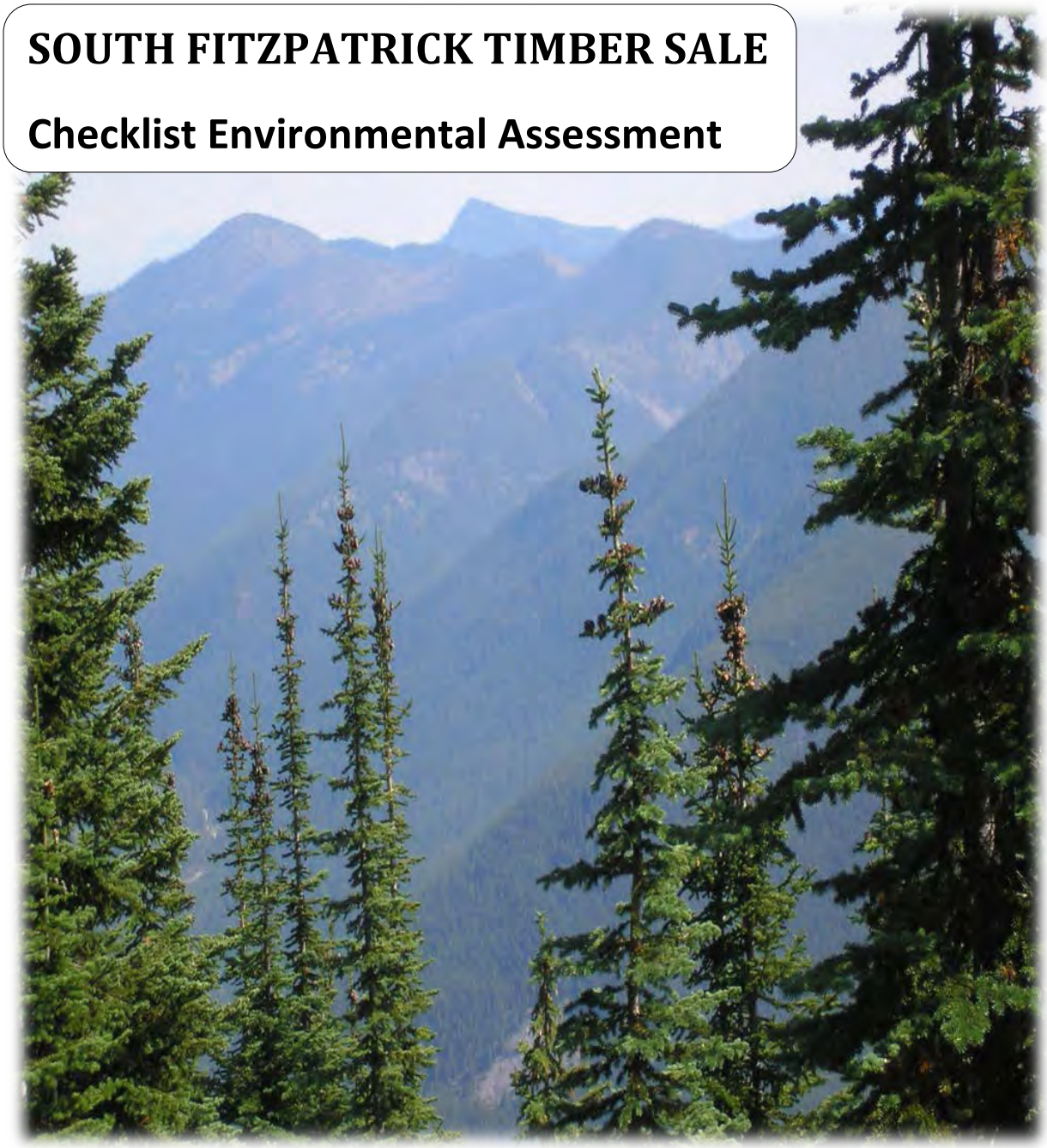
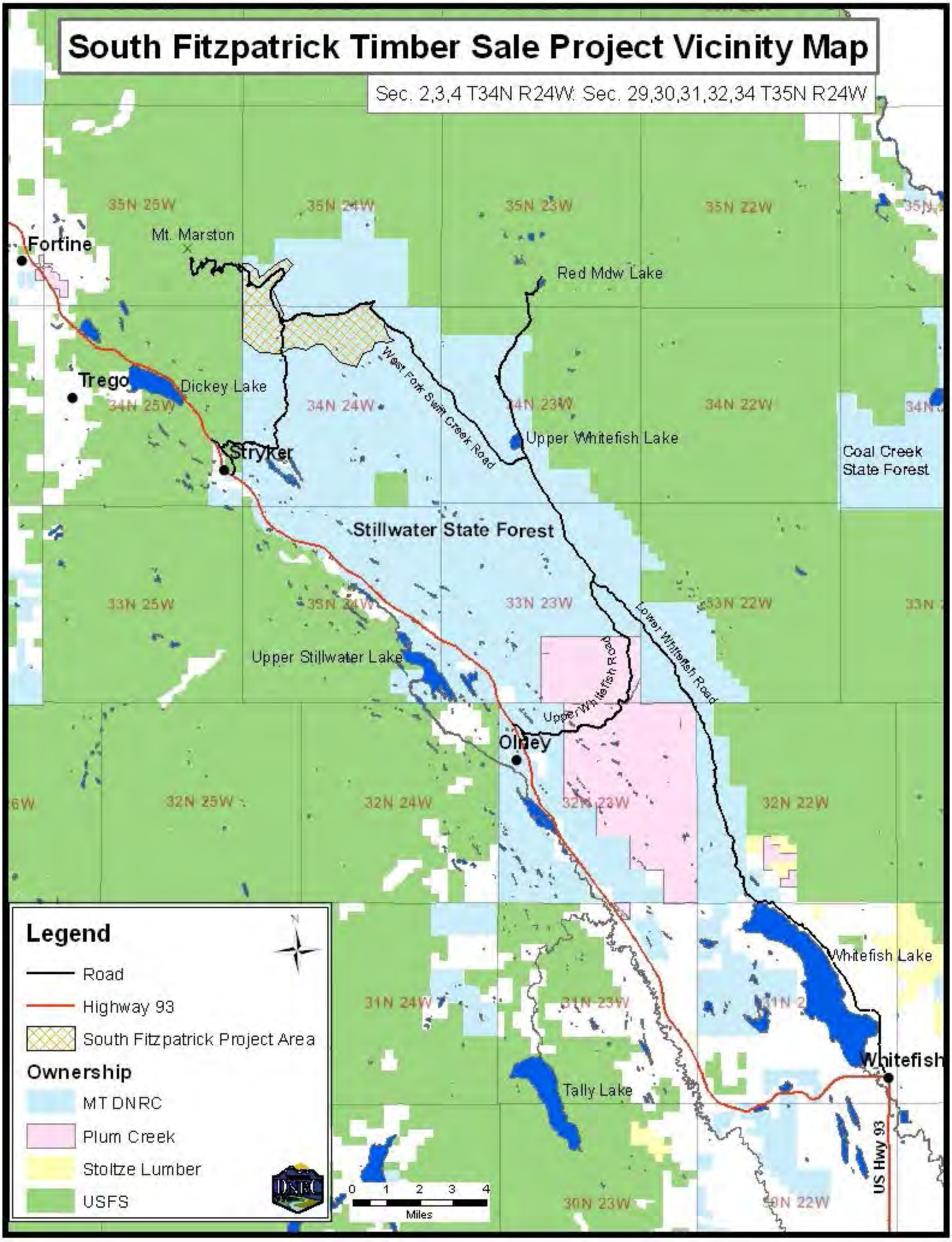
SOUTH FITZPATRICK TIMBER SALE

Checklist Environmental Assessment



Montana Dept. of Natural Resources and Conservation
Northwestern Land Office - Stillwater Unit

June, 2014


South Fitzpatrick Timber Sale Project Vicinity Map
Sec. 2,3,4 T34N R24W: Sec. 29,30,31,32,34 T35N R24W
35N 25W
35N 24W
35N 23W
35N 22W
Fortine
Mt. Marston
Red Mdw Lake
Trego
Dickey Lake
34N 25W
34N 24W
34N 23W
34N 22W
West Fork Swim Creek Road
Upper Whitefish Lake
Stryker
Coal Creek State Forest
Stillwater State Forest
33N 25W
33N 24W
33N 23W
33N 22W
Lower Whitefish Road
Upper Stillwater Lake
Upper Whitefish Road
Olney
32N 25W
32N 24W
32N 23W
32N 22W
Whitefish Lake
31N 24W
31N 23W
Whitefish
Tally Lake
US Hwy 93
30N 23W
30N 22W
Legend
Road
Highway 93
South Fitzpatrick Project Area
Ownership
MT DNRC
Plum Creek
Stoltze Lumber
USFS
0 1 2 3 4
Miles

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CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	South Fitzpatrick Timber Sale
Proposed Implementation Date:	Fall 2014
Proponent:	Montana Department of Natural Resources (DNRC), Northwestern Land Office, Stillwater Unit
Location:	Sec. 2,3,4 of T34N, R24W; Sec. 29,30,31,32,34 of T35N, R24W
County:	Lincoln

I. TYPE AND PURPOSE OF ACTION

Montana Department of Natural Resources and Conservation (DNRC), Stillwater Unit, proposes to harvest approximately 4 to 5 million board feet of timber from the Stillwater State Forest (*see Vicinity Map*). The proposed activities would regenerate new stands of healthy trees while improving the vigor and growth of trees remaining in the forest for the purpose of benefiting future trust actions. This project would produce an estimated $729,655 in revenue for the Common Schools Trust.

The lands in this project are held in trust by the State of Montana for the support of specific beneficiary institutions (*Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11*). The Board of Land Commissioners (Land Board) and DNRC are legally required to administer these trust lands to produce the largest measure of reasonable and legitimate long-term return for the trust beneficiaries (*Montana Code Annotated 77-1-202*).

This project was developed in compliance with the State Forest Land Management Plan (SFLMP), the Administrative Rules for Forest Management (Forest Management Rules; ARM 36.11.401 through 471), and Montana DNRC Forested State Trust Lands Habitat Conservation Plan (HCP), as well as other applicable state and federal laws.

II. PROJECT DEVELOPMENT

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

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

In July 2013, DNRC solicited public participation on the South Fitzpatrick Timber Sale Project. Scoping notices were placed in the Tobacco Valley News, Whitefish Pilot, and the Daily Inter Lake and sent to neighboring landowners, individuals, agencies, industry representatives, and other organizations that have expressed interest in DNRC's management activities. The Initial Proposal was also placed on the DNRC website and posted at the Olney and Stryker Post Offices for 30 days. The mailing list of parties receiving the Initial Proposal, and the comments received, are located in the project file at the Stillwater Unit Headquarters in Olney, Montana. During the 30 day public comment period DNRC received 2 emails: one supporting the project and one regarding cultural resources from the Salish/Pend d'Orielle and Kootenai Nation with regard to consultation of local tribes. DNRC has sent correspondence and a *CULTURAL RESOURCES INVENTORY* report to the Salish/Pend d'Orielle and Kootenai Nation. DNRC MEPA documents and standard timber sale contract language include provisions for protection of cultural resources if they are discovered during operations.

In September 2013, the Interdisciplinary (ID) Team began to gather information related to the current conditions of the project area. Transportation system development based around the hydrological concerns (especially the amount of new springs found during reconnaissance), soils, and wildlife connectivity were identified by DNRC resource specialists and field foresters as the main focus for the No-Action and Action Alternatives. Recreational, vegetative, and visual concerns were also part of alternative development. The ID Team determined that the issues directly related to the proposed actions could be addressed through project design and/or mitigation measures.

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

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

A Short-term Exemption From Montana's Surface Water Quality Standards (318 Authorization) may also be required from DEQ if activities such as removing a native log-sill crossing on a stream would introduce sediment above natural levels into streams, and if Montana Department of Fish, Wildlife and Parks recommends it.

