	Stumpage receipts in dollars (based on $8-$15 per ton)	$0	$140,000-$270,000
Objective #2: Reduce the incidents of Dwarf Mistletoe in the Douglas fir and beetle infestation in the Ponderosa Pine which would promote the health and vigor of the existing Ponderosa Pine, Douglas fir and Western Larch.	Acres thinned and commercially logged to reduce infected and diseased trees.	0 acres	338 acres

Objective #3: Decrease the long-term fire hazard adjacent to private lands.	Miles of property boundary thinned.	0 miles	1.0 miles

Table 2-3: SUMMARY OF ENVIRONMENTAL OF ENVIRONMENTAL EFFECTS

ISSUE	ALTERNATIVE A: NO ACTION	ALTERNATIVE B: ACTION
SOIL RESOURCES	Minimal effects to soil resources, Existing roads require routine maintenance to help reduce potential future impacts.	Harvest mitigation measures (e.g., skid trail planning and limits on season of use) would limit soil impacts to 15% or less of harvest area. Retention of coarse woody debris on site would have long term beneficial effects on nutrient cycling, maintain long-term soil productivity and reduce on-site erosion.
WATER QUALITY	No Change from current condition.	Harvest activities and road construction are not expected to significantly increase sediment yield to stream channels.
CUMULATIVE WATERSHED EFFECTS	No Change from current condition.	Erosion control, BMPs and other mitigation measures expected to minimize long-term impacts to downstream water quality.
COLD WATER FISHERIES	No Change from current condition.	Implementation of the SMZ Law and Rules, Best Management Practices and site-specific recommendations of the DNRC soil scientist and hydrologists would minimize impacts to downstream perennial stream channels.
NOXIOUS WEEDS	Gradual increase in weed density over time. Integrated weed management efforts would continue on the site.	Potential for an increase in noxious weed density and occurrence compared to Alternative A: No Action, due to soil disturbance and decreased tree canopy. Integrated weed management efforts would continue on the site. Control efforts would emphasize treatment of any new noxious weeds.
AIR QUALITY	No smoke would be produced from the burning of logging or thinning slash. There would be no immediate effect on air quality. However potential for large amounts of smoke from high intensity wildfire would remain at a high level.	Burning associated with slash disposal would only be done on days with good to excellent smoke dispersion. Air quality laws would be complied with by following the procedures of the Montana-Idaho state airshed group. Smoke may settle into the Deer Creek area overnight. However, smoke impacts should be minor and of short duration.

FOREST CONDITIONS AND FOREST HEALTH	Ecological health of the stands would continue to decline as ponderosa pine is replaced by Douglas-fir. Trees would continue to stagnate due to overstocking. Frequent outbreaks of pine beetle could be expected due to stressed condition of the stand. Large diameter ponderosa pine would likely not be restored on the site. There would be an increased potential for stand replacement wildfire in the long term.	Harvesting would move the stands closer to their pre-settlement open grown condition dominated by large Ponderosa Pine and Western Larch. Growth rates and health of trees would improve due to a reduction in stocking levels. Historic ecological processes and features would be enhanced.
VISUAL QUALITY	No change from current state. Increased potential for stand replacement wildfire in the long term and its associated effect on visual quality.	Following treatment all stands would have a more open appearance. Steeper slopes that are visible from a distance would have a mottled green and white appearance in the wintertime due to the thinning of the stand in contrast to the solid green appearance now.
ECONOMIC BENEFITS AND EXPECTED REVENUES	No revenue would be produced for the school trust fund	This alternative would generate $140,000-$270,000 in revenue divided between the Common School Trust.
URBAN INTERFACE FIRE HAZARD	Fire hazard due to fuel loads and ladder fuels would continue to increase. This would contribute to an increased potential for high intensity wildfire that could burn private homes adjacent to the project area.	Commercial thinning and slash burning would reduce fuel levels and fire hazard adjacent to homes. Risk of high intensity wildfire would be greatly reduced.
LOG TRUCK USE OF PUBLIC ROADS	No use of public roads by log trucks.	Approximately 670 loads of logs would be hauled over the Deer Creek Road. There would be no decking or loading on the main Deer Creek Road (county road).

ENDANGERED SPECIES		
BALD EAGLE	Low risk of effects.	Low risk of direct, indirect and cumulative effects.
GRIZZLY BEAR	Low risk of effects.	Low risk of direct, indirect and cumulative effects.
GRAY WOLF	Low risk of effects.	Low risk of direct, indirect and cumulative effects.

SENSITIVE SPECIES		
FLAMMULATED OWL	No Change.	Minor positive indirect and cumulative effect.
PILEATED WOODPECKER	Low risk of effects.	Low risk of direct, indirect and cumulative effects.
FISHER	Low risk of effects	Low to moderate effects.

Chapter 3:Affected Environment

3.1 Introduction

Chapter 3: Affected Environment succinctly describes the relevant resources that would affect or that would be affected by the alternatives if they were implemented. This chapter also describes relevant factors of the existing environment and includes effects of past and ongoing management activities within the analysis area that might affect project implementation and operation.

3.2 Description of Relevant Affected Resources

WATER QUALITY

Water Resources-Analysis Methods & Area

The primary concerns relating to water resources within the analysis area are potential impacts to water quality from sediment sources on roads and forest sites that can deliver to stream channels as well as inside the channels. In order to address these issues the following parameters are analyzed for each alternative:

- ◊ Miles of new road construction and road improvements
- ◊ Potential for sediment delivery to streams
- ◊ Potential for water yield increase impacts to stream channel stability

A watershed analysis and field survey was completed by a DNRC hydrologist for the proposed project to determine direct, indirect and cumulative effects to water quality. The water quality evaluation included a review of existing inventories for soils and water resources (NRIS 2009, DNRC 2008), the Milltown Dam Removal Project, and reference to previous DNRC projects, and comparisons of aerial photos combined with GIS analysis to estimate the area of past timber harvest and vegetative recovery. Several field reviews were completed for the proposed harvest units, access roads and associated streams and the observations, information and data were integrated into the watershed analysis and design of project mitigations.

The analysis areas for sediment delivery are limited to the harvest units and roads used for hauling and will focus on the streams described as affected watersheds. This includes in-channel and upland sources of sediment that could result from this project. In-channel areas include the stream channels adjacent to and directly downstream of harvest areas. Upland sources include harvest units and roads that may contribute sediment delivery as a result of this project.

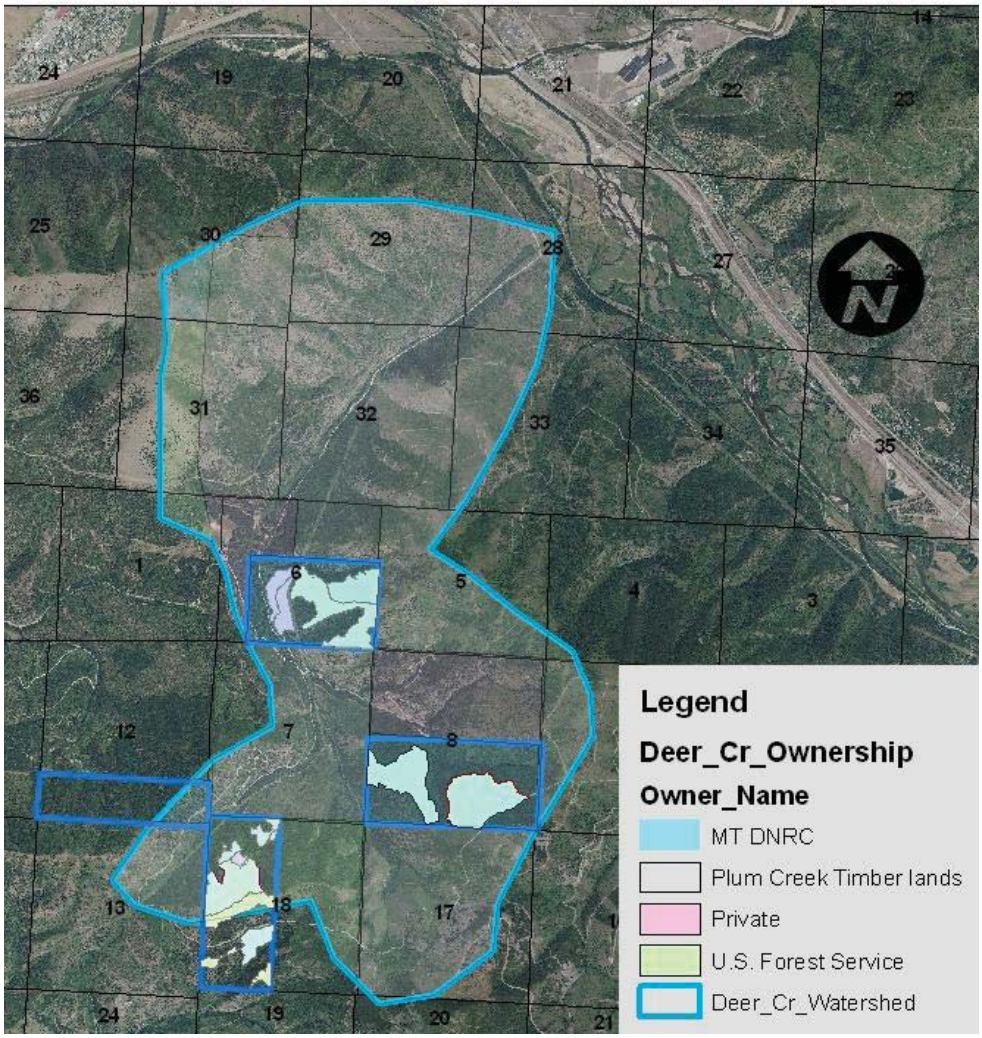
A DNRC hydrologist completed a coarse filter qualitative assessment of watershed conditions and cumulative effects as outlined in the Forest Management Rules (ARM 36.11.423) concerning watershed management. Based on extensive logging within the drainage in the past, a fine filter assessment of sediment sources and stream channel conditions was also completed. The analysis areas for watershed cumulative effects include the watersheds that wholly surround the DNRC project sections and the access roads to those parcels.

Affected Watersheds
The proposed harvest and thinning areas DNRC parcels in S ½ Section 8, T12N, R18W, partial Section S ½ 6, 12N, R18W & W ½ Section 18, T12N, R18W are located mainly in the Deer Creek drainage about 4-6 miles south of Bonner, Montana (refer to project watershed map). The analysis areas are framed within the 6th code HUC scale watershed boundaries for the Clark Fork/Donovan (HUC 170102021405 = 29,627 acres) watershed that includes Deer Creek and DNRC parcels in S ½ Section 8, T12N, R18W and partial Section S ½ 6, 12N, R18W. DNRC W ½ Section 18, T12N, R18 W (260 acres) straddles the divide between Deer Creek (146 acres) and Bear Run Creek (114 acres) which is part of the Miller Creek drainage (HUC 170102051601= 30,612 acres).

Initially two adjacent watershed analysis areas, the Deer Creek drainage and Bear Run Creek/Upper Miller Creek drainage were identified for this water resource assessment. However, the small area of proposed harvest and thinning operations in the Bear Run Creek/Upper Miller Creek drainage will be dismissed from further watershed analysis for the following reasons: 1) the DNRC project area is located in the dry headlands of a tributary to Bear Run Creek, where there is no stream channel 2) less than 40 acres of timber harvest and thinning is proposed, 3) this portion of the project would use existing roads that have low risk of off-site erosion and 4) proposed harvest and road locations are not adjacent to streams or sites where sediment delivery could affect water quality. There are not expected to be any potential adverse water resource impacts associated with the limited actions in the Bear Run Creek/Upper Miller Creek drainage.

The focus of water resource analysis will be the Deer Creek drainage from the headwaters to the mouth at the Clark Fork River. While many watershed analyses consider a larger HUC 6 or HUC 5 drainage, this analysis considered a more detailed, fine filter level to assess existing and potential management effects. Deer Creek watershed is 5411 acres in size and is approximately 14 miles in length. This analysis considered the haul routes, harvest units and potentially affected downstream water resources.