Montana Department of Fish, Wildlife and Parks (DFWP)
A Stream Protection Act Permit (124 Permit) is required from DFWP for activities that may affect the natural shape and form of a stream's channel, banks, or tributaries. Such activities include the installation and/or replacement of stream crossing culverts.

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

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

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

The No-Action and Action Alternatives are described in this section. The decisionmaker may select a modification or combination of these alternatives.

Alternatives Considered

- ***No-Action Alternative***

The No-Action Alternative is used as a baseline for comparing the effects that the Action Alternative would have on the environment and is considered a possible alternative for selection. Under this alternative, no timber would be harvested and therefore no revenue would be generated for the Trusts at this time. Salvage logging, firewood gathering, recreational use, fire suppression, noxious-weed control, additional requests for permits and easements, and ongoing management requests may still occur. Natural events, such as plant succession, tree mortality due to insects and diseases, windthrow, down fuel accumulation, in-growth of ladder fuels, and wildfires, would continue to occur.

· ***Action Alternative***

Development of the Action Alternative is based on the presence of current forest and resource conditions within the project area and cumulative effects areas. Many of the following resource conditions had an impact on the process of developing the proposed transportation and logging plans within the project area. Such conditions include numerous water sources such as streams and springs, recreation, timber stand health, biodiversity, old growth, and wildlife habitat connectivity.

The following are the main concerns or focal points related to project development in the project area:

Ø Develop a logging and transportation system in an area that has not been roaded and has had minimal logging in the past.
Ø Assure that SMZ law, Forest Management Rules, and HCP commitments are met when encountering numerous springs, streams, and associated wetlands in proximity to potential harvest units and new temporary roads.
Ø Minimize impacts(including aesthetics) to the USFS and public on a road system which accesses Mount Marston Lookout (USFS Administrative site) and receives regular recreational use.
Ø Manage the timber and vegetation to address diminishing tree growth with consideration toward timber stand health, and achieve certain desired future conditions in relation to tree species.
Ø Implement silvicultural practices to emulate natural process across the landscape.
Ø Consider and plan for wildlife habitat connectivity; specifically mature forested areas and lynx habitat.

<u>Alternative Dropped from Consideration</u>

As a result of the work involved in developing a transportation plan within the project area, several options were considered for this area. One comprehensive alternative was developed and then dismissed prior to this environmental assessment. This dismissed alternative included constructing an additional 2.1 miles of temporary road over multiple stream crossings therefore accessing more area for harvesting. The construction of the temporary road has been postponed in order to investigate an advanced type of engineered structure for crossing springs, wetlands and sensitive sites found along the slopes adjacent to the Stillwater River. This alternative also included the harvest in Class A lands (as identified in the HCP) where, after the harvesting activities were completed, an 8-year rest period would have been initiated; this would have postponed future timber sales within that Class A subzone. A more detailed explanation of this alternative is located in the South Fitzpatrick Timber Sale project file located at the Stillwater State Forest Office.

The final Action Alternative the ID Team developed would:

- Regenerate new stands of healthy trees on 359 acres through shelterwood and seed tree with reserves treatments; these acres would either be planted or regenerate naturally;
- Commercially thin 16 acres;
- Harvest 5 acres, implementing an old-growth maintenance treatment;
- Of the 380 acres proposed, selectively harvest approximately 12 acres within riparian and streamside management zones;
- Implement multiple (different) silvicultural practices in a single proposed harvest unit emulating mixed severity and stand replacement fires across the landscape;
- Perform road maintenance and Best Management Practices (BMP) improvements on approximately 14.7 miles of constructed road;
- Place gravel surfacing on several segments on Mount Marston Road; and,
- Construct 2.6 miles of temporary road which would be reclaimed post-harvest.

Detailed descriptions of the harvesting methods and silvicultural prescriptions can be found in *Attachment I – PROJECT MAP and Attachment II – PRESCRIPTION TABLE.* Also a detailed description of mitigation measures utilized to address or reduce impacts to the various resources can be found in *Attachment III - STIPULATIONS AND SPECIFICATIONS*.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

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

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:

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

The following issue statements were compiled from interdisciplinary team discussions regarding the effects of the proposed timber harvesting:

- *Timber harvesting activities may adversely affect soil resources due to increased compaction, displacement and erosion.*
- *Removal of both coarse and fine woody material off site during timber harvest operations can reduce nutrient pools required for future forest stands and can affect the long-term productivity of the site.*

EXISTING CONDITIONS

The *Soil Survey of Flathead National Forest Area, Montana* (*Martinson and Basko, 1998*) combines landform and soil information with habitat types to inventory and map soils in the project area. Nine landtypes were identified in the project area; with harvesting proposed on all nine of these landtypes (21-8, 21-9, 26A-8, 27-7, 28-7, 57-8, 72, 73 and 74).

Cumulative effects from past forest management in the proposed harvest units are a result of roads, skid trails and landings. Records show evidence of past harvest in some areas from the 1940's to the early 1990's. Impact from skid trails and landings from older sales have been reduced through freeze-thaw cycles and root mass penetrating the soil. While many of the impacts have ameliorated over time, some skid trails are still visible in the proposed harvest units and elsewhere in the project area. Skid trails within proposed harvest units do not appear to be eroding any more than the surrounding un-trailed areas, but reduced tree density and vigor is present on these areas as is more brush. The average amount of coarse woody debris found within proposed harvest areas is 15.7 tons per acre while the recommended levels range from 15 to 25 tons per acre (*Graham et.al., 1994*). *A* brief description of the landtypes within the project area can be found in the project file.

Environmental Effects

- ***Direct, Indirect and Cumulative Effects of the No-Action Alternative***

Since no additional activities would occur under this alternative, skid trails from past harvesting would continue to recover from compaction. Coarse woody debris would gradually increase over time. No additional cumulative effects would occur.

- ***Direct, Indirect, and Cumulative Effects of the Action Alternative***

As BMPs and mitigations are applied (see *Attachment III - STIPULATIONS AND SPECIFICATIONS*), the extent of expected impacts would be similar to those reported in past monitoring on DNRC timber sales from 1988 to 2011. Results have shown an average of 12.2 percent soil impacts due to compaction, displacement or severe erosion across all parent materials. Eighteen monitoring sites had soil textures (silt loam/gravelly silt loam) similar to the areas proposed for harvest in this project. Stratifying the results by soil texture that are similar to the majority of the proposed harvesting shows an average of approximately 16.9 percent of the harvest areas impacted from erosion, displacement, or severe compaction on ground-based harvesting operations and an average of 6.8 percent on cable yarding harvesting operations (*DNRC 2011*). Erosion would potentially result from implementation of the project, but the magnitude and area would remain low and duration of erosion would be short. Due to BMP implementation, the risk of unacceptable adverse impacts to physical soil properties would be low. Because coarse woody debris would be left on site in amounts recommended by *Graham (1994)*

and fine debris would be maintained as much as practicable, the risk of measureable adverse impacts to nutrient cycling would be moderate to low. Cumulatively, by designing the proposed harvesting operations with soil-moisture and season of use restrictions, utilizing appropriate harvesting methods, and reusing existing skid trails that meet BMPs, the risk of unacceptable long-term impacts to soil productivity from compaction, displacement and nutrient pool losses would be low.

A detailed analysis is contained in Attachment IV: SOILS ANALYSIS.

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

DNRC developed the following issue statements regarding the potential effects of the proposed timber harvesting:

- *Timber harvesting and road construction activities may increase sediment delivery into streams and affect water quality*
- *Water yield increases can result from timber harvesting and associated activities, which can affect the timing, distribution, and amount of water yield in a harvested watershed.*

Existing Conditions

The project area is located in portions of the Fitzsimmons Creek and Upper Stillwater River watersheds. The Stillwater River is the primary stream in the project area and is a perennial Class 1 stream with an approximately 45-foot bankfull width. The Stillwater River was classified as a B3/4 channel using a classification system developed by *Rosgen* (*1996*). Fitzsimmons Creek which flows through the eastern portion of the project area is a perennial Class 1 stream with an approximately 20-foot bankfull width. Fitzsimmons Creek is classified as a B2/3 channel using a classification system developed by *Rosgen* (*1996*). Several smaller first and second order creeks located within the project area are tributaries to the Stillwater River and Fitzsimmons Creek. A multitude of other streams in the watershed have discontinuous surface flow.

Sediment Delivery
A field review of the haul route identified no potential sediment sources from roads. Past timber sale projects and the Stillwater State Forest road maintenance contracts resulted in adequate surface drainage on all roads proposed for hauling. Off a closed road used for transportation during harvesting between 30 and 50 years ago, an old bridge crossing the Stillwater River has deteriorated and fallen log stringers have caused portions of the river channel to flow around the debris. All other stream channels observed during field reconnaissance were stable, showed no sign of SMZ harvesting, and had an adequate supply of large woody debris.

Water Yield
The existing annual water-yield increase for the Stillwater River watershed is estimated at 2.7 percent annual water yield increase over fully forested conditions. The existing annual water-yield increase for the Fitzsimmons Creek watershed is estimated at 2.2 percent annual water-yield increase over fully forested conditions.
After reviewing the beneficial uses, existing channel conditions, and existing watershed condition per ARM 36.11.423, the threshold of concern for both Stillwater River and Fitzsimmons Creek watersheds the threshold was set at 10 percent. These threshold values expect a low degree of risk of adverse impacts to beneficial uses due to water-yield increases, as described in ARM 36.11.423(f)(iv).

Environmental Effects

- ***Direct, Indirect, and Cumulative Effects of the No-Action Alternative***

Sediment Delivery
Under this alternative, no timber harvesting or related activities would occur. Sediment from all sources would continue as described in Existing Conditions.

Water Yield
No increased risk of increases or reductions in annual water yield or equivalent clearcut acres (ECA) would result from this alternative.

· ***Direct, Indirect, and Cumulative Effects of the Action Alternative***

Sediment Delivery
There is a low risk of direct or secondary effects to sediment delivery to streams from the timber harvesting activities proposed in the Action Alternative. The SMZ law, Administrative Rules for Forest Management, Riparian Management Zones (RMZ), channel migration zones (CMZ) on fish-bearing Class 1 streams, and applicable BMPs would be applied to all harvesting activities, which would minimize the risk of sediment delivery to draws and streams.

There is a moderate to low risk of low direct or secondary effects to sediment delivery to streams from the use of existing roads and construction of temporary roads proposed in the Action Alternative. The existing road system meets BMP standards, and no direct sources of sediment were identified. Use of existing closed roads to haul timber would present a low risk of low impacts to sediment delivery due to vegetation loss on existing grassed-in roads.

There is a moderate risk of low impacts to sediment delivery from construction of approximately 2.6 miles of new temporary road. These proposed temporary roads are located mainly on upland sites. Four culverts would be installed on new stream crossings and several more installed on ephemeral draws during the proposed new construction.

There is a moderate risk of moderate impacts to in-channel sediment delivery from the removal of an existing partial flow obstruction on the Stillwater River. Removal of the rotten bridge stringers and existing debris jam would likely generate in-channel adjustments of the main channel of the Stillwater River once the obstruction was removed. These adjustments would take several runoff cycles to adjust, but removal of the bridge material and associated debris jam would create a lower risk of in-channel sediment delivery than allowing the structure to remain and fail from natural causes.

Also there is a moderate risk of moderate impacts to sediment delivery with the installation of two additional stream crossings using temporary bridges in the proposed new construction. One is proposed for installation in the extreme northwest portion of the project area on a proposed 0.1-mile temporary road. This 20-foot bridge would cross a 2-foot bankfull width intermittent Class 1 tributary to the Stillwater River. The other proposed bridge installation, requiring a 45-foot portable bridge, would be installed across a 5.5-foot bankfull width perennial Class 1 stream on an unnamed perennial tributary to Fitzsimmons Creek in the eastern-most portion of the proposed project area. These proposed crossings would have minimal risk to the bed or banks of either stream since the approaches would lie well outside of the active channel. There is a moderate risk that these activities could release a short-term pulse of fine sediment into the stream during construction or removal. This risk is due solely to the proximity of the activity to a stream; no in-channel work is needed at either site. Each of these bridges would remain in place until project completion, and then both bridges would be removed and all disturbed soils re-shaped and grass seeded. Cumulatively, the risk of sediment delivery and sediment loading to the Upper Stillwater River and Fitzsimmons Creek watersheds and waters downstream from the proposed project area would be slightly increased from current levels in the short term and below current levels in the long term.