Watershed Map - Deer Creek Project Area



Water Quality Regulations and Uses

The Deer Creek drainage is tributary to the Clark Fork River, and is classified as B-1 in the Montana Surface Water Quality Standards (ARM 17.30.623). Waters classified B-1 are suitable for drinking, culinary and food processing purposes after conventional treatment for removal of naturally present impurities. Water quality must also be suitable for bathing, swimming and recreation; growth and propagation of salmonid fishes, and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply (ARM 17.30.623 (1&2)). Among other criteria for B-1 waters, no increases are allowed above naturally occurring concentrations of sediment, (except as permitted in 75-5-318, MCA) which will or are likely to create a nuisance or renders the waters harmful, detrimental or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish or other wildlife (ARM 17.30.623(2)(f)).

Naturally occurring includes resource conditions or materials present from runoff on developed land where all reasonable land, soil, and water conservation practices have been applied. Reasonable practices include methods, measures, or practices that protect

present and reasonably anticipated beneficial uses. The State has adopted Forestry Best Management Practices (BMP's) through its Nonpoint Source Management Plan as the principle means of controlling non-point source pollution from silvicultural activities. DNRC provides further protection of water quality and sensitive fish through implementation of the Streamside Management Zone (SMZ) Laws and Forest Management Rules.

Deer Creek and its tributaries are not listed as impaired on the State's 303(d) list of impaired bodies of water (MTDEQ 2008). The Middle Clark Fork River is on the 303(d) list, but has yet to be assessed for Total Maximum Daily Loads. The Mouth of Deer Creek and adjoining Middle Clark Fork River floodplain are to be reconstructed in 2010 as part of the Milltown Dam Removal project. The confluence of Deer Creek and Clark Fork River has been identified as a high priority for restoration (MT FWP comments 2005). MTFWP further stressed the need for implementing SMZ rules and BMP's at their highest levels to avoid sedimentation and effects to fisheries habitat.

Downstream beneficial uses in Deer Creek include: domestic surface water rights, fisheries, recreation, irrigation, and livestock watering. Deer Creek is not part of a municipal watershed. There are several wetlands near the mouth of Deer Creek and as slender wetlands adjacent to stream channels.

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

All applicable State Forest Land Management rules and regulations regarding watershed and fisheries management would be followed. This includes but is not limited to water quality (ARM 36.11.422), cumulative effects (36.11.423) Riparian Management Zones (ARM 36.11.425) and Fisheries (ARM 36.11.427).

As part of ARM 36.11.427(3)(a)(i) and (iv) and ARM 36.11.436, DNRC is committed to designing forest management activities to protect and maintain westslope cutthroat trout and all other sensitive fish and aquatic species. DNRC is a signatory to the 2007 (interagency) Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout.

Existing Conditions- Water Resources
Deer Creek is a 4th order tributary to the Clark Fork River. The land ownership in the Deer Creek drainage is mixed, and the primary landowner is The Nature Conservancy (previous Plum Creek Timberlands), Lolo National Forest, DNRC and small private ownership, including home sites and a relict ski area.

Roads- DNRC completed a sediment source survey for the proposed harvest areas and roads. Deer Creek and its tributaries have segments of roads that parallel the streams. Sedimentation sources identified in the Deer Creek drainage are; roadfill segments

adjacent to stream channels, stream crossings with inadequate road surface drainage prior to the crossing sites, historic riparian harvest and dispersed grazing use. Mainly within the lower Deer Creek drainage, grazing has disturbed segments of stream banks and trampled around culvert inlets, which has increased sediment.

The main Deer Creek road is open year round to provide access to homes in the drainage, while many of the spur roads are closed with gates. During our sediment source survey it was found that there are roads that have not been recently maintained, and that surface drainage was inadequate on many road segments. There are approximately 9 miles of roads /sq. mile in the Deer Creek drainage. Twenty three stream crossings were identified in Deer Creek (2.7 crossings/mi sq.) along with numerous other dry and ephemeral draw crossings. Sediment and surface erosion rates are generally low due to the very gravelly and coarse stable nature of the soils derived from Belt bedrocks. Research by Wood and Sugden (2007) found relatively low base erosion rates of approximately 1 ton/acre/yr for roads on similar soils from belt bedrock.

Historic crossings on the main Deer Creek county road were undersized and sources of sediment that affected sedimentation, bank erosion and flows. Three main crossing sites on the lower Deer Creek county road have been replaced with larger culverts to improve flow, fish connectivity during low flow, and reduce sediment. The improved crossings have elevated approaches to meet BMP's for adequate drainage to control erosion and sedimentation and should improve overall watershed condition and water quality in the lower drainage.

Access roads along the East Fork and Middle Fork of Deer Creek have segments that have inadequate road surface drainage and contribute sediment to Deer Creek. These roads are downslope of the project parcels and would not be used for harvest access. The proposed haul route to DNRC section 6 would use existing roads that include the main Deer Creek County road and an existing road to the top of the property for cable harvest. The proposed haul route to section 8 and 18 would use the 2127 forest road that begins near the confluence of the E. Fork and West Fork of Deer Creek. The most significant sediment source identified is an approximately one mile segment of this road that parallels the West Fork of Deer Creek in section 7. Segments of this road have locations where there is sediment delivery to the stream due to the close proximity of road to the stream and inadequate road maintenance and surface drainage.

The existing road #17121 provides access to the lower slopes of section 18 and section 8 parcels is gated at road #2127 and has fair road surface drainage condition down to the parcel. The road crosses uphill of the West Fork Deer Creek and there is a seep beneath the powerline that follows the draw bottom. Interior and connecting roads have not been recently maintained and segments of road do not have adequate surface drainage to meet BMP's. Several culverts needed inlet maintenance for rock armor and brushing of dense alder. Most roads are sparsely vegetated but sparse due to the coarse gravelly nature of the soils. Two culverts have been installed in recent years for relief drainage. One culvert that intercepts groundwater flow from a ditch on private land in the east ½ of section 18 is too short and eroding the fill slope. The access roads to section 8 crosses two small

headwaters streams that are not fish habitat, but do deliver to the Middle Fork Deer Creek.

Partial Section S ½- 6, T12N, R18W
This DNRC parcel is 240 acres located near the mid-point of the Deer Creek drainage and is the DNRC parcel lowest in the drainage. The main stem stream channel of Deer Creek is a class 1 stream that flows across the SW corner of the DNRC Section 6 parcel. Deer Creek supports westslope cutthroat trout which is assessed in the fisheries section. A stream channel stability rating was completed on Deer Creek just downstream of the state parcel, using the Stream Reach Inventory and Channel Stability Evaluation Procedure (Pfankuch,1978). The streambed is a relatively narrow Rosgen B4 type channel (Rosgen 1996) with a gravel cobble substrate and channel stability was rated as good.

There are two gravelly draws within this parcel that drain towards Deer Creek. The northern draw has intermittent flow, but does not appear to deliver to Deer Creek and both draws and crossing sites are not sources of sediment. The average annual precipitation in this parcel has a range of 18-23 inches, mainly received as snow. Soil infiltration rates exceed 10 inches/hr and surface runoff and overland flow are unlikely, except along drainages and on roads. No direct sediment sources were noted on existing roads in Section 6. The forest stands planned for harvest have several age classes of trees with generally over 70 % canopy coverage, and a dense understory stand of younger trees.

Partial Section S ½- 8, T12N, R18W
This DNRC parcel is 320 acres located mainly in the headwaters of the East Fork of Deer Creek with about 60 acres draining into the Middle Fork of Deer Creek. The East Fork of Deer Creek is a relatively short drainage that flows northwest from its headwaters in section 8 to lower Deer Creek. There are three short tributary streams that drain this parcel. Perennial stream flow occurs near the DNRC north and west property boundaries. Stream segments are relatively narrow and steep Rosgen A-4 type channels. Pfankuch method stability ratings determined that channel stability is good to excellent on the DNRC parcel.

No sediment sources were identified on the DNRC parcel. Based on elevation, the average annual precipitation in this parcel has a range of 24-30 inches, mainly received as snow. Soil infiltration rates exceed 10 inches/hr; therefore surface runoff and overland flow are unlikely, except along drainages and on roads. The streams are relatively narrow. The forest stands planned for harvest have several age classes of trees with over 70 % canopy coverage, and a dense understory stand of younger trees. No direct sediment sources were noted on existing roads in the DNRC Section 8 T11N, R15W parcels. Road access is from the upper slopes, where cable harvest would be employed.

W ½ Section 18, T12N, R18W
This DNRC parcel is 261 acres that straddles the divide between the headwaters of the West Fork of Deer Creek and Bear Run Creek. The West Fork of Deer Creek crosses the very NW corner of the parcel and no harvest activity is planned near this stream segment. The headlands of Bear Run Creek is a dry draw in the SE corner of the parcel and was dismissed from further analysis due to very low risk of effects (refer to analysis methods and watershed map).

An intermittent stream occurs in the north half of the parcel below the access road and drains towards the West Fork of Deer Creek. This steep ephemeral segment is stable and no harvest activities are planned in this draw. The average annual precipitation in this parcel has a range of 25-30 inches, mainly received as snow. Soil infiltration rates exceed 10 inches/hr; therefore surface runoff and overland flow are unlikely, except along drainages and on roads. The forest stands planned for harvest have several age classes of multi story trees with over 70 % canopy coverage on the Deer Creek side, and a dense understory stand of younger trees. Lodgepole pine makes up 20-25% of the forest stands and is dead, dying or at risk of pine beetle mortality. Roads are stable but require maintenance to restore road surface drainage. There are no stream crossings, proposed crossings, or sediment sources identified on this parcel. There is a poorly installed, short culvert on the east ½ of section 18 road that has an eroding fillslope which is a source of sediment to an unnamed tributary of Middle Fork Deer Creek.

Existing Watershed Cumulative Effects
Cumulative watershed effects can be characterized as impacts on water quality and quantity that result from the interaction of past, current or foreseeable future disturbances, both natural (fire) and human-caused. Past, current, and future planned activities have been taken into account for the cumulative effects analysis. Past management activities in the proposed project areas include timber harvest, road construction, grazing, irrigation diversions and fire suppression. A detailed watershed analysis of sediment sources and harvest areas was conducted to determine the cumulative watershed effects for the Deer Creek watershed.

Deer Creek is not a 303d listed impaired stream and all beneficial uses are currently supported, including fish and aquatic life. Yet there are cumulative effects to water quality within the drainage that include poor road locations and crossings, historic riparian timber harvest, livestock induced stream bank degradation and disturbance associated with utility corridors for a gas pipeline and powerline. Concerns for cumulative effects include sedimentation and potential water yield increases that may affect stream channel stability. Concerning sedimentation, there are extensive roads in the Deer Creek drainage. Twenty three drainage crossings were identified and have been evaluated in Deer Creek (2.7 crossings/mi sq.), also include streams and other dry and ephemeral draw crossings. Sediment sources of concern are primarily at stream crossing sites and road segments adjacent to stream channels. In spite of the high road density, sediment and surface erosion rates are generally low due to the very gravelly and coarse, stable nature of the soils derived from Belt bedrocks.

Concerning water yield, tree canopy reduction by timber harvest activities, tree mortality or wildfire can affect the timing of runoff, increase peak flows and increase the total annual water yield of a particular drainage. Increased water yield can increase stream channel scour and in-stream sediments that impact water quality. Within the project areas, average annual precipitation rates are moderate at 18-30" and soil infiltration rates exceed most precipitation rates due to the extremely gravelly soils and stable parent material of highly fractured bedrock.

Timber harvest has occurred in the Deer Creek drainage since the early 1900's and the first recorded entry on DNRC parcels was in 1938. Based on aerial photos and site reviews the more extensive harvests and road construction within Deer Creek and the project area occurred between 1960 and the 1980's, which has allowed considerable regrowth and vegetative recovery.

A harvest history was developed for the Deer Creek watershed from aerial photos to estimate the annual water yield increases for the Deer Creek watershed using Equivalent Clearcut Area (ECA) analysis (Haupt 1985). ECA is a procedure used to index the relationship between vegetative condition and water yields from forested watersheds. ECA is a function of; the total area that is roaded and harvested, the % crown removal in harvest units, and the amount of vegetative growth recovery that has occurred in the harvest areas. The existing cumulative ECA is calculated as 1211 acres and the allowable ECA is 1376 acres. The current % water yield increase is estimated at 9.5 %. After reviewing the beneficial uses, existing channel conditions and existing watershed condition per ARM 36.11.423, a threshold of concern for water yield increase in the Deer Creek watershed was set at 11% over a fully forested condition.

The area of past timber harvests, insect mortality and fires in Deer Creek indicate a concern for increased water yield. Fair to poor stream channel stability was noted below undersized culverts on the main Deer Creek road. Recent replacement of these stream crossings with larger diameter culverts will improve passage of flows, improve stream stability at these sites and have reduced the historic sediment sources. Actually several DNRC stream reaches were evaluated and found to have good stream channel stability on-site and directly downstream, and water yield was not an apparent impact on channel stability on these reaches. The channel types evaluated are Rosgen B4 on the mainstem of Deer Creek in section 6, in DNRC section 8, the intermittent stream segments rated as good to excellent condition and are considered stable. This high degree of stability on the sampled stream reaches can be associated with the stable rocky soils, levels of forest cover on the DNRC parcels, and moderate precipitation. Older Lodgepole pine and a portion of ponderosa pine that are dead, dying and at risk of mountain pine beetle mortality in the Deer Creek drainage comprise 20-35% of stand volume in proposed DNRC harvest areas. Loss of the pine would have an effect on changes in available water evapo-transpiration, but would be within the range of natural conditions and have a minor change to water yield.

Channel restoration is planned for the mouth of Deer Creek at the confluence with the restored Clark Fork River floodplain as part of the Milltown dam removal and

stabilization project. The goals for the restored channel are to reconstruct a stable confluence with the Clark Fork River and improve stream connectivity for fish passage.

SOIL RESOURCES

Soils Analysis Area & Methods
The analysis area for geology and soil resources includes the project sections and the access roads to the DNRC sections proposed for timber harvest. The soils analysis included an evaluation of Missoula County soil survey data, air photos, past harvest design and on-site field review by DNRC hydrologists/soil scientists for soil properties and current conditions to assess past and predicted effects compared with DNRC soil monitoring results on previous harvest operations.

Existing Conditions-Geology and Soils
The proposed harvest areas are located on the upper forested slopes of the Deer Creek drainage and approximately 40 acres in the Bear Run/Miller Creek drainage. Parent materials are a mixture of shallow to deep, extremely gravelly residual soils derived from mixed Precambrian Belt bedrocks of argillite and quartzite. Narrow bands of alluvial soils are formed along Deer Creek and segment of tributary channels. Rock outcrops and shallow soils are common on ridgelines, yet most sites are common excavation or rippable. The highly fractured bedrock that is throughout the project area is very stable, resilient to erosion, with soils of high infiltration capacities that generally exceeds precipitation rates. The existing forest access roads to the DNRC project parcels cross high gravel content soils that have low fine particle contents. Roads will require average drainage spacing and segments of ditching based on site specific conditions. With the exception of the narrow riparian areas adjacent to stream channels, the project sections are relatively dry mountain sideslopes which average 16-30” of precipitation/year. The majority of the DNRC project area is located on moderate to steep slopes. No especially unique geology occurs on the proposed project sites and the belt quartzites and argillites are among the most stable rock types in Montana. There are moderate to high levels of existing forest floor coarse woody debris across the proposed harvest areas similar to historic conditions established by Graham et al. (1994). Soil descriptions are generally described here and noted in table S-1 and on appendix soil map.

DNRC partial Section S ½ 6, 12N, R18W is located about mid-point in lower Deer Creek. Primary soils are moderately deep Winkler, very gravelly loam soils forming in fractured bedrock and colluvium on 30-60 % sideslopes. Winkler soils in this area are somewhat excessively well drained and have high gravel content subsoils exceeding 50% volume. These coarse textured soils have a long season of use and are resilient to erosion. Winkler on southerly aspects (MU 131/134) and ridges has shallower surface soils, lower moisture retention and productivity. Northerly aspects (MU 133) have slightly deeper surface soils, moisture retention and productivity, supporting Ponderosa pine and Douglas-fir. Both soils have a moderate potential for erosion on slopes < 45% which can be effectively controlled by limiting disturbance and standard drainage practices. Erosion

potential is similar for these soils and moderate to high on short steep slopes> 45%. Displacement potential for ground based operations is high for slopes over 45%. These limitations can be mitigated by reducing soil disturbance and limiting ground based operations to slopes less than 45% and cable harvest of slopes over 45%.

Totelake alluvial soils occur along Deer Creek in Section 6, as a complex of mixed gravels and sands adjacent to the stream. These alluvial soils support mainly deeper sod with sedges, riparian shrubs and some spruce. The sod provides a buffer that helps trap sediment and will revegetate quickly. No harvest or road operations are planned on these soils.

DNRC project parcels on S ½ Section 8, T12N, R18W, and W ½ Section 18, T12N, R12W are located in the headwaters of Deer Creek and share similar soil types. Primary forest soils on these parcels are Holloway gravelly silt loams, Mitten very gravelly silt loams and Tevis very gravelly loams, all on forested sideslopes of 30-60%. Soils located on northerly aspects in the project area are a combination Holloway gravelly silt loams and Mitten very gravelly silts loams have a reddish volcanic ash, silt loam surface soil with gravelly subsoil and occur on north aspects and higher elevations in the area. Holloway soils occur at slightly higher and colder elevations than Mitten soils. Mitten soils occur more commonly on concave slopes and draws in this area. Soil interpretations are similar for these soils. The primary limitation is concern for soil displacement from disturbance on steeper slopes.

In the DNRC section 8 parcel, there is a small area of Tevis very channery loams, cool phase on 30 to 60 percent slopes, yet the majority of this soil map unit has more moderate slopes of 20-50%. These are moderate to high productivity soils and support Douglas-fir, Lodgepole pine and western larch. Tevis soils have a shallow, gravelly silt loam surface over deep high gravel content subsoils and fractured bedrock on mountain sideslopes. Interpretations are noted in table S-1. Implementing BMP's and standard road drainage can control erosion and high gravel content allows a long season of use.

Soils located on the ridge and southerly aspects in the Section 18 parcel are a combination of Winkler dry site 30-60% slopes as previously described. The south slopes are droughtier, tend to have slightly less surface soil depth and slightly lower vegetative productivity. High gravel content soils and drier sites on road cut and fillslopes can be slow to revegetate, unless promptly reseeded.

The most recent harvest in the DNRC sections were sanitation harvest of minor tree volume about 23 years ago in 1987 and before that in the 1970. Historic harvest effects have largely recovered with few major skid trails still apparent on less than 10% of the old units. Historic skid trails were vegetated and no BMP restoration needs for past harvest areas were identified. Previous harvest sites across the project parcels are well regenerated to conifer species. The 1987 harvest sites would not be reentered with this proposed salvage entry. The previously harvested areas have regenerated well and are now overstocked. On all sites reviewed, there are moderate to high levels of existing

downed course woody debris on the forest floor across the proposed harvest areas, similar to historic conditions established by Graham et al. (1994).

Soil Interpretations Table S1
S ½ Section 8, Partial Section S ½ 6, and the W ½ Section 18, T12N, R18W

Map Unit	Mapping Unit Name	Soil Description	Erosion Potential	Displacement hazard	Compaction Hazard	Notes
57	Holloway gravelly silt loam, 30 to 60 percent slopes	GrSilt Loam colluvium from argillites/qtz Volcanic ash Surface	Mod to high on slopes >45%	Mod to high on slopes >45%	Mod-high if wet	Slightly colder than Mitten, LAOC, PICO.Limit ground skid to slopes less than 45%
71	Mitten very gravelly silt loam, 30 to 60 percent slopes	Gr Silt Loam Colluvium from argillites / quartzite Volcanic ash Surface	Mod to high on slopes >45%	Mod to high on slopes >45%	Mod	Limit ground skid to slopes less than 45%
102	Tevis very gravelly loams, 30 to 60 % slopes	Very Gr Loam Colluvium from argillites / quartzite	Mod to high on slopes >45%	Mod to high on slopes >45%	Mod	Mod depth soils, road construction may hit rock.Limit ground skid to slopes less than 45%
105	Totelake gravelly loam, 30-60 percent slopes NOT IN HARVEST	Alluvium 5-10" dark gr loam topsoil over deep vgr loams, 20-50% gravel and cobbles	Mod	Mod	Mod	Moist productive soil Average season of use.
131	Winkler, very gravelly loams, 30 to 60 % slopes	Shallow-mod deep residium & colluvium	Mod, very coarse	Mod to high on slopes >45%	Mod	Shallow-Mod depth soils with fractured rock at shallow depth, S Aspect droughty,.Limit ground skid to slopes less than 45%
133	Winkler gravelly loam, cool, 30 to 60 percent slopes	Shallow-mod deep residium & colluvium	Mod, very coarse	Mod to high on slopes >45%	Mod	Shallow-Mod depth soils with fractured rock at shallow depth, northerly aspect cool and more productive than 131 .Limit ground skid to slopes less than 45%
134	Winkler-Rubble land complex, 50 to 80 percent slopes	Shallow residium & colluvium fractured rock outcrops common	Mod, very coarse	Mod to high on slopes >45%	Mod	Shallow-Mod depth soils with fractured rock at shallow depth, northerly aspect cool and more productive than 131 .Limit ground skid to slopes less than 45%

FISHERIES

Fisheries Analysis, methods, and area

Fisheries resource concerns include: the proposed forest management actions may affect fisheries and fish habitat components, including sedimentation, decreasing large woody debris recruitment through the removal of trees near the stream channel, increased stream temperatures due to reduced canopy density (shading), and connectivity. MTFWP pointed out that the DNRC parcel in section 6 encompasses about 1300 ft of Deer Creek. This segment includes a rocky gorge, which is at the upstream end of the Westslope Cutthroat trout (WCT) spawning reach. Deer Creek is considered an important stream for spawning and support of WCT and has not been genetically compromised by non-native fish species (FWP, MFISH 2009).

These issues were evaluated by reviewing available resource inventories, completing field reviews of existing conditions and analyzing the anticipated effects of sediment delivery on fish habitat in the project area, connectivity and the potential reduction in available woody debris and shading to streams due to timber harvest activities. The fisheries analysis will focus on potentially affected water resources and streams associated with proposed harvest and access roads to known fisheries in 1) S ½ Section 6, T12N, R18W including a segment of Deer Creek, 2) the S ½ Section 8, T12N, R18W including a segment of the E. Fork Deer Creek, and the W ½ Section 18, T12N, R18W, including a segment of the Middle Fork Deer Creek and unnamed tributary and road crossings as referenced on Deer Creek watershed map W-1. Field reviews of the project area and fishery streams listed above were conducted by DNRC hydrologists in 2005 and 2009. Expected effects to fisheries habitat will be addressed qualitatively using the current condition as a baseline in comparison to the expected changes due to the alternatives proposed.

Cumulative Effects

The cumulative effects analysis area for sediment delivery is limited to the harvest units and roads used for hauling. This includes in-channel and upland sources of sediment that could result from this project. The cumulative effects analysis area for woody debris recruitment is the portion of the DNRC parcels that are adjacent to a fish-bearing stream.

Sediment Delivery

The analysis area for sediment delivery is limited to the harvest units and roads used for hauling as displayed in the water resources analysis. This includes in-channel and upland sources of sediment that could result from this project. The analysis methods for sediment delivery will follow those used in the Hydrology portion of this report. Potential sediment sources from roads, stream crossings and in-channel sources were identified during field reconnaissance. Stream channel stability varies and several stream reaches on Deer Creek exhibit marginal channel stability associated with roads adjacent to stream channels and crossing sites within the drainage. All potential sediment sources identified as part of the existing condition are discussed in the Hydrology Analysis portion of this EA.