Water Yield
Direct and secondary effects of the Action Alternative to water yield include a 0.6% increase in annual water yield in the Upper Stillwater River watershed and a 1.3% increase in annual water yield in the Fitzsimmons Creek watershed. Cumulative effects of the Action Alternative on water yield include removal of trees that would increase the annual water yield in the Upper Stillwater River watershed from its current level of approximately 2.7 percent over a fully forested condition to an estimated 3.3 percent, and the annual water yield in the Fitzsimmons Creek watershed from its current level of approximately 2.2 percent over a fully forested condition to an estimated 3.5 percent.

The water-yield increase expected from this alternative leaves the watershed below the established threshold of concern reported in the existing conditions portion of this analysis. This cumulative level of water-yield increase would produce a low risk of creating unstable channels in the Fitzsimmons Creek and Stillwater River watersheds. The Action Alternative is expected to have a low risk of cumulative impacts to water yield as a result of the proposed timber harvesting and road work.

A detailed analysis is contained in Attachment V: WATER RESOURCES ANALYSIS.

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6. AIR QUALITY:

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

· ***Direct, Indirect and Cumulative Effects of the No-Action Alternative***

Under this alternative, no timber harvest or related activities would occur. No dust associated with log hauling traffic and no burning of slash piles would occur from this proposed action.

· ***Direct, Indirect, and Cumulative Effects of the Action Alternative***

The project is located in Airshed 1. Some particulate matter may be introduced into the Airshed from the burning of logging slash. Burning within the project area would be short in duration and would be conducted when conditions favored good to excellent ventilation and smoke dispersion as determined by the Montana Department of Environmental Quality and the Montana/Idaho Airshed Group. The DNRC, as a member of the Montana/Idaho Airshed Group, would burn only on approved days. Thus, direct and indirect effects to air quality due to slash pile burning associated with the proposed action would be minimal.

Cumulative effects to air quality would not exceed the levels defined by State of Montana Cooperative Smoke Management Plan (1988) and managed by the Montana Airshed Group. Prescribed burning by other nearby airshed cooperators (for example the U.S. Forest Service) would have potential to affect air quality. All cooperators currently operate under the same Airshed Group guidelines. The State, as a member, would burn only on approved days. This should decrease the likelihood of additive cumulative effects.

During dry periods of the year, road dust would be created on gravel and dirt (native-surfaced) roads, relative to the amount of use. The log-hauling traffic from this proposed sale may increase by 6 to 12 truckloads per day. Depending on the season of harvest and the weather conditions, road dust may increase. In cases where the Forest Officer considers the dust level as unacceptable, the application of dust abatement, such as magnesium chloride, may be required.

Harvesting operations would be short in duration and as mentioned possible dust caused by hauling may be mitigated using dust abatement. Thus, direct, indirect, and cumulative effects to air quality due to harvesting and hauling associated with the proposed action would be minimal.

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7. VEGETATION COVER, QUANTITY AND QUALITY:

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

Existing Condition

The majority of the project area was burned in a stand replacement fire in 1926. As a result 76 percent of the project area consists of similar characteristics in age class, species distribution, and structure. The stands are generally 85-year old mixed conifer species with an even mix of western larch, Engelmann spruce, Douglas-fir, and lodgepole pine. Lodgepole pine and Douglas-fir are more prevalent on the rockier, upper slopes and the

Engelmann spruce component is more at the bottom of the slopes closer to the Stillwater River and Fitzsimmons Creek.

Stands within the project that did not experience stand replacement in the 1926 fire, have larger overstory trees ranging from 150 to 300 years old with an average height of 120 feet. These stands contain larger western larch, spruce, and Douglas-fir in the overstory and saw timber sized shade tolerant species in the understory. The overstory tends to have lower crown ratio percentages and show more signs of disease and mortality.

The State Land Forest Management Plan and associated Forest Management Rules direct DNRC to promote biodiversity by taking a coarse-filter approach that favors an appropriate mix of stand structures and composition on state lands (ARM 36.11.404). Cover type refers to the dominant tree species that currently occupy a forested area. The four cover types present within the proposed harvest units are: mixed conifer (297 acres), subalpine fir (60 acres), lodgepole pine (20 acres), and western larch/Douglas-fir (3 acres). The desired future cover types identified for these proposed units are: western larch/Douglas-fir (268 acres), mixed conifer (68 acres), subalpine fir (35 acres), and Douglas-fir (9 acres). Therefore, compared to desired future conditions, there is currently an excess of primarily mixed conifer cover types, and deficiency in the western larch/Douglas-fir cover type.

Stands where the harvest units are proposed are slowing in growth due to overstocking. Insect and disease are currently at low levels, but such timber stand health threats are active in most stands. Other issues present are as follows:

- Current cover types do not match DNRC's desired future conditions for most stands.
- Pini rot is found in scattered western larch throughout most harvest units.
- Live crown ratios are diminishing reducing growth potential within some areas on co-dominate trees and leading to mortality in understory trees.
- Bears have stripped bark off lower portions of 6"-18" diameter trees scattered across the landscape causing mortality and rot.
- Lodgepole pine is approximately 85 years old, losing its vigor, and entering a period of susceptibility to insect infestations, i.e. mountain pine beetle.

Noxious weeds are present along the roads within the project area; these include oxeye daisy, spotted knapweed, orange hawkweed, and St. Johnswort.

Using the Natural Heritage Program (NHP) database, no sensitive, threatened, or endangered plant species have been documented within any proposed units.

Environmental Effects

- ***Direct, Indirect and Cumulative Effects of the No-Action Alternative***

Timber harvesting would not occur at this time. Neither cover types nor age class distributions would be directly or indirectly affected. Stocking levels of shade-tolerant trees and downed woody debris would increase within those stands over time. Various factors, such as insects, diseases, and weather events, would eventually cause more snags to occupy portions of the stands. This, in turn, would increase the potential and/or severity of a wildfire, and in the event that one was ignited, would make it harder to suppress.

Additional mineral soil would not be exposed, and heavy tree canopies would continue to compete with weeds; therefore the risk of additional establishment of weed populations would not likely increase.

- ***Direct, Indirect, and Cumulative Effects of the Action Alternative***

Under the proposed action:

- 278 acres that do not currently meet the desired cover type would be moved toward desired future conditions.

- Units 1, 10 and 14 would receive a seed tree regeneration treatment which would move the stands to a 0-39 year age class; within all other units, including seedtree harvest treatments, age class would remain the same. (DNRC's Stand Level Inventory (SLI) methodologies evaluate age class based on the sawtimber components within stands; stands with greater than 10 percent canopy coverage of sawtimber-size trees will not be classified in the "non-stocked" or "0-39 year age class".)
- Of the 130 acres of old growth in the project area, 5 acres would receive an old-growth maintenance treatment that maintains the stand as old growth as defined by DNRC and the other 125 acres would not be treated at this time. Minor changes in old-growth attribute levels would occur within the 5 acres although the area would still retain >10 trees per acre > than 21" dbh and approximately 80 square feet of basal area. Cumulatively, no changes would occur to old growth amounts or distributions on the Stillwater Unit analysis area; therefore old-growth amounts would remain at approximately 10.3%.

Overall, the variations of harvest treatments would create a mosaic of new stands of timber similar to what a mixed severity fire might cause. The shelterwood and seedtree with reserves treatments are regeneration treatments and larger-diameter, full vigor western larch and Douglas-fir would remain scattered across the unit as new, likely mixed conifer, regeneration begins to establish itself. The commercial thin and old-growth maintenance treatments are intermediate treatments and the stand would be fully stocked with western larch and Douglas-fir although Unit 8, the old-growth maintenance treatment unit, would also contain subalpine fir and Engelmann spruce.

Additionally, following harvest and fuels treatments, the connectivity of dense fuel loading and ladder fuels leading to the tree crowns would be removed in the proposed harvest units. The success of aerial and ground attacks on wildfires would likely be improved.

The spread of noxious weeds from the use of mechanized equipment and ground disturbance would be minimized, but not completely eliminated, by the washing of equipment before entering the site, and sowing grass seed on roads after road construction and harvesting (ARM 36.11.445). Herbicide treatments on haul roads would be scheduled through Stillwater Unit's weed management program.

Additional information can be found in the Project File: Vegetation, located at the Stillwater Unit office.

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8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:
Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify direct, indirect, and cumulative effects to fish and wildlife.

Terrestrial Wildlife

The project area encompasses mature forest of both dense and open canopies, pole and small sized saw timber, varying stages and age classes of regeneration, rock/scree areas, upper alpine areas and old-growth forest. The majority of the project area has dense pole-sized and small-diameter sawtimber trees that regenerated after a 1926 stand-replacement and mixed-severity wildfire. While crown closure of these stands is generally over 40%, they were not considered mature forested habitat in this analysis due to young age and abundance of small live tree diameter. However, because of their dense stocking and canopy levels, these 60- to 85-year-old stands likely provide some suitable travel habitat for a number of wildlife species that prefer interior forest conditions.

For this project, a coarse filter analysis was conducted that addressed potential adverse effects to wildlife associated with habitat connectivity and removal of mature forest cover, and changes in the abundance of snags and coarse woody debris.

Fisheries

Fitzsimmons Creek and upper Stillwater River are considered in the fisheries resources assessment for the South Fitzpatrick Timber Sale. The Stillwater River analysis area is defined by the entire Stillwater River watershed upstream of the confluence with Fitzsimons Creek. The Fitzsimmons Creek analysis area is defined by the entire Fitzsimmons Creek watershed. Bull trout, westslope cutthroat trout, slimy sculpin, eastern brook trout, and westslope cutthroat

trout x rainbow trout hybrids can be found within the Stillwater River analysis area. All of the above except the westslope cutthroat trout hybrids can be found in the Fitzsimmons Creek analysis area.

Environmental Effects

Direct, Indirect and Cumulative Effects of the No Action Alternative

Under this alternative, no timber harvesting or related activities would occur. Thus, no appreciable changes to existing wildlife or fisheries habitat would be anticipated.

Direct, Indirect and Cumulative Effects of the Action Alternative

Terrestrial Wildlife

Minor direct and indirect effects to connectivity and suitability of mature forested habitat in the project area would be expected to occur. Minor adverse cumulative effects to mature forested habitat suitability and connectivity for wildlife would be expected in the CEAA.

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Minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect habitat quality of wildlife species requiring these habitat attributes. Minor adverse cumulative effects to habitat quality for wildlife requiring snags and coarse woody debris would be anticipated over the next 30-100 years would be expected in the CEAA.

Fisheries

Existing moderate to high cumulative impacts to fisheries resources are occurring across both analysis areas. The elevated existing cumulative effects are primarily related to the presence and consequent effects from nonnative fish species and minor recreational fishing pressure.

The resource variables that would potentially be affected by the proposal are channel forms, sediment, flow regime, stream shading, and stream temperature.

As a result of implementing the proposed actions, negligible direct and indirect impacts to fisheries resources are expected to occur to in the Stillwater River and Fitzsimmons Creek analysis areas. Low additional direct and indirect impacts to channel forms are anticipated in each of the analysis areas. Considering all of these impacts collectively, in the Fitzsimmons Creek, and Stillwater River analysis areas (1) negligible to low additional cumulative effects to fisheries resources would be expected, (2) cumulative effects to the fisheries would remain elevated primarily due to the presence and consequent adverse impacts from nonnative fish species, and (3) the elevated cumulative effects would be expected to occur regardless of whether or not the Action Alternative is selected.

A detailed analysis is contained in Attachment VI: FISHERIES RESOURCES ASSESSMENT, and Attachment VII: WILDLIFE ANALYSIS.

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9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:
Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify direct, indirect, and cumulative effects to these species and their habitat.