Connectivity
The analysis area for stream connectivity includes the project haul routes and stream crossings.

Woody Debris Recruitment and Stream Shading / Temperature
The analysis areas for woody debris and stream shading/temperature are the portions of the DNRC parcels that are adjacent to a fish-bearing stream. The analysis method for woody debris recruitment will evaluate the potential reduction in available woody debris due to timber harvest activities.

Existing Condition- Fisheries
Deer Creek and its perennial tributaries in the project area support native westslope cutthroat trout (FWP-MFISH 2009). Westslope cutthroat trout are considered a sensitive species by DNRC (ARM 36.11.436). Deer Creek and its perennial tributaries are important spawning and rearing habitat for westslope cutthroat trout (WCT). Deer Creek is not known to support bull trout, non-native fish or hybridized fish based on sampling (FWP- MFISH 2009). Deer Creek is a productive fishery and considered to be one of the most important WCT streams in the Middle Clark Fork River system (FWP personal comm.).

Section 6 T12N, R18W
Access to section 6 and the project area follows the Deer Creek county road that parallels the main stem of Deer Creek, part of which flows through a steep gradient rocky gorge. On the DNRC parcel, all roads are at least 100 feet away from the main channel. There are no channels on the upland slopes that contribute sediment to Deer Creek that would affect sedimentation (refer to water quality section). The county access road up through the section 6 parcel and on up to the confluence of the East and West Forks of Deer Creek includes 3 stream crossings that were considered undersized in 2005 and limited connectivity at low flows. The culverts were replaced in the fall of 2009 with larger culverts to improve fish passage, improve flow passage and reduce channel scour and sedimentation. No fish barriers or limitations to habitat connectivity were identified on the DNRC parcels or roads included in this project.

On the DNRC section 6 parcel, there is considerable well anchored large woody debris incorporated into the Deer Creek streambed and banks. Some riparian trees have been removed by past harvest. There are lodgepole pine, mistletoe Douglas fir and ponderosa pine that are subject to mortality along Deer Creek. With the mortality, we expect an increase in large woody debris falling towards the stream and a partial reduction in shade, that would mirror the expected range of natural conditions and it is unlikely that stream temperatures would change substantially.

W1/2 Section 8, T12N, R18W
Two first order tributaries to East Fork Deer Creek flow from springs on the DNRC parcel. These are small, relatively short and steep Rosgen B, and A channels (refer to water resources section) with intermittent segments. These streams are unlikely to support fish, except near the northern DNRC property boundary, but will be protected as

fish bearing streams for the perennial reaches. The longest tributary segment draining from the eastern DNRC boundary is intermittent flow. Stream channel stability is good on the short perennial reach with minimal sedimentation and there is considerable large woody debris along the channel. Stream shading is a combination of bank edge riparian shrubs and trees that maintains cold, clear water. Downstream of the DNRC parcel, there is an historic in-stream pond on private land in the East Fork of Deer Creek that limits connectivity upstream. The E. Fork Deer Creek and Middle Fork Deer Creek roads would not be used for this project and there are no stream crossings on the DNRC parcel. This parcel will be accessed from existing roads that are located upslope in the south half of the parcel.

With the continuing tree mortality, we expect a short term increase in large woody debris falling towards the stream and a partial reduction in shade, but it is unlikely that stream temperatures would change substantially. Riparian Management Zones (RMZ) will be designated at 80-90 feet based on site potential tree heights (SPTH) at 100-years as required by ARM 36.11.425.

The haul route to DNRC parcels in section 8 and 18 follows the West Fork Deer Creek road. This road has not had recent maintenance. There is an approximately 1 mile segment of existing road in section 7 that is adjacent to the West Fork of Deer Creek which has segments that are sediment sources.

W ½ Section 18 T12N, R18W

A short segment of the West Fork Deer Creek flows through the northwest corner of the parcel. There is a powerline R/W upslope of the stream and periodic maintenance may occur on the powerline as needed. No sediment sources were identified on the DNRC parcel and there are no limitations on stream connectivity in this DNRC parcel. Channel stability and large woody debris levels are good. No harvest operations would occur within 300 feet of the stream.

No streams occur on the south side of DNRC section 18 in the Bear Run Creek drainage, therefore, there are no streamside harvest impacts which would reduce woody debris or impact fish bearing streams. The project area in the headlands of a steep gradient first order tributary to Bear Run Creek does not contain any drainage features with direct connectivity to streams or downstream fisheries habitat in Miller Creek. Therefore, there is no risk of direct, indirect or cumulative impacts to fisheries occurring in the south ½ of section 18 with the proposed project.

NOXIOUS WEEDS

Noxious weeds infestations are mainly a combination of spotted knapweed, houndstongue and spots of thistle which occur along portions of the existing access road system, open forest and rangeland sites.

Noxious weeds occurring in the project parcels are mostly knapweed (Centaurea maculosa), houndstongue (Cynoglossum officinale L) and spot infestations of thistle (Cirsium arvense) within project sections and on adjacent lands. Knapweed (Centaurea maculosa) was found along roadsides as well as in some forested portions of the project area. Houndstongue was found mostly along roadsides, with isolated spot infestations found within the forested area. Historic cattle grazing, timber harvest activities, recreational uses, and residential areas are most likely the reason for the existing rate of spread of noxious weeds and the potential future spread and introduction of noxious weeds.
Previous weed management treatments in the area have been limited to reseeding of some roadcuts and control treatments adjacent to homesites on private ownership.

Existing Noxious Weed Cumulative Impacts
Impacts of noxious weeds within the project areas are moderate. Weeds have spread throughout the drainage across ownerships over time, mainly along roadsides and open forest sites with multiple uses and by seed dispersal from wind, traffic and wildlife. Timber harvest throughout these drainages has increased the risk for noxious weeds to spread though ground disturbance. Overall, cumulative existing impacts to weeds are moderate.

AIR QUALITY

Products of Combustion
When forest fuels burn, complex organic molecules composed primarily of carbon, hydrogen and oxygen break down and then recombine with oxygen. If combustion were 100% complete the only products produced would be water vapor and carbon dioxide. However complete combustion is only achieved under very controlled conditions and combustion of forest fuels is very incomplete. Some of the products of incomplete combustion are carbon monoxide, particulate matter and a wide variety of volatile organic compounds (VOCs). A fire that burns at a high temperature burns more completely and produces less particulate and other partial combustion products than a fire that burns at a lower temperature. Dry fuel that burns with flaming combustion burns hotter and therefore cleaner than fuel that is wet and burning at a lower temperature. Fuel that burns with an adequate supply of oxygen burns hotter and cleaner than fuel that is buried by dirt and therefore getting an inadequate supply of oxygen. Fire that is in the smoldering stage of combustion is cooler than the flaming stage and therefore produces more partial combustion products.

Characteristics of Smoke in the Missoula Valley
The project area is located approximately 10 miles east of downtown Missoula. The mountain valleys of Western Montana are prone to cold air inversions in the fall and winter when stationary high-pressure systems create a stable air mass that traps pollutants in the valley bottom. During the spring season the atmosphere is much more unstable and stable cold air does not settle into the valleys to the extent it does in the fall or winter. Due to this atmospheric instability, smoke is transported out of the valley much better in the spring than in the fall.

Effects of Smoke on Human Health
The most problematic pollutant in the Missoula area is particulate matter. Particulate is produced by a number of sources such as road dust from vehicles, forest and agricultural burning, industrial sources, windblown dust from plowed fields, smoke from wildfires and other sources. Particulate is classified by its size. PM-10 is less than 10 microns in diameter. PM-2.5 is less than 2.5 microns. The smaller the particle, the greater impact it can have on human health. Smaller particles are able to penetrate farther into the human respiratory system. Smaller particles are also more difficult for the human body's natural processes to remove.

Regulation of Open Burning
Missoula County is a PM-10 Non-Attainment area as designated by the Environmental Protection Agency and the Montana Department of Environmental Quality. Open burning is allowed in Missoula County from March 1 to August 30 of each year. From September 1 to November 30 burning is permitted for forestry purposes only. No burning is allowed from December 1 to February 28. The Montana DNRC is a member of the Montana-Idaho Airshed Group. This group is composed of the major forestry burners in Idaho and Montana. Members of the group report their planned burns to a monitoring unit in Missoula before they are ignited. The goal of the smoke monitoring unit is not to allow the average PM-10 level for a 24 hour period to exceed 50 milligrams per cubic meter of air. Idaho and Montana are divided into "airsheds" which are geographic areas with similar topography and weather patterns. Urban areas within airsheds are designated as impact zones. Due to the potential for adverse impacts to air quality in urban areas, burning in these impacts zones is much more restrictive than the airshed it is located in as a whole. The project area is located in Airshed 3A and the Missoula Impact Zone as designated by the Montana/Idaho Airshed Group. The Montana/Idaho Airshed Group Monitoring Unit issues daily smoke dispersion forecasts and burning restrictions for each airshed and impact zone. Restrictions are based on the number of burns planned, their location and atmospheric conditions. These restrictions are designed to limit the adverse impact to air quality resulting from prescribed burning.

FOREST CONDITIONS AND FOREST HEALTH
While we have no record of large scale logging on these sections of state land, we can safely assume it was logged in the late 1800's and early 1900's when logging operations were very active in the Missoula Valley area. There have been small scale logging projects occurring on some of these parcels in the 1970's and 1980's. This past harvesting and decades of fire exclusion have caused significant changes in stand structure and species composition of the timber stands within the project area. Prior to European settlement, sites such as this one were frequently open park-like stands, composed of large diameter ponderosa pine, western larch and some Douglas-fir. This condition was maintained by frequent low intensity surface fires that killed young shade tolerant species such as Douglas-fir in the understory but generally did not kill the large trees in the overstory. Within these foothill vegetation communities on southerly aspects, sizable acreages of dense mature forest were rare. Mature forest patches were likely open and fragmented by naturally occurring wildfire events.

Logging of the large pine on the site coupled with the beginning of effective fire suppression led to the establishment of dense regeneration, with a higher proportion of the more shade tolerant Douglas-fir. With the absence of fire, these stands became overstocked and stagnated. Fuel accumulations increase as trees die from competition and environmental stresses. In this dry climate, decomposition can take several decades. Overstocking and the associated stress due to competition between the trees for moisture and nutrients can lead to increased attack by insects and diseases. This dense stand structure and the development of an understory of Douglas-fir form a very effective fuel ladder that allows a ground fire to climb into the crowns of the large overstory trees and kill them. These high fuel loadings and dense stand conditions have led to high intensity, stand replacing wildfire in stands where they were uncommon in the past.

The analysis area for this timber sale includes Plum Creek owned lands which have been heavily logged in the recent past. Some of the parcels were logged several years ago under the ownership of Champion International. Many of these have been successfully regenerated with very healthy stands of sapling sized Western Larch.

The state lands in this area are covered with mostly second growth Western Larch, Ponderosa Pine and Douglas fir. The stands are infected with mistletoe and mountain pine beetles. There are relic Western Larch and Ponderosa Pine scattered throughout the stands but the majority of the timber is less than 15" DBH. The mistletoe in the Douglas fir and the beetles in the Ponderosa Pine are contributing to heavier fuel loading on the state land than the surrounding privately owned land. There are several houses existing adjacent to the state land which would be threatened by a large fire in the area.

The stands currently planned for harvest are dense, with trees less than 15" in diameter dominating the site. Douglas-fir has become the dominant tree species, replacing ponderosa pine. Regeneration that is present is also dominated by Douglas-fir.

VISUAL QUALITY

Most of Section 6 is visible from the Deer Creek county road. The partial section is mostly west facing and very visible from the Pattee Canyon road as it turns into Deer Creek. Sections 8 and 18 are south of the main Deer Creek road and are screened by a mostly privately owned thickly timbered ridge. The northern boundary of the State property in Section 8 is adjacent to privately owned land with several residences built in the East Fork Deer Creek canyon. The north line faces the East Fork Deer Creek road which is a private drive. Much of the project area has a closed canopy, dense forest appearance from both a near and far view perspective.

ECONOMICS

The costs related to the administration of the timber sale program are only tracked at the Land Office and statewide level. DNRC does not track project level costs for individual timber sales. An annual cash flow analysis is conducted on the DNRC forest product

sales program. Revenue and costs are calculated by Land Office and Statewide. These revenue-to-cost ratios are a measure of economic efficiency.

Revenue cost ratios:

	FY2005	FY2006	FY2007	FY2008	FY 2009
SWLO	2.43	2.17	1.32	2.55	1.16
State	2.44	2.31	1.46	2.22	1.68

URBAN INTERFACE FIRE HAZARD

There are several homes scattered in the woods around the Deer Creek drainage, but only one adjacent to the State land involved in this project. The north property line in Section 8 is bordered by private land and one residence. The other sections are adjacent to heavily logged Plum Creek Timber Company lands and well regenerated U.S. Forest Service lands. Dense second growth forests such as those within the project area and on adjacent private lands pose a fire hazard to homes in the area. Trees in these overstocked stands are competing with each other for growing space. As trees die, they become fuel on the forest floor. Decomposition of woody debris in dry climates such as western Montana can take several decades. Shade tolerant Douglas-fir saplings are also becoming well established in much of the understory, these smaller trees create a very effective fuel ladder that can carry a ground fire into the crowns of the larger trees and create a high intensity crown fire. A fire in an open stand of timber without fuel accumulations and ladder fuels is much easier to control than a fire in a dense stand of timber with heavy fuel accumulations and abundant ladder fuels.

LOGGING EQUIPMENT USE ON PUBLIC ROADS

The road system in Deer Creek and the surrounding area have seen extensive log truck use over the last several years. The local residents are aware of log truck traffic and the inherent dangers. Log loading and decking on the main Deer Creek road would cause traffic delays and possible road closures on a main county road. Loading and decking on the East Fork road would cause access problems for residences in the East Fork.

ENDANGERED SPECIES

Canada Lynx (Federally threatened)

Lynx are currently classified as threatened in Montana under the Endangered Species Act. In North America, lynx distribution and abundance is strongly correlated with snowshoe hares, their primary prey. Consequently, lynx foraging habitat follows the predominant snowshoe hare habitat, early- to mid-successional lodgepole pine, subalpine fir, and Engelmann spruce forest. For denning sites, the primary component appears to be large woody debris, in the form of either down logs or root wads (Squires and Laurion 2000, Mowat et al. 2000, Koehler 1990). These den sites may be located in regenerating

stands that are >20 years post-disturbance, or in mature conifer stands (Ruediger et al. 2000, Koehler 1990).

Elevation within the project area ranges between 3,820 and 6,160 feet. There are approximately 250 acres of mature foraging habitat, 49 acres of denning, and approximately 75 acres of "other" lynx habitat (i.e., lands in lynx habitat that do not meet definitions for young or mature foraging, denning, or temporary non-lynx habitat, but serve to provide cover to facilitate movement and acquisition of alternative prey species) on the affected parcels. The lynx cumulative effects analysis area is an approximately 27,785 acre analysis area that is comprised of approximately 14,785 acres of former Plum Creek lands, and approximately 7,987 acres and 1,976 acres of U.S. Forest Service and DNRC lands, respectively. Additionally, a single lynx was observed 2 miles south of the project area in 1987 (Natural Heritage database).

Grizzly Bear (Federally threatened)

Grizzly bears are listed as federally threatened under the Endangered Species Act, and are the largest terrestrial predators in North America, feasting upon deer, rodents, fish, roots and berries, as well as a wide assortment of vegetation (Hewitt and Robbins 1996). Depending upon climate, abundance of food, and cover distribution, home ranges for male grizzly bears in northwest Montana can range from 60 - 500 mi^2 (Waller and Mace 1997). The search for food drives grizzly bear movement, with bears moving from low elevations in spring to higher elevations in fall, as fruits ripen throughout the year. However, in their pursuit of food, grizzly bears can be negatively impacted through open roads (Kasworm and Manley 1990). Such impacts are manifested through habitat avoidance, poaching, and vehicle collisions.

Portions of the project area are approximately 11 miles south of the Northern Continental Divide Ecosystem grizzly bear recovery area. The project area is in an area of high recreational use, but could be used by grizzly bears in the near future due to the area's proximity to occupied areas. The cumulative effects analysis area for grizzly bears encompasses 164 square miles (104,968 acres), from Pattee Canyon to Eightmile Creek and the Rock Creek Road.

Grizzly bears are known to be more vulnerable to human interaction in areas with high open road densities or ineffective road closures. Currently there are 2.82 miles of open road per square mile (simple linear calculation; 462.6 miles of open road), and 3.96 total miles of road per square mile (649 miles of road), within the 164 square mile grizzly bear analysis area. Within the project area, there are approximately 2.58 miles of open road per square mile (project area is approximately 1.3 square miles), and approximately 4.69 miles of total road per square mile (simple linear calculation).

SENSITIVE SPECIES

Pileated Woodpecker

The pileated woodpecker is one of the largest woodpeckers in North America (15-19 inches in length), feeding primarily on carpenter ants (*Camponotus* spp.) and woodboring beetle larvae (Bull and Jackson 1995). The pileated woodpecker nests and roosts in larger diameter snags, typically in mature to old-growth forest stands (McClelland et al. 1979, Bull et al. 1992). Due primarily to its large size, pileated woodpeckers require nest snags averaging 29 inches dbh, but have been known to nest in snags as small as 15 inches dbh in Montana (McClelland 1979). Pairs of pileated woodpeckers excavate 2-3 snags for potential nesting sites each year (Bull and Jackson 1995). Snags used for roosting are slightly smaller, averaging 27 inches dbh (Bull et al. 1992). Overall, McClelland (1979) found pileated woodpeckers to nest and roost primarily in western larch, ponderosa pine, and black cottonwood. The primary prey of pileated woodpeckers, carpenter ants, tend to prefer western larch logs with a large end diameter greater than 20 inches (Torgersen and Bull 1995). Thus, pileated woodpeckers generally prefer western larch and ponderosa pine snags > 15 inches dbh for nesting and roosting, and would likely feed on downed larch logs with a large end diameter greater than 20 inches.
The project area is either a Douglas-fir/ninebark/pinegrass phase (453 acres) or subalpine fir/twinflower/beargrass phase (375 acres) habitat type, with approximately 461 acres having an average stand diameter $\geq$ 15 inches dbh and canopy cover $\geq$ 40% (Stand Level Inventory database). The potentially suitable habitat is split among all three project area parcels. The cumulative effects analysis area encompasses a 1-mile radius surrounding each parcel of the project area.

Flammulated Owl

The flammulated owl is a tiny forest owl that inhabits warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and is a secondary cavity nester. Nest trees in 2 Oregon studies were 22-28 inches dbh (McCallum 1994). Habitats used have open to moderate canopy closure (30 to 50%) with at least 2 canopy layers, and are often adjacent to small clearings. It subsists primarily on insects and is considered a sensitive species in Montana. Periodic underburns may contribute to increasing habitat suitability for flammulated owls because low intensity fires would reduce understory density of seedlings and saplings, while periodically stimulating shrub growth. Among the project area parcels, there are approximately 453 acres of flammulated owl preferred habitat types.

Fisher

The fisher is a medium-sized animal belonging to the weasel family. Fishers prefer dense, lowland spruce-fir forests with high canopy closure, and avoid forests with little overhead cover and open areas (Powell 1978, Powell 1977, Kelly 1977, Clem 1977, Coulter 1966). For resting and denning, fishers typically use hollow trees, logs and stumps, brush piles, and holes in the ground (Coulter 1966, Powell 1977).

Based on habitat types, there are approximately 300 acres of fisher preferred habitat types among the three parcels in the project area. Thus, the analysis area is a 1-mile radius surrounding the project area. Within this analysis area, there are approximately 1,868 acres of fisher preferred habitat types.

Chapter 4: Environmental Consequences

4.1 Introduction

Chapter 4: Environmental Consequences forms the scientific and analytic basis for the summary comparison of effects presented in Chapter 2 of this EA. This chapter describes the environmental consequences or effects of the proposed action and the cumulative effects of past and concurrent activities within the analysis area. This chapter addresses the direct, indirect, and cumulative effects.

This chapter has the following two major sections:

- Predicted Attainment of the Project Objectives of All Alternatives
- Predicted Effects on Relevant Affected Resources of All Alternatives

4.2 Predicted Attainment Project Objectives for all Alternatives

Project Objective #1

Harvest 18,034 tons of sawtimber to generate revenue for the Public Building (PB) grant.

Alternative A: No Action

Under the No Action alternative, timber would not be harvested and there would be no revenue generated for the Public Building Trust.

Alternative B: Action Alternative

If Alternative B were implemented, the harvest would produce a total estimated timber volume of 18,034 tons of sawtimber. This timber sale would generate an estimated $140,000-$270,000 to the Public Building Trust.

Project Objective #2:

Reduce the incidents of Dwarf Mistletoe in the Douglas fir and beetle infestation in the Lodgepole and Ponderosa Pine which will promote the health and vigor of the remaining Ponderosa Pine, Western Larch and Douglas fir.

Alternative A: No Action

Under the No Action alternative, the Douglas fir, Lodgepole and Ponderosa Pine would continue to die causing increased fuel loading and increasing the risk of infection for additional trees increasing tree mortality. Mortality of trees due to competition stress would continue.

Alternative B: Action Alternative
Commercial thinning - Selection harvest would occur on 338 acres. This commercial harvest would serve to reduce insect and disease mortality while decreasing competition for moisture and sunlight thus increasing productivity on the remaining trees.

Project Objective #3:
Decrease the long-term fire hazard adjacent to private lands.

Alternative A: No Action
Under the No Action alternative, fire hazard reduction work would not be done. Threat of wildfire to private homes adjacent to the project area would remain high.

Alternative B: Action Alternative
Fuels reduction work would be done along 1.0 miles of property line adjacent to private property. This work would consist of commercial tree thinning and piling and burning of slash. Logging and slash burning on the rest of the project area would also reduce the fire danger posed to the private homes in the area.

Predicted Effects on Relevant Resources of all Alternatives

WATER QUALITY

Alternative A: No Action
Direct and Indirect Effects
Under the No Action alternative, direct, indirect or cumulative effects to water quality or quantity would be similar to effects described under the existing conditions. Sedimentation will continue principally at the existing stream crossings with inadequate surface drainage and road segments where road fillslopes are encroaching on stream channels. The levels of continued sedimentation will depend mainly on the levels of year round road use, road maintenance and precipitation.

Restoration projects will occur on the mouth of Deer Creek associated with the Milltown Dam Removal. Mountain pine beetle attacks to mainly older age lodgepole pine and some ponderosa pine are increasing tree mortality resulting in a spotty loss of forest canopy within the area. The current overstocked stands with insect mortality present an elevated fuel and fire risk for home sites adjacent to the DNRC parcels in sections 6 and 8. Water yields may increase naturally as a result of continued tree mortality from insects or wildfire, but are expected to decline as current young stands of trees from previously harvest, advance in growth and increase tree cover. Grazing management would continue and should gradually improve over time as inspections and management modifications are made.

Alternative B: Action
Direct and Indirect Effects
Under the Action alternative, the proposed project would harvest up to 2.8 mmbf from approximately 338 acres (298 acres in Deer Creek) of the 1040 acres within the three dispersed parcels as noted in table W1& W2, and as described in the vegetation section. The proposed harvest would be a combination of salvage and sanitation harvest prescriptions to selectively remove dead, diseased and dying trees and improve tree spacing and growth while retaining the dominant overstory and a distribution of tree size classes.