Suitable potential habitat for grizzly bear (*Ursus arctos*) and Canada lynx (*Felis lynx*) is present in the project area. Both of these species have been documented in their respective cumulative effects analysis areas in the past.

Habitat assessments were also conducted for the following sensitive species: bald eagle (*Haliaeetus leucocephalus*), black-backed woodpecker (*Picoides arcticus*), Coeur d'Alene salamander (*Plethodon idahoensis*), Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*), common loon (*Gavia immer*), fisher (*Martes pennanti*), flammulated owl (*Otus flammeolus*), gray wolf (*Canis lupus*), harlequin duck (*Histrionicus histrionicus*), Northern bog lemming (*Synaptomys borealis*), peregrine falcon (*Falco peregrinus*), pileated woodpecker(*Dryocopus pileatus*), Townsend's big-eared bat (*Plecotus townsendii*), and wolverine (*Gulo gulo*).

From this list of sensitive species, it was determined that the fisher and gray wolf warranted more detailed study due to historical observations and the presence of habitat in the project area.

Grizzly Bear / Canada Lynx:
Given the level of disturbance and extent of habitat alteration associated with the proposed action, minor adverse direct, indirect and cumulative effects to habitat suitability for Canada lynx and grizzly bears would be expected under the Action Alternative.

Gray Wolf:

Given the level of disturbance and extent of habitat alteration associated with the proposed action, minor adverse direct, indirect and cumulative effects to habitat suitability for gray wolf would be expected under the Action Alternative.

Fisher:
Moderate adverse direct and indirect effects and minor cumulative effects that would affect fisher habitat suitability in the project area would be expected under the Action Alternative.

A detailed analysis is contained in Attachment VI: FISHERIES RESOURCES ASSESSMENT, and Attachment VII: WILDLIFE ANALYSIS.

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

A Class III intensity level cultural and paleontological resources inventory was conducted of the project area of potential effect. Despite a detailed examination, no cultural or fossil resources were identified and no additional archaeological or paleontological investigative work is recommended. The proposed project will have *No Effect to Antiquities* as defined under the Montana State Antiquities Act. A formal report of findings has been prepared and is on file with the DNRC and the Montana State Historic Preservation Officer.

If previously unknown cultural or paleontological materials are identified during project related activities, all work will cease until a professional assessment of such resources can be made.

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

· ***Direct, Indirect and Cumulative Effects of the No-Action Alternative***

Under this alternative, no timber harvesting or related activities would occur. No changes in visual aesthetics would occur outside of natural events.

· ***Direct, Indirect and Cumulative Effects of the Action Alternative***

The aesthetics impacts were analyzed using photographs, aerial photos, ARC GIS tools, and visiting possible view points.

Visual aesthetic impacts would vary depending on the location of the vantage point. The project area is not located on a prominent topographic area or visible from a densely populated area but portions of the project's harvest units and road construction would be visible from the Stillwater River Road, Fitzsimmons Road, Mount Marston Road and Mount Marston Lookout.

Foreground views, middle ground views and background views of harvest units would vary depending on location of the observation point. Foreground views would be visible while traveling by harvest units on the Mount Marston Road. Middle-ground views of harvest units would be apparent while traveling portions of the Fitzsimmons and Stillwater River Roads. Background views of harvest units would be evident from high vantage points such as Mount Marston and other ridge tops within a few miles of harvest units.

Foreground views of proposed units is where evidence of logging would be most noticeable. Individual scattered trees, stumps and some logging slash would be visible until regeneration has reached a point where sight distance is limited again. At middle-ground vantage points, the straight line of cable corridors, roads, larger landing piles and leave tree spacing would be visible. Cable corridors will be most obvious in intermediate type treatments within the foreground and middle-ground views. Background views would display unit boundaries, some new road construction and larger areas of reserve trees such as SMZ's and wildlife corridors.

For all proposed harvest units, the variations in spacing of the trees retained, location, and rolling topography would break up visual sight distance resulting in minor visual impacts. Dense tree canopies that line the roadsides would screen harvest units in the foreground and middle ground views making only portions of units visible at one time. Cable corridors will be kept to a minimum width with lateral yarding encouraged. A 300-foot wide wildlife corridor following the ridge between Units 6 and 7 would retain all canopy cover and benefit aesthetics. Two SMZs run through Unit 13, which would remain fully stocked, thereby breaking up the size of the unit and reducing sight distance within the unit.

Overall, timber sale design would minimize the visual impacts timber harvesting and road building may have by randomly spacing the leave trees in the units and leaving additional trees along unit boundaries and open roads. Under the Habitat Conservation Plan grizzly bear commitments, DNRC is required to design new seed tree units so that visual sight distance is no greater than 600 feet in at least one direction from any point in the unit. By limiting visual sight distance to 600 feet or less, impacts to visual aesthetics at close range would be minimized.

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

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

No demand for limited environmental resources or other activities demanding limited environmental resources were identified; therefore, no direct, indirect, or cumulative impacts would occur under either alternative.

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13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

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

- Ritsenberg / Fitzsimmons Timber Sale EA (1991)
- Mystery Fish Timber Sale EA (March 2012)
- Upper Whitefish Lake Timber Sale Checklist EA (March 2012)
- Fish Bull Timber Sale Checklist EA (April 2012)
- Lower Herrig Timber Sale Checklist EA (April 2013)

IV. IMPACTS ON THE HUMAN POPULATION

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

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

No unusual safety considerations are associated with the proposed timber sale. Warning signs would be located along the Stillwater River Road, Fitzsimmons Road, and Mt. Marston Road cautioning recreational and residential traffic of logging activities.

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

The proposed timber harvest would provide continued industrial production in the region.

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

Due to the relatively small size of the proposed timber sale, no measurable direct, indirect, or cumulative effects to the employment market would be likely.

Based upon *Bureau of Business and Economic Research*, *2008,* an average of 10.0 jobs per million board feet (MMbf) of timber harvested are maintained annually in the logging and timber industry. Since the Action Alternative would harvest between 4 and 5 MMbf, an estimated 40 to 50 jobs would continue to be supported. Statewide, DNRC anticipates annual harvest levels at 56 MMbf, and applying the same job multiplier indicates the program supports an estimated 560 timber industry jobs.

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

Indirectly, the proposed action would contribute to the local and state tax base primarily through employment and equipment taxes.

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

Log trucks hauling to the purchasing mill would result in temporary increases in traffic on U.S. Highway 93. This increase is a normal contributor to the activities of the local community and would not be considered a new or increased source of traffic, therefore additional government service would not be required.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:
List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

No locally adopted environmental plans are associated with the proposed timber sale.

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

The Stillwater River Road and the Fitzsimmons Road are main roads that access the northern portions of Stillwater State Forest and Mt. Marston Lookout. Under HCP commitments, the Fitzsimmons Road is restricted from general motorized use between April 1st and June 30th. The project area is often used for dispersed general recreation including, but not limited to, hunting, berry picking, hiking and sightseeing.

No appreciable changes would occur to recreational activity in the project area under the No-Action Alternative.

Minor direct and indirect changes would occur to recreational activity in the project area under the Action Alternative. Recreation would be directly affected for a short time, approximately 2 months, with the blockage of the Mt. Marston Road while harvesting proposed units 3-8, as well as while the installation of several new culverts and placement of gravel on the roadway takes place. The road closure would be temporary and affect the immediate area and 6.3 miles of road behind the closure. Harvesting would be limited to a single year in the fall season within the length of the contract; the fall of 2014, 2015, or 2016 would be options for the closure. Road signs would be placed indicating a Mt. Marston Road closure at the start of the Stillwater River Road and at the start of Mt. Marston Road. Other effects would be an increase in commercial log traffic on the Stillwater River Road, Mt. Marston Road, and Fitzsimmons Road. Under the Action Alternative, timber harvesting would not affect the ability of people to recreate in the project area.

A detailed description of mitigation measures for road closures can be found in *Attachment III - STIPULATIONS AND SPECIFICATIONS*.

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

No measurable direct, indirect, and cumulative impacts related to population and housing would be expected due to the relatively small size of the proposed timber sale project.

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

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

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

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

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

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

· ***Direct, Indirect and Cumulative Effects of the No-Action Alternative***

No revenue would be generated for the Common Schools Trust at this time. Small timber permits could yield some additional revenue.

· ***Direct, Indirect and Cumulative Effects of the Action Alternative***

The timber harvest would generate approximately $729,655 for the Common Schools Trust, and approximately $115,598 in Forest Improvement (FI) fees would be collected for FI projects. This is based on a stumpage rate of $26.41 per ton, multiplied by the estimated volume of tons. This stumpage rate was derived by comparing attributes of the proposed timber sale with the attributes and results of other DNRC timber sales recently advertised for bid. Costs related to the administration of the timber sale program are only tracked at the Northwestern Land Office (NWLO) 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 Statewide and by Land Office. From 2006 through 2010, revenue-to-cost ratio of the NWLO was 2.51. This means that, on average, for every $1.00 spent in costs, $2.51 in revenue was generated. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return.

EA Checklist Prepared By:	**Name:**	Zachary Miller, Mike McMahon	**Date:**	5/12/2014
	Title:	Management Foresters		

V. FINDING

25. ALTERNATIVE SELECTED:

An Interdisciplinary team (ID Team) has completed the Checklist Environmental Analysis (CEA) for the proposed South Fitzpatrick Timber Sale Project. Following a thorough review of the CEA, project file, public correspondence, and Department policies and rules, the decision has been made to select the Action Alternative.

The Action Alternative meets the intent of the project objectives as stated in Section I – *Type and Purpose of Action*. Specifically the project would:

- Harvest approximately 4 to 5 million board feet of timber from the Stillwater State Forest to regenerate new stands of healthy trees while improving the vigor and growth of trees remaining in the forest.
- Perform road maintenance and Best Management Practices (BMP) improvements on approximately 14.7 miles of constructed road, including placing gravel surfacing on several segments of Mount Marston Road.
- Implement multiple (different) silvicultural practices including shelterwood, seed tree, commercial thinning and old-growth maintenance emulating natural disturbance.

- Generate approximately $729,655 for the Common Schools Trust, and collect approximately $115,598 in Forest Improvement (FI) fees for FI projects. In addition, approximately $138,500 in road maintenance, construction and reconstruction would be accomplished.