The primary risks to water quality are sediment from roads and stream crossings and potential channel effects of increased water yield. Water yields are further discussed under cumulative effects. The proposed timber harvest is designed to prevent impacts to water quality from off-site erosion through the implementation of BMP's, protection of streams and riparian areas with adequate buffers and site specific mitigations. Harvest would be primarily completed by low impact cable yarding on about 229 acres. Ground based equipment would occur on about 103 acres and would be limited to slopes less than 45% to minimize disturbance and erosion, and presents low risk of sedimentation.

No SMZ harvest is planned with this proposed management action. Proposed harvests are well back from streamside riparian areas ensuring all riparian attributes would be maintained. In section 6, no harvest is planned below the road near Deer Creek to provide a broad riparian buffer to Deer Creek and maintain the existing stream shading. All streams would have adequate Streamside Management Zone protection in accordance with SMZ requirements of ARM 36.11.302. Within Section 8, no cable harvest units have segments near the SMZ. Trees would be winched up to roads on upper slopes to avoid disturbance near riparian areas.

The proposed haul routes would use primarily existing roads by completing standard road drainage maintenance and repairs on 19 miles of road, to reduce current sediment sources and meet BMP's. Research by Wood and Sugden (2007) found relatively low base erosion rates of approximately 1 ton/acre/yr for roads on similar soils from Belt series bedrocks, where BMP's had been applied. No new stream crossings are proposed and there would be no increase in open road density. The proposed action would construct 1/2 mile of temporary road on a moderate ridge in Deer Creek, and ½ mile in Bear Run/Upper Miller Creek drainage which are located on stable slopes that are well away from surface waters.

Table W-1 Action Alternative Harvest and Road Construction on DNRC			
Action ALT	**DNRC Harvest Sites in Deer Creek drainage 5411 acres**	**DNRC Harvest Sites in Bear Run / Miller Creek drainage**	**Notes**
DNRC Harvest Acres	298 acres	40 acres	Total 338 acres 229 cable, 103 tractor
Proposed SMZ harvest	No SMZ Harvest	No SMZ Harvest	No SMZ Harvest
DNRC Miles New road	½ temporary road on ridge	½ temporary road on ridge	Total 1 mile temp road
Road maintenance and drainage repairs	~ 16 miles	~ 3 miles	
Stream Crossings	No new crossings	No new crossings	Replace bad culvert on secondary road, Restore & stabilize.

Table W-2 Action Alternative Harvest and Road Construction by DNRC Parcel			
Action ALT	Partial Section S ½ 6, 12N, R18W	S ½ Section 8, T12N, R18W	W ½ Section 18, T12N, R12W
DNRC Harvest & Thinning Acres	73 acres tractor 29 acres cable	122 acres cable	30 acres tractor 44 acres cable In Deer Creek Drainage
Proposed SMZ harvest	No SMZ Harvest	No SMZ Harvest	No SMZ Harvest
DNRC Miles New road	No new road	No new roads	1 mile temp. road, located away from streams
Stream Crossings	No new crossings	Replace a bad culvert Restore & stabilize	No new crossings

In summary, DNRC would implement all applicable BMP's and Forest Management Rules to protect water quality. There is a moderate risk of short term, low impacts during the implementation of road maintenance and repair measures for the road segment along the West Fork Deer Creek. Road maintenance and improved road drainage are expected to reduce sedimentation and maintain or slightly improve long term water quality. Overall there is low risk of low impacts to water quality and beneficial uses due to potential sediment associated with the proposed timber harvest and road construction, due to the following reasons: 1) no SMZ harvest is proposed to protect stream channels and provide an undisturbed vegetative buffer to prevent sediment runoff, 2) RMZ boundaries will be established to retain recruitable trees, limit disturbance near riparian areas and protect vegetation to trap sediment, 3) combined mitigation measures for harvest operations and season of use are all directed at minimizing soil disturbance to prevent erosion and sedimentation, 4) the proposed harvest is mainly low impact cable harvest from existing roads, 5) road maintenance and repairs are expected to prevent water

quality impacts from erosion and reduce current sediment sources, 6) no new stream crossings and no new roads would be constructed adjacent to streams.

Cumulative Watershed Effects of No-Action Alternative:
Under the no-action alternative, cumulative effects would remain the same as described in existing conditions. The effects would be most likely to decline over time as insect mortality declines and hydrologic recovery continues. A risk of fire always exists, and is heightened by the recent insect mortality.

Cumulative Watershed Effects of the Action Alternative; harvest, water yield sediment restoration
Within the cumulative effects analysis area, DNRC has proposed to harvest approximately 338 acres, distributed across 3 parcels in 2 watersheds. Road density in Deer Creek would be minimally increased by 0.06 miles/sq. mile on a watershed scale. The construction of temporary road has no potential for sediment deliver on the proposed locations, and no new stream crossings would be constructed. The proposed action would be a sanitation harvest of dead/ diseased lodgepole, ponderosa pine and Douglas fir trees while retaining a healthy overstory of western larch, Douglas-fir and ponderosa pine as described in the vegetative section. The proposed ground based timber harvest and use of existing roads is expected to result in low impacts to water quality associated with potential sediment on Deer Creek from the planned operations based on implementation of BMP's and mitigation measures during timber harvest. There is a moderate risk of short term, low impacts to sediment during road maintenance and repair operations that would not likely be detectable in Deer Creek. Potential sediment from the 19 miles of road maintenance is unlikely to exceed current levels on road segments with inadequate road surface drainage and sediment should be reduced shortly after repairs are completed. Examples of maintenance items include cleaning culvert inlets, restoring existing road surface drainage and adding drainage where needed. The combination of road drainage improvements, and maintenance measures would reduce existing sediment sources. Long term benefits would depend on the level of future maintenance to control erosion and sedimentation.

The extent of previous timber harvest and activities in the Deer Creek drainage would indicate a concern for water yield increase effects to stream channel stability. To assess conditions and potential impacts of the proposed harvest, a fine filter assessment of stream channel conditions and sediment source survey were completed on the project area that included previous harvests and existing access roads. When we look more specifically at the stream channel conditions and harvest on DNRC project parcels there is a low level of cumulative watershed impacts due to water yield increases occurring from this proposal due to the following reasons. The proposed treatments would occur on about 298 acres within the 5253 acre Deer Creek watershed with sanitation and selection prescriptions. The proposed moderate level of harvest would focus on removal of trees that are diseased, dead and overstocked and that have poor growth and water utilization. The proposed harvest would remove an average 40% of forest cover and retain 50-70% of the conifer canopy through un-even age management to improve tree spacing, canopy structure and growth.

As a relative comparison, an estimate of the existing ECA is 1211 acres for Deer Creek and the allowable ECA is 1376 acres equal to 165 acres available in the drainage. The ECA increment of the proposed action is equivalent to 120 acres harvested or about .4 of 298 acres. The allowable water yield increase was set at 11% for this analysis. The existing water yield for Deer Creek is calculated as 2319 acre feet and the proposed action is expected to raise the water yield a minor amount of about 20 acre feet or 0.8 % increase. This low level of increased ECA is dispersed over three parcels and across the drainage. Increased water yield from this project is not expected to have a measurable effect on Deer Creek following the proposed harvest. It is possible that minor increases in water yield could occur through the implementation of the Action Alternative B and could result in minor changes in stream flow, but measurable impacts to stream channel form and function would not be expected to occur. Changes in channel conditions are unlikely, given the good channel-stability ratings of Deer Creek and the tributary stream segments within and directly below the DNRC project parcels. Based on all of the previous discussion, there is a low potential for cumulative effects to sediment or water yield increase impacts to Deer Creek stream channel stability, considering the harvest prescription, no proposed harvest in SMZ's, and the good average stream channel stability in the DNRC parcels and directly downstream.

SOIL RESOURCES

Direct-Indirect and Cumulative Effects of Alternative A: No-Action Alternative on Soils

The effects of the no action alternative would be the same as previously described under existing conditions for soils. With no action, roads will continue to erode depending on the level of maintenance implemented.

Direct and Indirect Effects of Alternative B: Action Alternative on Soils

Under the Action alterative, the proposed project would harvest up to 2.8 mmbf from approximately 338 acres within the three DNRC parcels of 1040 acres. The proposed harvest would be a combination of sanitation and selection treatments to remove dead, diseased, and overstocked trees, salvage lodgepole pine and mistletoe infected Douglas fir, improve tree spacing, reduce plant competition and improve growth. Douglas-fir trees that have mistletoe infection and stagnant growth would be targeted for removal to reduce infection. Hauling access would primarily use existing roads. Site specific road recommendations would be implemented on existing roads to maintain, restore and improve road surface drainage on about 18 miles of road to control erosion. Approximately .5 mile of new, temporary road would be constructed near the ridgeline in the DNRC parcel of section 18. The new road would be constructed with minor excavation on moderate road grades and stable slopes over ¼ mile from any surface water. Disturbed roads and landings would be stabilized and grass seeded after use.

The primary risks to long term soil productivity and hydrologic function are excessive impacts to soil properties caused by rutting, compaction and displacement of surface soils by equipment operation and road construction. Most sensitive soils are small areas of steep slopes, erosive soils and wet sites which will be avoided or protected by implementing mitigation measures. Potential soil impacts are determined by the area and the degree of activity to which these soils are subjected. The risk of disturbance is higher on tractor units and below average on cable units.

Tractor logging would occur on up to 110 acres while the majority of the logging activity (approximately 228 acres) would be harvested using cable logging methods. By implementing mitigation measures on tractor units, the area of detrimental impacts will be limited to 15% or less of the harvest area. Units that will be cable logged will have negligible effects of 8% area or less on soils (DNRC 2005).

For the proposed harvest, BMP's and mitigations would be implemented to minimize the area and degree of detrimental soil impacts (displacement, erosion, and compaction). Mitigations include general skid trail planning, limiting tractor skidding to moderate slopes, avoiding wetlands and controlling soil disturbance to meet silvicultural goals to promote conifer regeneration. Ground based harvest operations would be limited to slopes less than 45%. Steeper slopes would be harvested by cable/line skidding to reduce disturbance and erosion.

On all proposed harvest areas, a portion of old and new course woody debris (CWD>3" dia.) at ~5-10 tons/acre and fine litter (similar to historic ranges) would be retained or return skidded. CWD and fine litter act as a mulch to enhance protection of surface soils maintain soil moisture and provide media for healthy soil fungi and conservation of soil nutrients important to tree growth. Protection of established regeneration and healthy over-story trees would be a priority. The improved tree spacing is expected to result in improved growth, due to reduced competition for limited soil moisture and nutrients.

Based on DNRC soil monitoring on comparable sites (DNRC 2004), implementation of BMP's and the recommended mitigation measures, the proposed harvest and road operations present low risk of excessive impacts to soils if impacts are restricted to ~15% of the proposed harvest areas. Cable harvest effects have resulted in 8% or less soils impacts. Ground based tractor harvest would be less than 15% of units, potentially as soil displacement. We expect that by protecting ~85% of a harvest area in non-detrimental soil impacts, soil properties important to soil productivity will be maintained. Sale administrators will monitor on-going harvest and road construction activities to meet contract requirements, BMP'S for soil and water protection and silvicultural objectives. For all of these reasons the proposed harvest operations and mitigation measures are expected to maintain soil properties important to plant growth and hydrologic function and present low risk of direct and indirect impacts to soils.

Cumulative effects to soils
Cumulative effects to soils can occur from repeated ground skidding entries into the harvest area and additional road construction, depending on area and degree of detrimental impacts. The initial entries on portions of these forested sites occurred in 1938. Most harvest sites proposed have been previously entered with selective harvest generally over 30-40 yrs ago, except for selection harvest on section 8 in 1987. The areas affected have recovered and left less than 10% of area effects on the soils, with few trails still evident. The observed trails have revegetated and are stable and the sites have been regenerated to young trees. This level of effects is consistent with DNRC soil monitoring (DNRC 2004) to maintain soil properties conducive to hydrologic function, plant growth and maintain long term productivity.

There is low risk of cumulative effects to soils with the proposed harvest based on: implementation of BMP's, harvest will be mainly by cable operations with low potential for disturbance while skidding and slash disposal mitigation measures limit the impacted areas. All newly disturbed roads and landings will be grass seeded to promote prompt revegetation and reduce erosion. Any future harvest would likely use the same road system, skid trails and landings to reduce the risk of cumulative effects. Improved tree spacing is expected to reduce competition for nutrients and soil moisture, enhance growth of retained trees, and promote regeneration of conifers.

COLD WATER FISHERIES

Alternative A: No Action
Direct and Indirect
Under the No Action alternative, no road construction or planned timber harvest would occur. The direct, in-direct impact to fisheries would be similar to the existing condition. The most apparent change would be the natural shading loss from interspersed dying trees that will occur along Deer Creek and its tributaries and more specifically on the north aspects in DNRC parcels of section 8 and 18 where lodgepole pine is more extensive and makes up to 30% of the forest sites. We would expect a short term increase in large woody debris as dead and dying trees fall towards streams. The loss of shading from tree mortality or fire has historically influenced available shade and stream temperatures, and a potential for increase in stream temperatures could be expected to be similar to historic conditions. Connectivity associated with restrictive road crossing culverts would remain the same as the existing condition.

Cumulative Effects

Under the No Action alternative, no timber harvest or road construction is associated with this alternative. Existing sediment sources from existing roads, grazing and land uses would continue to contribute sediment to streams in the analysis areas until remedial actions were implemented or natural stabilization occurs. Large woody debris may

increase in the short term as trees fall into streams due to mortality. There would be spotty reductions in stream shading equivalent with the lost trees, but the loss of lodgepole and remaining mixed conifers would not substantially change stream temperatures compared to natural forest changes over time.

Alternative B: Action
Direct and Indirect
With the action alternative, timber harvest of dead and dying trees would be removed from upland sites. No harvest or disturbance of riparian soils or vegetation would occur within SMZs or RMZs adjacent to Deer Creek or tributary fishery streams. Under the action alternative, there would be low risk of impacts to recruitable large woody debris, shading or stream temperature. We would expect a short term increase in large woody debris as dead and dying trees fall towards streams. There would be no change in current stream connectivity.

Within the DNRC section 8 parcel, selective cable harvest of dead, dying and high risk trees may occur only within 75-100 feet along class 2 and class 3 stream segments in the headwaters of the East Fork Deer Creek. While these small steep stream segments are not fish habitat, the class 2 segments will be protected as such and RMZ's would be designated to provide adequate retention of recruitable trees for large woody debris and an wide buffer to maintain riparian zones. The selective harvest in the designated RMZ's would not remove more than 10% of recruitable trees in the 75-100 ft range from the streams that may fall towards these stream segments. There is currently adequate large woody debris in these steams and this minor tree removal would not have a measurable change on fish habitat components of stream shading, stream temperature, or large woody debris. Operations within the RMZ's would be limited to dry or frozen ground conditions to minimize soil disturbance and maintain a vegetative buffer to trap sediment.

As noted in the water quality section, there is a moderate risk of low level, short term effects to sediment during road drainage repairs and site specific maintenance to improve drainage on 19 miles of existing roads. Potential sediment would be quickly reduced to less than existing conditions with implementation of BMP's and mitigation measures. No new stream crossings would be constructed. Erosion control and revegetation would be implemented to reduce current sediment introduction to the stream.

For all the above reasons; there would be an overall low risk of effects to: LWD, stream shading, change in stream temperature or sediment from harvest operations. No change in the existing limitations to connectivity of fish bearing streams would occur along the haul routes.

Cumulative Effects
There is low risk of additional cumulative impacts to fisheries in the project area, including Deer Creek and its tributaries or the Clark Fork River with the proposed timber harvest and road maintenance, due to the following reasons: 1) No harvest is planned in streamside management zones or riparian management zones adjacent to fish bearing streams, 2) SMZ and RMZ boundaries will be established where needed to limit disturbance near water resources and protect vegetation to trap sediment , 3) estimated water yield increases are very small and have low risk of impact to channel form or function, 4) road surface drainage improvements would reduce current sedimentation on proposed haul routes, 5) no new roads would be constructed adjacent to fisheries streams or in locations that could contribute sediment to streams, 6) combined mitigation measures for harvest operations and season of use are all directed at minimizing soil disturbance to prevent erosion and sedimentation, 7) streamside snags and recruitable trees would be retained to provide adequate levels of long term woody debris recruitment to stream channels.

NOXIOUS WEEDS

Alternative A: No action
With no action, noxious weeds will continue to spread along roads and may increase on the drier site habitats. Following disturbance events such as timber harvest activities, fires, or grazing, the establishment and spread of noxious weeds is more prevalent than in undisturbed areas. The grazing licensees would be required to continue weed control efforts consistent with their use.

Direct and Indirect Effects
Under the No Action alternative, noxious weeds would continue to spread along existing roads and into non-infested areas. Integrated weed management efforts would continue.

Cumulative Effects
Under the No Action alternative, there would be no cumulative impact to noxious weed spread. Weeds would continue to spread into non-infested areas. Any increase or decrease in noxious weeds as a result of no action would be in addition to weed spread on adjacent public and private lands. Level of control efforts and effectiveness varies greatly with different landowners.

Alternative B: Action
Direct and Indirect Effects
The action alternative would involve ground-disturbing activities that have the potential to introduce or spread noxious weeds in susceptible habitat types. For the action alternative, an Integrated Weed Management (IWM) approach would be considered for treatment of existing and prevention of potential noxious weeds. For this project: prevention, revegetation and weed control measures for spot outbreaks are considered the most effective weed management treatments. Prevention measures would require cleaning off-road equipment. Roadsides would be sprayed prior to operations and weed control and

revegetation would reduce noxious weed density and occurrence compared to no-action. There would be similar or potential slight increase in weed infestation with harvest units due to soil disturbance and decreased tree canopy. Control efforts will promote revegetation and emphasize treatment of any new noxious weeds. More weed control would occur compared to no-action alternative.

Cumulative Effects
Any increase or decrease in noxious weeds as a result of harvesting and road building activities would be in addition to weed spread on adjacent public and private lands. Level of control efforts and effectiveness varies greatly with different landowners.

AIR QUALITY

Alternative A: No action
Direct and Indirect
Under the No Action alternative, timber harvest and slash burning would not take place. There would be no immediate effect on air quality.

Cumulative Effects
Under the No Action alternative, there would be no additional effect on air quality.

Alternative B: Action
Direct and Indirect Effects
If the Action alternative were to be implemented, approximately 338 acres of logging slash would be in need of treatment. The tractor units in the sale area would be piled and burned at the landings.
The logging slash in the cable logging units would be limited to slash piles next to the logging roads. The tops and branches broken during logging will be left in sale units for downed woody recruitment, so the slash will consist of primarily limbs and small tops. While spring burning may provide better conditions for ventilation and dispersion, it also provides a much greater fire hazard due to warm temperatures and less moisture. Fall burning would be required with DNRC personnel providing the burning crew. The DNRC would burn only after receiving approval from the Smoke Monitoring Unit and on days with good conditions for smoke ventilation and dispersion. Some smoke may collect in the Deer Creek valley as a result of evening down slope winds and nighttime inversions even during periods of good smoke dispersion. With proper smoke management applied, impacts to air quality should be minor and short in duration.

Cumulative Effects
Smoke resulting from this project will have a cumulative effect with other prescribed burns being conducted in the region as well as with pollutants produced from other sources. Prescribed burning conducted by major open burners in Montana and Idaho is regulated by the smoke monitoring unit, which considers the cumulative impact of smoke from all past, current and proposed burns on all ownerships within an airshed as a part of their burning approval process. Through this process, the amount of burning allowed on a

given day would not be expected to produce smoke exceeding allowable levels of pollutants that would result in foreseeable and lasting impacts on air quality. Industrial, agricultural and vehicular sources of particulate will also be producing pollutants while burning is ongoing. With attention to burning under only ideal conditions, the projects cumulative impact to air quality should be minor and of short duration.

FOREST CONDITIONS AND FOREST HEALTH

Alternative A: No Action

Under the No Action alternative, harvesting would not take place. In the short-term, forest conditions and health would remain the same. Under this alternative, conditions contributing to mortality, decreased growth and vigor of trees would continue. It is expected that the regeneration of shade tolerant species would continue. Douglas fir would continue to replace ponderosa pine and western larch. At current stocking levels, trees eventually would "stagnate" (grow at much reduced rates).

Growth rates of all trees would be far below their potential due to the level of over stocking and resulting inter-tree competition. Trees would remain in a stressed condition due to overstocking and would remain more susceptible to insect and disease attacks than if they were thinned.

Cumulative Effects

Under the No Action alternative, forest health would continue to decline as stands age and competition becomes more intense. As competition for resources for tree growth (water, nutrients, and light) increase, the risk of insect or disease infestations becomes much greater. As insect and disease infestations increase, the potential for large-scale epidemics increase. This would provide a cumulative risk over time. These factors would decrease the growth and vigor of the stands. Tree mortality would increase adding to the ever growing fuel load. These factors also would greatly increase the chance of a stand replacement wildfire.

Alternative B: Action Alternative

Direct and Indirect Effects

Under the Action alternative, approximately 338 acres would be treated with a combination of commercial thinning and selection cutting. The proposed harvesting would reduce the tree canopy cover in the harvested areas by approximately 40%. Harvesting would leave the dominant ponderosa pine and western larch whenever possible. Following harvest the site would have approximately 50 trees per acre ranging from 8" to 26" dbh with an average around 14" dbh. Species composition after harvest would be roughly 50% ponderosa pine, 30% Douglas fir, and 20% western larch. These percentages are similar to what would have been present on the site under pre-settlement conditions (Losensky). Growth rates should increase dramatically due to the thinning, as competition between trees would be substantially reduced. Other plant species currently on the site such as grass, forbs, and shrub species should also experience an increase in growth and vigor as a result of tree thinning. The average tree size would be much smaller than that of the stand present on the site during the pre-settlement era as larger trees are simply not present at the current time. With thinning, the stand would be closer

to its pre-settlement condition than it would be without any harvest. Removal of understory and suppressed trees would give the stand an open nature, similar to what would have been present with frequent low intensity fires which historically occurred.

Cumulative Effects
The risk of adverse cumulative effects occurring is very low since the proposed treatments are designed to bring stands toward more historic and healthier stand conditions. The proposed treatment would increase tree vigor and reduce insect and disease problems. With the decrease in tree mortality, the fuel loading would decrease. The treatment would also reduce potential fire hazards by removing large logging slash build up.

VISUAL QUALITY

Alternative A: No Action
Direct and Indirect Effects
Under the No Action alternative, harvesting would not take place. The area would maintain its current appearance for the near future. The stand would continue to have a dense closed canopy appearance. No skid trails or skyline corridors would be created and no new roads would be constructed. No logging slash would be created. A stand replacing fire at some time in the future could dramatically change the appearance of the stand. The likelihood of a stand replacing fire occurring would be higher under Alternative A, No Action rather than Alternative B: Action.

Cumulative Effects
Under the No Action alternative, there would be no cumulative effects from harvesting or road building. There would be no cumulative effects from harvesting done on adjacent lands.

Alternative B: Action Alternative
Direct and Indirect Effects
The commercial thinning and selection harvests proposed for the area would maintain a forested far view appearance. When the ground is snow covered, the portions of harvest units over approximately 35% slope may appear as a mottled white and green as opposed to the solid green look of a forest with a closed tree canopy. The area within the harvested units would appear much more open and sight distances would be increased. Since the stands have been overstocked for a number of years and the smaller trees are to be removed, the remaining trees would have few if any low live limbs and have a somewhat unnatural appearance immediately after harvest. In summary, a harvest system that leaves 40-65 of the largest trees per acre should result in small or no negative visual impact in the short term. Aesthetic quality would improve in the long term as the trees in the stand increase in size and their crowns expand.