DNRC is required by law to administer these Trust Lands to produce the largest measure of reasonable and legitimate return over the long run (*Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X Section 11;* and, *77-1-212 MCA*). The Action Alternative was designed to be in full compliance of State Forest Land Management Plan (SFLMP), the Administrative Rules for Forest Management (Forest Management Rules; ARM 36.11.401 through 471), and conservation commitments contained in the Selected Alternative in the Final EIS of the Montana DNRC Forested State Trust Lands Habitat Conservation Plan (HCP) and associated Record of Decision (ROD), as well as other applicable state and federal laws.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

The identified resource management concerns have been fully addressed in the environmental analysis that was conducted. Specific project design features and various recommendations of the resource management specialists have been implemented to ensure that this project will fall within the limits of acceptable environmental change. For example, the project is designed to:

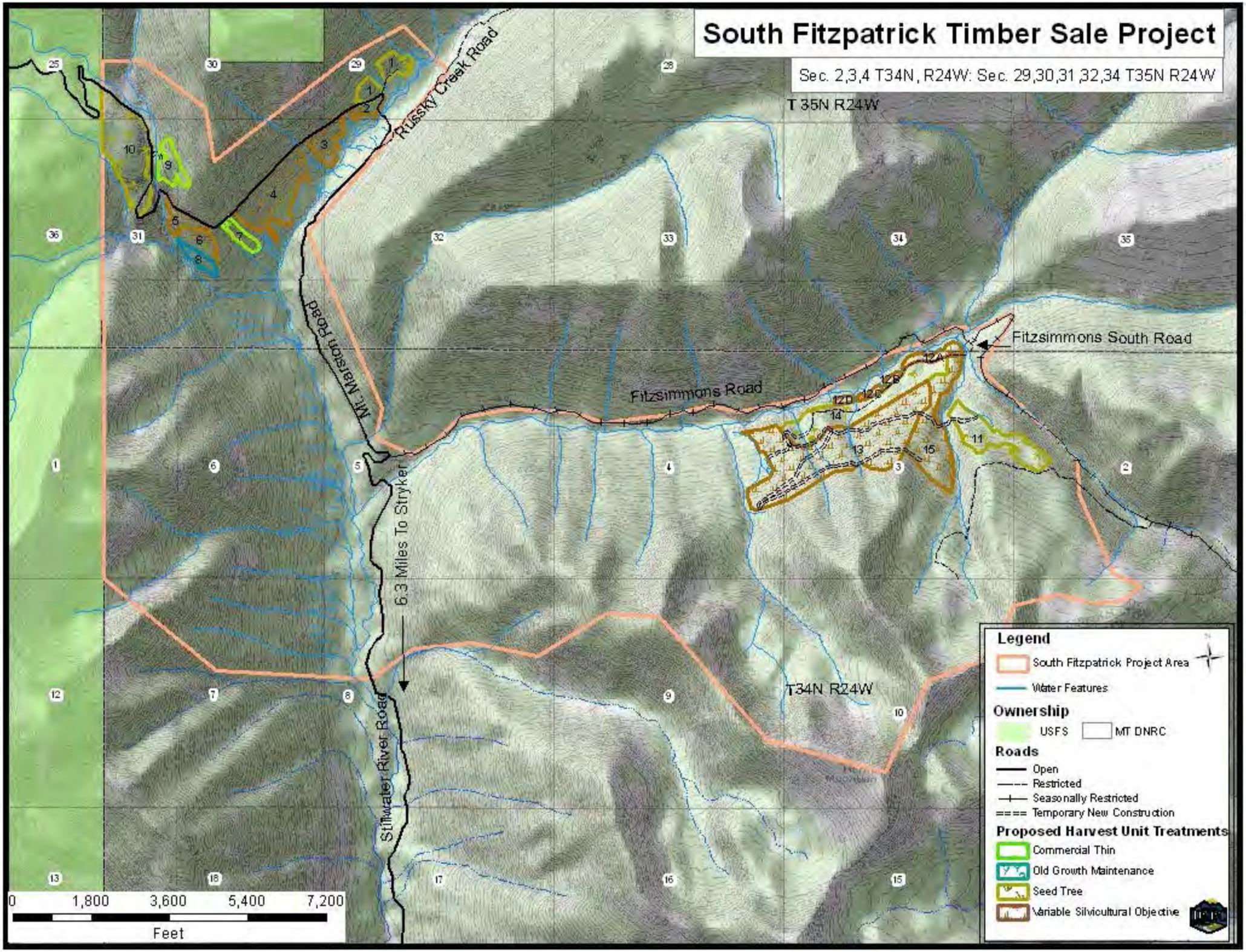
- Have irregular shaped harvest unit boundaries and retain vegetative buffer strips along open roads, reducing visual impacts.
- Perform road maintenance and Best Management Practices (BMP) improvements on existing roads to reduce the potential for erosion and sediment delivery to streams.
- Retain coarse woody debris to be left on site in amounts recommended by *Graham, et.al. (1994)* and fine debris as much as practicable, maintaining nutrient cycling in harvest units.
- Require cleaning all tracked and wheeled equipment of noxious weeds prior to beginning project operations.
- Minimize impacts (including aesthetics) to the USFS and public on a road system which accesses Mount Marston Lookout (USFS Administrative site) and receives regular recreational use.

Taken individually and cumulatively, the proposed activities are common practices, and no project activities will be conducted on important fragile or unique sites. I find there will be no significant impacts to the human environment as a result of implementing the Action Alternative. In summary, I find that the identified adverse impacts will be controlled, mitigated, or avoided by the design of the project to the extent that the impacts are not significant.

27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

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

EA Checklist Approved By:	**Name:**	Brian Manning
	Title:	Unit Manager, DNRC Stillwater
Signature: */s/ Brian Manning*		**Date**: 6/18/2014


South Fitzpatrick Timber Sale Project
Sec. 2,3,4 T34N, R24W: Sec. 29,30,31,32,34 T35N R24W
T 35N R24W
Russky Creek Road
Mc Mason Road
Fitzsimmons Road
Fitzsimmons South Road
6.3 Miles To Stryker
Stillwater River Road
T34N R24W
0 1,800 3,600 5,400 7,200
Feet
Legend
South Fitzpatrick Project Area
Water Features
Ownership
USFS
MT DNRC
Roads
Open
Restricted
Seasonally Restricted
Temporary New Construction
Proposed Harvest Unit Treatments
Commercial Thin
Old Growth Maintenance
Seed Tree
Variable Silvicultural Objective

Attachment II:

Prescription Table

Unit Number	Acres MBF/Acre Unit MBF	Prescription	Marking guides	Particulars involved in unit(s)	Notes
1	13 acres 14 mbf/ac 180 mbf	Seed Tree	- Leave tree marked vertical blue - Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- Tractor harvest unit - 3 culverts need to be installed on existing road into the unit - Visual buffer required along open road - Age class would change from 150+ years to 0-39 years - Mechanical site preparation - Anticipate natural regeneration; regeneration survey 5 years post harvest to confirm establishment, plant if necessary	- Class 2 SMZ harvest - RMZ harvest implementing Allowance AQ – RM10.1c
2	5 acres 11 mbf/ac 55 mbf	Seed Tree	- Species designated to cut = ES, LPP, AF, and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- Tractor harvest unit - Place jump down spur to landing where future road will be built - Visual buffer required along open road - Site prep and plant WL & DF - Some larger trees left from 1926 burn will be left for wildlife trees	- Class 2 SMZ harvest - RMZ harvest implementing Allowance AQ – RM10.1c
3	12 acres 11 mbf/ac 130 mbf	Seed Tree (10 acres) Shelterwood (2 acres)	- Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- The combination of a seedtree and shelterwood with reserves treatment will be implemented. The primary prescription is seedtree; however desired species meeting leave tree standards are variable throughout unit. When more of these desired species are present a shelterwood with reserves treatment (30-40 foot spacing) will be used which is estimated to be 2 acres for this unit. - Cable harvest unit - Slopes 45% and less for majority of unit - Blockage of Mt. Marston Rd. with line machine - Visual buffer will be non-continuous due to line corridors and landings - Site prep and plant western larch and Douglas-fir in areas of seed tree treatment.	- Equipment may be required for tail holds in bottom of unit. - Feller buncher can be used to cut trees on slopes <40% - RMZ harvest implementing Allowance AQ – RM10.1c

4	38 acres 6 mbf/ac 230 mbf	Seed Tree (30 acres) Shelterwood (6 Acres)	- Species designated to cut = ES, LPP, AF, and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- The combination of a seedtree and shelterwood with reserves treatment will be implemented - Cable harvest unit - Blockage of Mt. Marston Rd. with line machine - Average yarding distance: 400' - Visual buffer will be non-continuous due to line corridors and landings - Feather edges of stand for visual effects - Site prep and plant western larch and Douglas-fir in areas of seed tree treatment.	- Variable volume within this unit. Harvest would improve stand health. - The upper end of this unit is a drier site than the lower portion. - RMZ harvest implementing Allowance AQ – RM10.1c
5	7 acres 9 mbf/ac 60 mbf	Seed Tree (4 acres) Commercial Thin (3 acres)	- Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- The combination of a seedtree and shelterwood with reserves treatment will be implemented - Cable harvest unit - Units 6 and 8 will be yarded thru this unit - Average yarding distance: 175' - Areas of 70% slope - Feather stand edges for visual effects - Road widening and turnouts needed for yarding locations - Blockage of Mt. Marston Rd. with line machine - Visual buffer will be non-continuous due to line corridors and associated landings - Site prep and plant western larch and Douglas-fir in areas of seed tree treatment	-RMZ harvest of 50% for outer 50', not invoking the Allowance AQ – RM10.1c
6	10 acres 17 mbf/ac 170 mbf	Seed Tree (5 acres) Shelterwood (5 acres)	**Leave Tree Marked** - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- The combination of a seedtree and shelterwood with reserves treatment will be implemented - Cable harvest unit - Average yarding distance 375' - Blockage of Mt. Marston Rd. with line machine - Site prep and plant western larch and Douglas-fir in areas of seed tree treatment	-Feller buncher can be used to cut trees on slopes <40%
7	6 acres 9 mbf/ac 54 mbf	Commercial Thin	- Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- Cable harvest unit - Average yarding distance 550' - Blockage of Mt. Marston Rd. with line machine. - Visual buffer will be non-continuous due to line corridors and landings.	- Borders lynx corridor boundary

8	5 acres 17 mbf/ac 85 mbf	Old Growth Maintenance	**Leave Tree Marked for ES and AF** **Cut Tree Marked for WL and DF** -Maintain 80 Sq. Ft. basal area and ≥10 trees ≥21"/acre. - Maintain all snags safe to operate around**.	- Cable harvest unit - Average yarding distance 700' - Slopes <45% - Blockage of Mt. Marston Rd. with line machine.	-Feller buncher can be used to cut trees on slopes <40%
9	10 acres 15 mbf/ac 150mbf	Commercial Thin (7 acres) Seed Tree (3 acres)	**Leave Tree Marked** - Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- Tractor harvest unit - 20' bridge required over Class 1 stream - Areas of >50% slope between benches that exist throughout the unit. - RMZ harvest	- RMZ harvest implementing Allowance AQ – RM10.1c
10	46 acres 12 mbf/ac 550mbf	Seed Tree	- Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- Tractor harvest unit - Existing skid trails throughout unit will be utilized. - Short jump-up road needed. - Existing road in lower portion of unit with established landing. - Slope break provides visual buffer along some segments of open road – Otherwise a visual buffer will be left - Age class would change from 150+ years to 0-39 years. - Protect areas of advanced regeneration on the northern and southeastern side of unit.	- 3 acre portion of ~45-50% slopes where winchlines required
11	27 acres 15 mbf/ac 405 mbf	Seed Tree	- Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- 45' temporary bridge required over Class 1 stream to access unit - Combination Unit- 23 acres Tractor harvest, 4 acres cable harvest - 200' excavated skid trail needed to access upper portion of unit. - ~2,000' skid from upper portion of unit - Western boundary borders lynx corridor unit - Site prep and plant western larch and Douglas-fir	
12 A,B,C,D	11 acres 12mbf/ac 130 mbf	Seed Tree (5 acres) Shelterwood (6 acres)	- Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- The combination of a seedtree and shelterwood with reserves treatment will be implemented. - Tractor but may winch line some - SMZ and RMZ harvest on unnamed tributary - Site prep and plant WL & DF in areas of seed tree treatment.	

13	109 acres 12mbf/ac 1,310mbf	Seed Tree (90 acres) Shelterwood (19 acres)	- Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- The combination of a seedtree and shelterwood with reserves treatment will be implemented - Combination Unit- 30 acres tractor harvest, 79 acres cable harvest - Unit includes 7 acres for SMZ and brush fields - SMZ harvest on class 2 and class 3 creeks - Highbank logging above (~150') temporary road - Site prep and plant WL & DF in areas of seed tree treatment	- Class 2 and Class 3 SMZ harvest - Portion of road built in RMZ - RMZ harvest implementing Allowance AQ – RM10.1c in southwest portion of unit
14	43 acres 8 mbf/ac 340 mbf	Seed Tree	- Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- There are wet soil types in here - This unit was harvested in Ritz/Fits Timber Sale (1996) - Old landing and skid trails will be used - Age class would change from 150+ years to 0-39 years - Anticipate natural regeneration; regeneration survey 5 years post harvest to confirm establishment, plant if necessary	- Established brush component which could be dozer treated for FI
15	38 acres 17 mbf/ac 645 mbf	Seed Tree	- Species designated to cut = ES, LPP, AF and WL / DF with crowns <40% - Maintain 4 snags or snag recruits per acre >21" DBH (~100' spacing)**.	- Tractor unit - There are some existing skid trails in unit - Site prep and plant WL & DF	- RMZ harvest of 50% for outer 50', not invoking the allowance - Unit borders lynx corridors

Total=4.50 mmbf

***For more specifics on snag recruits, please refer to Attachment III, Stipulations and Specifications.*

NOTES:

AF = Alpine fir
BMP = Best Management Practices
DBH = Diameter at Breast Height
DF = Douglas-fir
ERZ = Equipment Restriction Zone
ES = Englemann spruce
LPP = Lodgepole Pine
RMZ = Riparian Management Zone
SMZ = Streamside Management Zone
WL = Western Larch

Attachment III:

Stipulations and Specifications

Stipulations and specifications for the Action Alternative include project design provisions that follow Forest Management Rules, relevant laws and regulations. They also include mitigations that were designed to avoid or reduce potential effects to resources considered in this analysis. In part, stipulations and specifications are a direct result of issue identification and resource concerns. This section is organized by resource.

Stipulations and specifications that apply to operations required by, and occurring during the contract period, would be contained within the Timber Sale Contract. As such, they are binding and enforceable. Project administrators would enforce stipulations and specifications relating to activities such as hazard reduction, site preparation, and planting, that may occur during or after the contract period.

The following stipulations and specifications would be incorporated into the selected Action Alternative to mitigate potential effects of resources.

Aesthetics

- Damaged residual vegetation would be slashed.
- The size and number of landings would be limited.
- In areas where cable logging is required, the width of the cable corridor would be limited, and a minimum distance between corridors would be required to reduce the amount and visibility of corridors in the harvest areas.
- Disturbed soil sites along road right-of-ways would be grass-seeded.
- Leave trees are to be left with both even and clumpy distributions.
- Where possible a higher number of trees will be left closer to unit boundaries to feather stand edges.
- The temporary roads and all jump-ups would be reclaimed after harvesting.
- A higher concentration of trees would be left within 100-foot buffers in units along open roads.

Air Quality

- To minimize cumulative effects during burning operations, burning would be done in compliance with the Montana Airshed Group reporting regulations and any burning restrictions imposed in Airshed 1. This would only allow for burning during conditions of acceptable ventilation and smoke dispersion.
- Dozer, excavator, landing, and roadwork debris would be piled clean to allow ignition during fall and spring when ventilation is good and surrounding fuels are wet. The Forest Officer may require that piles be covered so the fuels are drier, ignite easier, burn hotter, and extinguish sooner.

- In order to reduce smoke production, some large woody debris would be left on the forest floor to minimize the number of burn piles.
- Dust abatement may be applied on some road segments, depending on the seasonal conditions and level of public traffic.

Archaeology

- A contract clause provides for suspending operations if cultural resources were discovered; operations in that area may only resume as directed by the Forest Officer following consultation with a DNRC Archeologist.
- If cultural resources were discovered, the Salish/Pend d'Orielle and Kootenai Nation would be notified.

Fisheries

- Apply all applicable Forestry Best Management Practices (BMPs), including the Streamside Management Zone (SMZ) Law and Rules, HCP commitments, and Forest Management Rules for fisheries, soils, and watershed management (*ARMs 36.11.425* and *36.11.426*).
- Apply the SMZ Law and Rules to all streams and lakes.
- Monitor all road-stream crossings for sedimentation and deterioration of road prism.
- Only allow equipment traffic at road-stream crossings when road prisms have adequate load-bearing capacity, thus reducing the potential for rutting.
- No harvesting is allowed within Class 1 SMZ's for creeks adjacent to the Stillwater River and Fitzsimmons Creek.

Noxious Weed Management

- All tracked and wheeled equipment would be cleaned of noxious weeds prior to beginning project operations.
- Disturbed roadside sites would be promptly revegetated with a native grass seed mix. Roads used and closed as part of this proposal would be reshaped and reseeded.

Recreation

- Closure of the Mount Marston Road for logging would be limited to the fall of either 2014, 2015, or 2016, when USFS administrative and general tourism traffic has slowed down.
- Information on road closures and log hauling activity would be disseminated to the public through signage and other means of public notification such as postings in local newspapers.

Soils

Soil Compaction and Displacement

- Limit equipment operations to periods when soils are relatively dry (less than 20 percent), frozen, or snow-covered to in order to minimize soil compaction and rutting, and maintain drainage features. Check soil moisture conditions prior to equipment start-up.
- On ground-based units, the logger and sale administrator would agree to a skidding plan prior to equipment operations. Skid-trail planning would identify which main trails to use and how many additional trails are needed. Trails that do not comply with BMPs (i.e. trails in draw bottoms) would not be used unless impacts can be adequately mitigated. Regardless of use, these trails may be closed with additional drainage installed where needed, or grass-seeded to stabilize the site and control erosion.
- Tractor skidding should be limited to slopes of less than 40 percent unless the operation can be completed without causing excessive displacement or erosion. Based on site review, short, steep slopes may require a combination of mitigation measures, such as adverse skidding to a ridge or winchline, and skidding from more moderate slopes of less than 40 percent.
- Keep skid trails to 20 percent or less of the harvest unit acreage. Provide for drainage in skid trails and roads concurrently with operations.
- Slash disposal: Limit the combination of disturbance and scarification to 30 to 40 percent of the harvest units. No dozer piling on slopes over 35 percent; no excavator piling on slopes over 40 percent, unless the operation can be completed without causing excessive erosion. Consider disturbance incurred during skidding operations to at least partially provide scarification for regeneration.
- Retain 15-25 tons of large woody debris (depending on habitat type) and a feasible majority of all fine litter following harvesting operations. On units where whole tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves slash on site; 2) return-skid slash and evenly distribute within the harvest area; or 3) cut tops from every third bundle of logs so that tops are dispersed as skidding progresses.

Erosion

- Roads used by the purchaser would be reshaped and the ditches redefined following use to reduce surface erosion.
- Drain dips and gravel would be installed on roads as needed to improve road drainage and reduce maintenance needs and erosion.
- Some road sections would be repaired to upgrade the roads to design standards that reduce erosion potential and maintenance needs.
- Certified weed-free grass seed and fertilizer would be applied in a prompt and timely manner to all newly constructed road surfaces, cutslopes, and fillslopes. These applications would also be applied to any existing disturbed cutslopes, fillslopes, and landings immediately adjacent to open roads. Seeding to stabilize soils and to reduce or prevent the establishment of noxious weeds would include:
  - Seeding all road cuts and fills concurrent with construction.

  - Applying “quick-cover” seed mix within 1 day of work completion at culvert installation sites involving stream crossings.
  - Seeding all road surfaces and reseeding culvert installation sites when the final blading is completed for each specified road segment.

- Based on ground and weather conditions, water bars and logging-slash barriers would be installed on skid trails where erosion is anticipated as directed by the Forest Officer. These erosion-control features would be periodically inspected and maintained throughout the contract period or extensions thereof.
- Temporary roads will be reclaimed by removing culverts, placing water bars at intervals to adequately provide drainage for runoff and placing slash and other debris on the road surface to make roads impassable and to meet reclamation standards as defined in HCP.

Vegetation

- All harvest areas shall have a minimum of 2 snags and 2 snag-recruits over 21 inches dbh, or the next largest size class available. Additional large-diameter recruitment trees may be left if sufficient large snags are not present. These snags and recruitment trees may be clumped or evenly distributed throughout the harvest units.
- Certain portions of the harvest areas would be left uncut; these areas may include large healthy trees, snag patches, small healthy trees, rocky outcrops, SMZs, small wetlands, etc.

Watershed

- Implement Riparian Management Zones on all Class 1 streams based on site-potential tree heights in the project area.
- Implement BMPs on all new temporary roads and improve BMPs on existing roads where needed.
- Use spot-blading on existing roads to preserve as much of the existing vegetative cover as possible on vegetated road surfaces.
- Planned erosion-control measures include:
  - grade breaks on roads,
  - surface water-diverting mechanisms on roads,
  - slash-filter windrows, and
  - grass seeding.
- Details for these control measures would be included in *ATTACHMENT B* of the *TIMBER SALE CONTRACT*.
- Streamside Management Zones (SMZs) and Riparian Management Zones (RMZs) would be defined along those streams and/or wetlands where they occur within, or adjacent to, harvest areas. This project would meet or exceed SMZ and RMZ rules.
- Brush would be removed from existing road prisms to allow for effective road maintenance. Road maintenance can help reduce sediment delivery.
- The contractor would be responsible for the immediate cleanup of any spills (fuel, oil, dirt, etc.,) that may affect water quality.

· The BMP audit process will continue. This project would likely be reviewed in an internal audit, and may be selected at random as a statewide audit site.

Wildlife

– If a threatened or endangered species is encountered, consult a DNRC biologist and develop additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*).

– Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per GB-PR2 (*USFWS AND DNRC 2010, Vol. II p. 2-5*).

– Contractors will adhere to food storage and sanitation requirements as per GB-PR3 (*USFWS AND DNRC 2010, Vol. II p. 2-6*).

– Design seed tree units to provide topographic breaks in view or to retain visual screening for bears by ensuring that vegetation or topographic breaks be no greater than 600 feet in at least one direction from any point in the unit as per *GB-NR4 (USFWS and DNRC 2010*).

– Retain up to 100 feet of vegetation between open roads and clearcut and seed tree units as per *GB-RZ2* (*USFWS and DNRC 2010*) (applies to proposed Units 1, 3, 4, 5, and 7).

– Public access would be restricted at all times on restricted roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.).

– No commercial harvest or public motorized activities on seasonally restricted roads would occur (refer to Stillwater Block HCP Transportation Plan) to reduce disturbance to grizzly bears from April 1through June 30 during the Spring Period (*GB-NR3, USFWS AND DNRC 2010, Vol. II pp. 2-11, 2-12*).

– No commercial harvest on open roads would occur (refer to Stillwater Block HCP Transportation Plan) to reduce disturbance to grizzly bears from April 1through June 15 during the Spring Period (*GB-NR3, USFWS AND DNRC 2010, Vol. II pp. 2-11, 2-12*).

– Retain 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh) particularly favoring western larch and Douglas-fir and retain 15 to 25 tons/acre coarse woody debris as consistent with Graham et.al. (*1994*). Emphasize the retention of downed logs ≥15 inches dbh where they occur as per LY-HB2 (*USFWS and DNRC 2010).*

– Use a combination of topography, group retention, and roadside vegetation to reduce sight distances within harvest units where feasible.

– In a portion of harvest units, retain patches of advanced regeneration of shade-tolerant trees as per LY-HB4 (*USFWS AND DNRC 2010, Vol. II pp. 2-50, 2-51*).

– Establish travel corridors down ridges next to Unit 7 and Unit 11 as per LY-HB4 (*USFWS AND DNRC 2010, Vol. II pp. 2-50, 2-51*).

Attachment IV:

Soils Analysis

Analysis Prepared By:

Name: Marc Vessar

Title: Hydrologist, Montana DNRC

Introduction and Issues Statements

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

- *Timber harvesting activities may adversely affect soil resources due to increased compaction, displacement and erosion.*
- *Removal of both coarse and fine woody material off site during timber harvest operations can reduce nutrient pools required for future forest stands and can affect the long-term productivity of the site.*

Regulatory Framework

The Administrative Rules for Forest Management (ARM 36.11.401 to 456) include several rules that guide conservation of soils resources. The Administrative Rules were generally adopted from recommendations in the State Forest Land Management Plan (SFLMP) (DNRC 1996). Part of the project area is also covered by the Montana DNRC Forested Trust Lands Habitat Conservation Plan (2012). The project was developed to be compliant with both the Administrative Rules and the HCP.

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

Analysis Methods and Analysis Areas

The project area for this proposal includes approximately 4,185 acres. Because harvesting is proposed on just a portion of the project area, the analysis area will be smaller.

Compaction, Displacement and Erosion

Methods for disclosing impacts include using general soil descriptions and the management limitations for each soil type. This analysis will qualitatively assess the risk of negative effects to soils from erosion, compaction, and displacement from each alternative, using insight from previously collected soils-monitoring data from over 90 DNRC post-harvest monitoring projects (*DNRC, 2011*).