Cumulative Effects
Adjacent Forest Service lands generally have been partially harvested in the past or not harvested at all in the recent past. They have been successfully regenerated to full stocking levels. They do contain several miles of road per section.
Adjacent private industrial lands have been extensively harvested using even-aged silviculture that has resulted in clearcuts and seed tree cuts of several hundred acres in size. The road building and partial harvesting that is planned under this environmental assessment would have a minor impact on visual quality and therefore a minor cumulative impact when contrasted with the adjacent landscape.

ECONOMICS

Alternative A: No Action
Direct and Indirect Effects
Under the No Action alternative, revenue would not be realized for the Public Building account.

Cumulative Effects
Under the No Action alternative, revenue would not be realized for the Public Building account, beyond that currently received, from the project area.

Alternative B: Action Alternative
Direct and Indirect Effects
Alternative B would yield between $140,000 and $270,000 to the Public Building account. In addition to the revenue to the trusts, the timber purchaser would pay the DNRC $60,000 to $120,000 in forest improvement funds.

Cumulative Effects
Revenue and Forest Improvement payments realized from this project would be in addition to other revenue generated from trust lands statewide.

URBAN INTERFACE FIRE HAZARD

Alternative A: No Action
Direct and Indirect Effects
Under the No Action alternative, there would be no thinning or fuel reduction work done. Stands would remain in a dense condition and ladder fuels would continue to develop. Fire risk to adjacent homes would remain high.

Cumulative Effects
Under the No Action alternative, fuel reduction work would not be done and the risk to adjacent private homes would remain high. This would be in addition to the fire risk posed by fuel hazards currently present on untreated private lands adjacent to the project area.

Alternative B: Action Alternative
Direct and Indirect Effects
Under Alternative B, commercial thinning and selection harvest would occur on 338 acres. Stand density would be greatly reduced. All slash resulting from commercial treatments created within 200' of private property would be piled and burned. Commercial thinning slash in areas that are to be ground based skidded would be piled and burned. Slash created in areas that are cable yarded would be piled on roadside landings and burned. The long-term fire hazard would be reduced as a result of the reduction in stand density.

Cumulative effects
Reduction in the risk of fire to private homes by the timber harvest would be in addition to fuels reduction work already completed or underway on adjacent private and federal lands.

LOGGING EQUIPMENT USE ON PUBLIC ROADS

Alternative A: No Action
Direct and Indirect Effects
Under the No Action alternative, there would be no use of public roads by logging equipment and log trucks associated with this project.

Cumulative Effects
Under the No Action alternative, there would be no use of public roads by logging equipment and log trucks associated with this project and therefore no cumulative effects.

Alternative B: Action Alternative
Direct and Indirect Effects
Log trucks would be required to observe all speed limits on public roads. The road system in Deer Creek and the surrounding area have seen extensive log truck use over the last several years. The local residents are aware of log truck traffic and the inherent dangers. There would be no log decking or loading on the main Deer Creek road (county road) or the East Fork Deer Creek road. All roads used for log decking and loading on this timber sale are logging roads located behind locked gates.

Cumulative Effects
Log truck traffic on public roads would be in addition to the current use the roads receive.

ENDANGERED SPECIES

Canada Lynx

Alternative A: No Action
Direct and Indirect Effects
No change from current conditions would be expected. There would likely be minimal risk of direct or indirect effects to Canada lynx due to the no action alternative.

Cumulative Effects
No change from current conditions would be expected. There would likely be minimal risk of cumulative effects to Canada lynx due to the no action alternative.

Alternative B:Action Alternative
Direct and Indirect Effects
The proposed harvest would affect approximately 23 acres of the 75 acres of existing "other" lynx habitat, approximately 134 acres of the 250 acres of existing mature foraging habitat, and approximately 32 acres of 49 existing acres of denning habitat within the project area. These measures would be in compliance with ARM 36.11.435 (8) (a) and (8) (b) (i), regarding retention levels for lynx denning and mature foraging habitat, respectively. Additionally, connective corridors would be retained post-harvest. As a result, there would likely be low risk of direct and indirect effects to lynx as a result of the proposed action.

Cumulative Effects
Within the analysis area, suitable lynx habitat occurs in usually small, isolated patches within a matrix of heavily harvested former industrial lands that are currently unsuitable lynx habitat. Fortunately, many of these former industrial lands will likely grow into young foraging habitat within the next 20 years. Under the proposed action, post-harvest suitable habitat would be connected through narrow corridors in a matrix of currently unsuitable habitat. Additionally, there is a proposed fuels reduction project proposed for 22 acres in the northwest corner of the section 8 parcel, which would likely transform current mature foraging habitat to "other" lynx habitat post-harvest. Given the scale of currently unsuitable lynx habitat on former industrial lands within the analysis area, the proposed action would likely have a moderate risk of cumulative effects to lynx until young foraging habitat develops within the analysis area within the next 20 years.

Grizzly Bear

Alternative A: No Action
Direct and Indirect Effects
No change from current conditions would be expected. There would likely be minimal risk of direct or indirect effects to grizzly bears due to the no action alternative.

Cumulative Effects
No change from current conditions would be expected. There would likely be minimal risk of cumulative effects to grizzly bears due to the no action alternative.

Alternative B: Action Alternative
Direct and Indirect Effects
New road would be constructed in section 18, and approximately 338 acres are proposed for harvesting within the project area. While new road would be constructed, seasonal road closures would be implemented on adjacent lands which would affect the new road. The proposed silvicultural prescriptions would treat mistletoe-infested Douglas-fir, remove beetle hit lodgepole and Ponderosa pine, and thin the remainder of the stands to increase vigor. Given the extent of mistletoe and pine beetle infestation, post-harvest stand density and topography would likely still provide visual screening cover for grizzly bears. As a result, there would likely be low risk of direct and indirect effects to grizzly bears as a result of the proposed action.

Cumulative Effects
The proposed action would not increase open road density within the analysis area, and the proposed harvest would likely retain visual screening cover post harvest. However, a 22-acre fuels reduction project for the northwest corner of the parcel in section 8 has been proposed, and the former Plum Creek lands within the analysis area have been heavily harvested in the past. Fortunately, the majority of the heavily harvested former Plum Creek lands cannot be accessed by open roads. As a result, there would likely be low risk of cumulative effects to grizzly bears as a result of the proposed action.

SENSITIVE SPECIES

Pileated Woodpecker

Alternative A: No Action
Direct and Indirect Effects
No change from current conditions would be expected. There would likely be minimal risk of direct or indirect effects to pileated woodpeckers due to the no action alternative.

Cumulative Effects
No change from current conditions would be expected. There would likely be minimal risk of cumulative effects to pileated woodpeckers due to the no action alternative.

Alternative B: Action Alternative
Direct and Indirect Effects
The proposed action would harvest within approximately 226 of the approximately 461 acres of potentially suitable pileated woodpecker habitat within the project area. Habitat not entered would be maintained in 40 acre blocks, as per ARM 36.11.439 (1) (a). Post-harvest, affected pileated woodpecker habitat would have decreased habitat suitability, and may have canopy closure <40%. As a result, there would likely be low to moderate risk of direct and indirect effects to a small group of pileated woodpeckers due to the proposed action.

Cumulative Effects
Aside from potential pileated woodpecker habitat within the project area, much of the analysis area has been heavily harvested on former industrial lands. Currently, the bulk of the potential habitat occurs in two blocks: (1) approximately 660 acres on USFS and DNRC land in the Pattee Canyon Recreation Area; and (2) approximately 121 acres on USFS land in Bear Gulch, to the east of the project area. As previously mentioned, the proposed action would affect approximately 226 acres of potential pileated woodpecker habitat through reductions in canopy closure, and thus, reductions in habitat suitability. As a result, there would likely be low to moderate risk of cumulative effects to pileated woodpeckers within the analysis area.

Flammulated Owl

Alternative A: No Action
Direct and Indirect Effects
No change from current conditions would be expected. There would likely be minimal risk of direct or indirect effects to flammulated owls due to the no action alternative.

Cumulative Effects
No change from current conditions would be expected. There would likely be minimal risk of cumulative effects to flammulated owls due to the no action alternative.

Alternative B: Action Alternative
Direct, Indirect, and Cumulative Effects
The proposed action would treat approximately 156 of the approximately 453 acres of flammulated owl preferred habitat types within the project area through removal of mistletoe and mountain pine beetle infested trees, as well as reductions in stocking levels to increase vigor. As such, the proposed action would likely improve habitat conditions for flammulated owls because it would foster development of small openings, and eventually seedlings and saplings within the affected stands. Thus, the proposed action would likely improve habitat conditions for flammulated owls within 25 years post-harvest. As a result, there would likely be low risk of direct, indirect, or cumulative effects to this species from the proposed action.

Fisher

Alternative A: No Action
Direct and Indirect Effects
No change from current conditions would be expected. There would likely be minimal risk of direct or indirect effects to fishers due to the no action alternative.

Cumulative Effects
No change from current conditions would be expected. There would likely be minimal risk of cumulative effects to fishers due to the no action alternative.

Alternative B: Action Alternative
Direct and Indirect Effects
The proposed action would harvest within approximately 162 of the approximately 300 acres of fisher preferred habitat types within the project area. Unentered patches would serve to provide connectivity, where conditions allow. Additionally, there are no class 1 or 2 streams within the project area. As such, there would likely be low risk of direct or indirect effects to fishers as a result of the proposed action.

Cumulative Effects
Aside from fisher preferred habitat types within the project area, much of the analysis area has been heavily harvested on former industrial lands. Currently, the bulk of the potential habitat occurs in four blocks: (1) an approximately 794 acre block connecting the project area; (2) an approximately 288 acre block on USFS and DNRC land in the Pattee Canyon Recreation Area; (3) approximately 420 acres in the headwaters of Crystal Creek; and (4) approximately 212 acres on USFS land in Bear Gulch, to the east of the project area. As previously mentioned, the proposed action would affect approximately 162 acres of potential pileated woodpecker habitat through reductions in canopy closure, and thus, reductions in habitat suitability. As a result, there would likely be low to moderate risk of cumulative effects to fishers within the analysis area.

Cumulative Effects Associated with other DNRC Projects
Several other DNRC projects are either ongoing or have undergone scoping in the general area around the Deer Creek Project Area. The following Table displays the name of the proposed activity, the year when activity is planned, and the type of activity proposed. Of the projects listed, all are outside of any Analysis Area used in this assessment and would have no measurable cumulative effects on wildlife considered in this assessment.

Table 4-1: OTHER DNRC MISSOULA UNIT ACTIVITIES

Project Name	Air miles from Deer Creek	Year of Proposed Activity	Description of proposed Activity
Fournier Creek	9	2007	Fire Salvage
Roman – Sixmile	9	2008	Commercial Thinning
Evaro Thinning	9	2009	Precommercial Thinning
Roman Thinning	9	2009	Precommercial Thinning
Mill Creek	20	2010	Selection
Dry Gulch	30	2010	Shelterwood

5.0 List of Individuals and Groups Associated with the Project:

Jeff Rupkalvis	Forest Management Supervisor /Project Leader, Missoula Unit, DNRC
Mike McGrath	Wildlife Biologist, SWLO, DNRC
Renee Hanna	Hydrologist Scientist, SWLO, DNRC
Jeff Collins	Hydrologist Scientist, SWLO, DNRC
Ladd Knotek	Montana Fish Wildlife and Parks
Dana Boruch	Right of Way Specialist, DNRC Southwest Land Office
David McEldery	Contract Right of Way Specialist
Jonathan Hansen	Unit Manager/Decision Maker, Missoula Unit, SWLO, DNRC
Wayne Lyngholm	management Forester, Missoula Unit, SWLO, DNRC
Richard Stocker	Management Forester, Missoula Unit, SWLO, DNRC
Catina McLean	US Forest Service, Lolo National Forest

6.0 Individuals and Agencies Consulted and/or Provided Copies of this EA:

Ladd Knotek	Montana Fish, Wildlife and Parks

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