The analysis area will be the proposed harvest units and road locations.

Nutrient Cycling

Coarse woody material will be addressed first, by disclosing existing levels from transect data collected during field reconnaissance. The transect data will be compared with scientific literature as required by ARM 36.11.414 (2). If the Action Alternative is selected, this assessment will assist in developing contract requirements and mitigation measures necessary to ensure post project levels of coarse woody debris (CWD) adequately meet the recommendations of relevant literature, primarily *Graham et al (1994*). Fine woody material will be addressed solely through contract language that minimized removal (ARM 36.11.410).

The analysis area will be the proposed harvest units.

Existing Conditions

The *Soil Survey of Flathead National Forest Area, Montana* (*Martinson and Basko, 1998*) combines landform and soil information with habitat types to inventory and map soils in the project area. Nine landtypes were identified in the project area; harvesting is proposed on nine of these landtypes (21-8, 21-9, 26A-8, 27-7, 28-7, 57-8, 72, 73 and 74). All of these landtypes are considered as having a moderate erosion risk except for Landtype 74 which has a high erosion hazard risk. Approximately 0.5 acres of landtype 74 is proposed for harvesting. All landtypes are suitable for conventional ground-based timber harvest or cable harvest depending upon slope. A brief description of the landtypes within the project area can be found in the project file, located at the Stillwater Unit office.

Compaction, Displacement and Erosion

Cumulative effects from past forest management in a portion of the proposed harvest units are a result of roads, skid trails and landings. Records show evidence of harvest from the 1940's to the early 1990's. Major harvests occurred in the project area in 1941, 1956-58, and 1974. Other forest product removals include pulp, commercial Christmas trees, individual firewood and individual Christmas tree harvests. Past harvesting has occurred on approximately 48 acres of the proposed harvest units.

Impact from skid trails and landings from older timber sales have been reduced through freeze-thaw cycles and root mass penetrating the soil. While many of the impacts have ameliorated over time, some skid trails are still visible in the proposed harvest units and elsewhere in the project area. Skid trails within proposed harvest units do not appear to be eroding more than the surrounding un-trailed areas, but reduced tree densities and vigor is present on these areas as is a more brush. A list of harvesting in the project area can be found in the project file.

Past monitoring on DNRC timber sales from 1988 to 2011 has shown an average of 12.2 percent soil impacts due to compaction, displacement or severe erosion across all parent materials. Eighteen monitoring sites had soil textures similar (silt loam/gravelly silt loam) to the areas proposed for harvest in this project. Stratifying the results by soil texture that are similar to the majority of the proposed harvesting shows an average of approximately 16.9 percent of the harvest areas impacted from erosion, displacement or severe compaction on ground-based harvesting operations and an average of 6.8 percent on cable yarding harvesting operations (*DNRC 2011*).

The *DNRC Soil Monitoring Report* (*DNRC 2011*) noted that ground-based sites harvested before 1990 had the largest areas of compaction attributed to dozer piling during the site-

preparation activities. Dozer piled units had impacts that averaged over 23 percent; units that were not dozer piled had impacts averaging 11.4 percent. Monitoring soil impacts has resulted in a change of management that has substantially reduced this practice.

Nutrient Cycling

Coarse and fine woody debris provide a crucial component in forested environments through nutrient cycling, microbial habitat, moisture retention and protection from mineral soil erosion. (*Harmon et. al., 1986*). Fine woody debris, typically the branches and foliage, contain the majority of the macronutrients in forest stands. Harrington and Kirkland found higher levels of nitrogen, carbon and other important macronutrients on sites where debris was retained compared to sites where most of the debris is removed (*Harrington and Kirkland 2012*). While coarse woody debris decays at various rates due to local climatic conditions, the advanced stages of decay contains many nutrients and holds substantial amounts of moisture for vegetation during dry periods (*Larson et. al. 1978, Wicklow et. al. 1973*). Forest management can affect the volumes of fine and coarse woody debris through timber harvesting and result in changes to the available nutrients for long term forest production. The method for quantifying the coarse woody debris is described in the *Handbook for Inventorying Downed Woody Material* (*Brown, 1974*).

During field reconnaissance, 19 transects were used to estimate coarse woody debris in the project area; 9 transects were located in proposed units. *TABLE S-2 – COARSE WOODY DEBRIS AMOUNTS* displays the average, minimum, maximum and median levels of coarse woody debris within transects in the project area and the proposed units. The median is the point with half the transects showing more, and half the transects showing less.

TABLE S-2: COARSE WOODY DEBRIS AMOUNTS

	Number of transects	Average	Minimum	Maximum	Median
		tons per acre			
Project Area	19	15.7	0.7	54.8	9.8
Within proposed units	9	15.8	0.7	54.3	9.8

These results are within the recommendations in *Managing Coarse Woody Debris in Forests of the Rocky Mountains* (*Graham et. al., 1994*) on similar habitat types post timber harvest. Subalpine fir habitat types similar to the project area are recommended to have a level of coarse woody debris in the range of 15 to 25 tons per acre to maintain forest productivity. Currently, two of the nineteen (11%) transects located in project area were within the recommendations; four (21%) are above the recommended range; and thirteen (68%) are below the recommended levels.

DESCRIPTION OF ALTERNATIVES

- ***No-Action Alternative***

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

- ***Action Alternative***

  Eighteen units totaling approximately 380 acres would be commercially harvested under this alternative. The majority (359 acres) of the proposed harvest would be regeneration harvest (seed tree or shelterwood). Approximately 220 acres would be harvested using conventional ground-based equipment and 160 acres would employ cable yarding methods. Site preparation would include machine piling and scarification on units approximately 240 acres.

Approximate miles of road activities include:

- 14.7 miles of maintenance/BMP upgrades
- 2.6 miles of road construction for temporary use

Recommended Mitigation Measures and Contract Clauses

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

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

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

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

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

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

6) Retain 15 to 25 tons of large woody debris and a feasible majority of all fine litter following harvesting operations. On units where whole tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves slash on site; 2) return-skid slash and evenly distribute within the harvest area; or 3) cut tops from every third bundle of logs so that tops are dispersed as skidding progresses.

Environmental Effects

- ***Direct, Indirect, and Cumulative Effects of the No-Action Alternative***

No timber harvesting or associated activities would occur under this alternative. Skid trails from past harvesting would continue to recover from compaction as freeze-thaw cycles continue and vegetation root mass increases. No additional adverse cumulative effects would be expected from the implementation of the No-Action Alternative. Because harvesting would not be implemented, compaction, displacement and erosion rates above natural levels would not be expected. Coarse woody debris levels and nutrient cycling would continue as dictated by natural events.

- ***Direct, Indirect, and Cumulative Effects of the Action Alternative***

The comparison of the soil type map, field reconnaissance notes, and topographic map features with the proposed harvest unit map, indicates that ground-based skidding would occur on slopes of up to 40 percent. Therefore, the extent of expected impacts would likely be similar to those reported in the *DNRC SOIL MONITORING REPORT (DNRC, 2011)* or approximately 12.2 percent for ground-based harvesting and 6.8 percent for cable yarding operations. The project proposes to harvest 220 acres using ground-based operations which would be expected to have moderate or higher impacts on up to 27 acres. The 160 acres of cable yarding would expect moderate or higher impacts on up to 11 acres. Total moderate or higher impacts for all units would be approximately 38 acres or 10 percent of the harvest unit area.

Less than one-half acre of harvest on high erosion risk soils would be implemented, however mitigation measures to minimize erosion risk would be incorporated into the timber sale contract.

Although erosion would potentially result from this alternative, the magnitude, area and duration of erosion and other adverse impacts such as compaction and displacement would remain low. Therefore the risk of unacceptable adverse direct and indirect impacts to physical soil properties would be low.

Coarse woody debris would be left on-site in volumes recommended to help maintain soil moisture and forest productivity, generally in the 15 to 25 tons per acre range for habitat types found in the harvest locations (*Graham et. al. 1994*). Because coarse woody debris would be left on site in amounts recommended by scientific literature, benefits to nutrient cycling and forest productivity would be maintained over the long term. However, removal of fine material in several of the units may result in reduced soil macronutrients and tree productivity (*Harrington and Kirkland 2012*).

Cumulative effects would be controlled by limiting the area of adverse soil impacts to less than 15 percent of the harvest units (as recommended by the SFLMP) through implementation of BMPs, skid trail planning on tractor units, and limiting operations to dry or frozen conditions. Future harvesting opportunities would likely use the same road system, skid trails, and landing sites to reduce additional cumulative impacts. Due to these mitigation measures and the limited existing impacts, the cumulative effects from compaction, erosion and displacement would be low.

By designing the proposed harvesting operations with soil-moisture restrictions, season of use, and method of harvesting, the risk of unacceptable long-term impacts to soil productivity from compaction and displacement would be low.

Fine and large woody debris remaining post-harvest would vary greatly between harvest units. Harvest units that maintain the majority of fine material and recommended amounts of coarse woody debris would have a low risk of cumulative impacts due to nutrient cycle alterations. Harvest units that would have the majority of the fine material removed during harvest may have up to moderate cumulative impacts to soil productivity in the short-term due to reduced forest productivity from nutrient pool loss.

Soils Analysis References

Brown, J.K. 1974. Handbook for inventorying downed woody material. In: USDA and Forest Service (Editors). Ogden, Utah: Intermountain Forest and Range Experiment Station.

DNRC, 1996. State Forest Land Management Plan Final Environmental Impact Statement. Montana Department of Natural Resources and Conservation, Forest Management Bureau. Missoula, MT.

DNRC 2011. DNRC update to the Compiled Monitoring Report. Includes data from 1988 through 2011. Unpublished. Prepared by J. Schmalenberg, Forest Management Bureau, Missoula, MT.

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

Harmon, M.E.; J.F. Franklin, and F. J Swanson. 1986. Ecology of coarse woody debris in temperate ecosystems. Advances in Ecological Research, Vol. 15. New York: Academic Press: 133-302.

Harrington, Timoth B.; Kirkland, John 2012. Logging debris matters: better soil, fewer invasive plants. Science Findings 145. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 6 p.

Martinson, A. H. and W. J. Basko. 1998. Soil Survey of Flathead National Forest Area, Montana. USDA Forest Service, Flathead National Forest, Kalispell, Montana.

Wicklow, M.C., W. B. Bolen, and W.C. Denison. 1973. Comparison of Soil micro-fungi in 40-year-old stands of pure alder, pure conifer and alder-conifer mixtures. Soil Biology and Biochemistry, 6:73-78.

Attachment V:

Water Resources Analysis

Analysis Prepared By:

Name: Tony Nelson

Title: Hydrologist, Montana DNRC

Introduction

The following analysis will disclose anticipated effects to water resources within the South Fitzpatrick project area. Direct, secondary, and cumulative effects to water resources of both the No-Action and Action alternatives will be analyzed.

Issues and Measurement Criteria

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

Sediment Delivery

Sediment delivery and subsequent water quality impacts can be affected by timber harvesting and related activities, such as road construction, by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and deliver substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment-filtering capacity and may reduce channel stability and the amounts of large woody material. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce the velocity and erosive power of stream flows. Other aspects of sediment analysis can also be found in Attachment VI, Fisheries Resources Assessment.

Measurement Criteria: Sediment from roads, harvesting activities and vegetative removal will be analyzed qualitatively through data collected during past statewide and DNRC internal BMP field reviews.

Water Yield

Water yield increases can result from timber harvesting and associated activities, which can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal (*Haupt 1976*), because removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which lead to further water-yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition. Vegetation removal can also reduce peak flows by changing the timing of snowmelt. Openings will melt earlier in the spring with

solar radiation and have less snow available in late spring when temperatures are warm. This effect can reduce the synchronization of snowmelt runoff and lower peak flows.

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

Regulatory Framework

The following plans, rules, and practices have guided this projects planning and/or will be implemented during project activities:

Montana Surface Water Quality Standards

According to the Montana Surface Water Quality Standards found in *ARM 17.30.608* (*1*)(*a*), this portion of the Stillwater River drainage, including Fitzsimmons Creek, is classified as B-1. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases over natural turbidity. "Naturally occurring," as defined by *ARM 17.30.602* (*19*), includes conditions or materials present during runoff from developed land where all reasonable land, soil, and water conservation practices (commonly called Best Management Practices or BMPs) have been applied. Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of activities that could create impacts.

Designated beneficial water uses within the project area include cold-water fisheries and recreational use in the streams, wetlands, and lakes in the surrounding area. There are no existing surface water rights in the proposed project area. There are several surface water rights approximately 4-6 miles downstream from the proposed project area. These water rights are for domestic use, municipal, irrigation, lawn and garden, and fish and wildlife. Domestic use refers to water rights assigned to individual property owners for uses such as eating, drinking, laundering, bathing, lawn watering and watering a household garden.

Water-Quality-Limited Waterbodies

None of the streams in the proposed project area are currently listed as water-quality-limited waterbodies in the *2012 Montana 303*(*d*) list (*DEQ, 2012*).

Portions of the Stillwater River located approximately 33 miles downstream from the proposed project area are currently listed as a water quality limited water body in the 2012 303(d) list. The 303(d) list is compiled by the Montana Department of Environmental Quality (DEQ) as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify water bodies that do not fully meet water quality standards, or where beneficial uses are threatened or impaired. These water bodies are then

characterized as “water quality limited” and thus targeted for Total Maximum Daily Load (TMDL) development. The TMDL process is used to determine the total allowable amount of pollutants in a water body of watershed. Each contributing source is allocated a portion of the allowable limit. These allocations are designed to achieve water quality standards.

The Montana Water Quality Act (MCA 75-5-701-705) also directs the DEQ to assess the quality of state waters, insure that sufficient and credible data exists to support a 303(d) listing and to develop TMDL for those waters identified as threatened or impaired. Under the Montana TMDL Law, new or expanded nonpoint source activities affecting a listed water body may commence and continue provided they are conducted in accordance with all reasonable land, soil and water conservation practices. Total Maximum Daily Loads have not been completed for the Stillwater River. DNRC will comply with the Law and interim guidance developed by DEQ through implementation of all reasonable soil and water conservation practices, including Best Management Practices and Forest Management Rules (ARM 36.11.401 through 36.11.450 and 36.11.470 & 471).

The current listed causes of impairment in the Stillwater River are: alteration in stream-side or littoral vegetative covers and sedimentation/siltation. The probable sources for the Stillwater River are: site clearance (land development), unknown sources, and loss of riparian habitat.

Montana Streamside Management Zone Law

By the definition in *ARM 36.11.312* (*3*), several of the stream reaches in the project area are Class 1 streams. All of these streams and many of their tributaries have flow for more than 6 months each year and contribute flow to downstream waters. The rest of the stream reaches in the project area are classified as Class 2 or 3 based on site-specific conditions. A Class 3 stream is defined as a stream that does not support fish, normally has surface flow during less than 6 months of the year, and rarely contributes surface flow to another stream, lake or other body of water (*ARM 36.11.312* (*5*)). According to ARM 36.11.312 (4), a Class 2 stream is a portion of a stream that is not a Class 1 or Class 3 stream segment. Figure H-2 displays the stream classes and locations for project area streams.

Figure H-1 *–Project Area Watersheds*

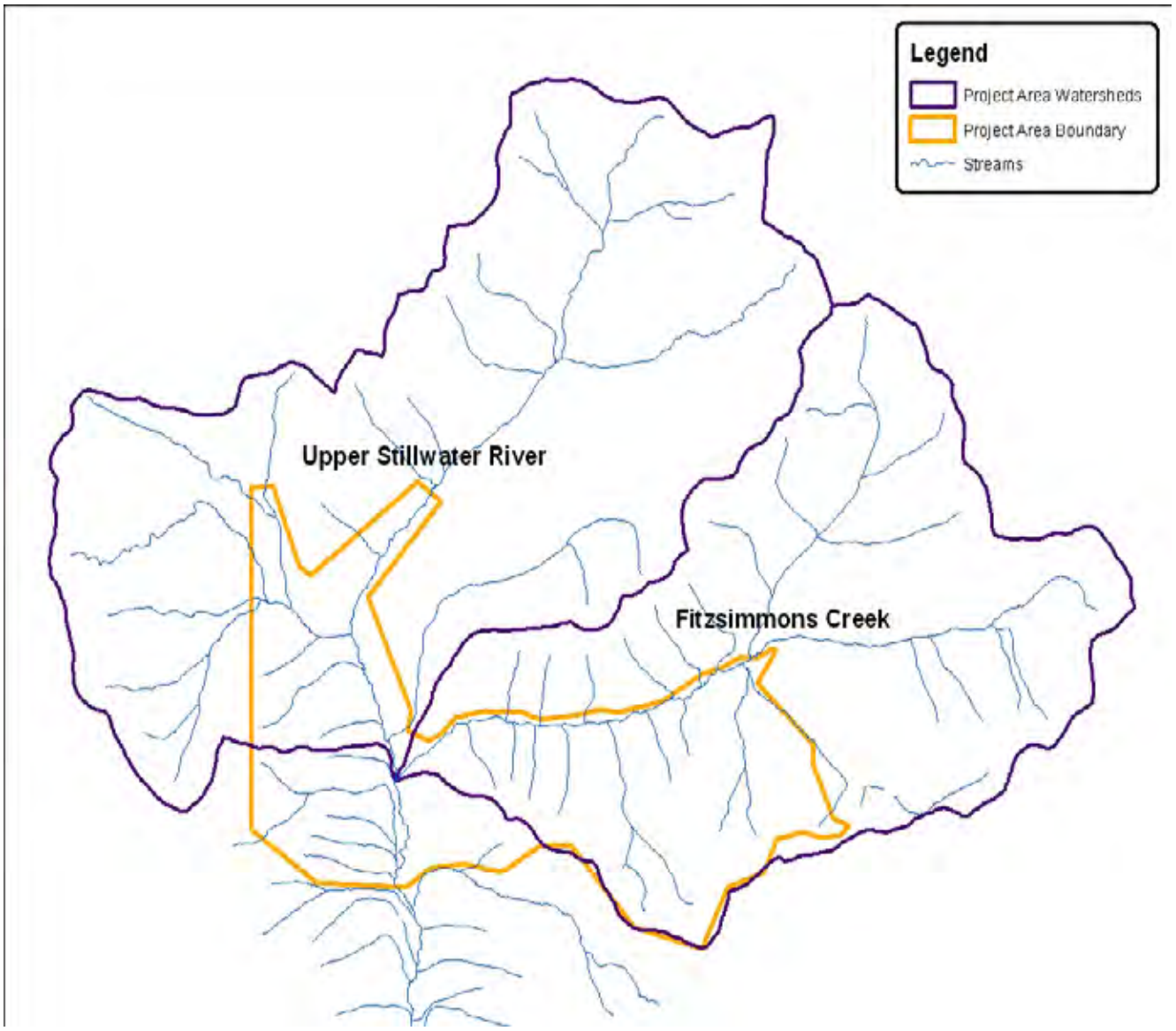
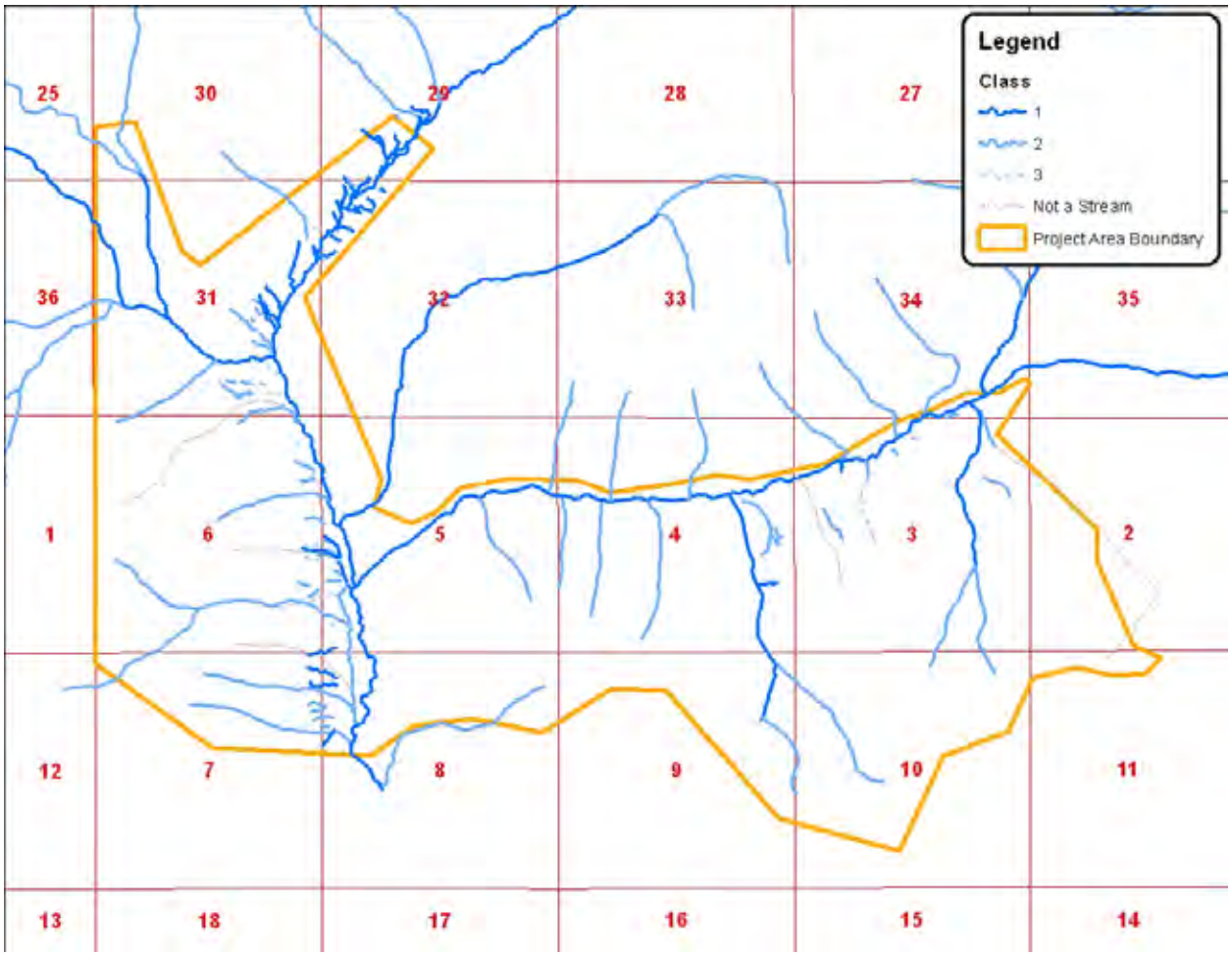


***Figure H-2** – South Fitzpatrick Project Area Steam Classifications*



Forest Management Rules

In 2003, DNRC drafted Administrative Rules for Forest Management. The portion of those rules applicable to watershed and hydrology resources include ARM 36.11.422 through 426. All applicable rules will be implemented if they are relevant to activities proposed with this project.

Habitat Conservation Plan

In 2011, DNRC adopted a habitat conservation plan (HCP) in coordination with the United States Fish and Wildlife Service. All applicable HCP riparian timber harvest and aquatic conservation strategies *(DNRC, 2010)* would be implemented if they are relevant to activities proposed with this project.

Analysis Areas

Sediment Delivery

Analysis area for direct, indirect and cumulative effects to sediment delivery will be analyzed on all existing roads in and leading to the proposed project area. Additional sites on proposed haul routes located outside the project area will be assessed qualitatively for their potential to affect downstream water.

Water Yield

Direct, indirect and cumulative effects to water yield will be analyzed in the Upper Stillwater River and Fitzsimmons Creek watersheds. A map of the project area watersheds and their relation to the proposed project area is found above *(**Figure H-1**)*. A map of the project area and the streams found within the project area is found in ***Figure H-2***. All existing activities on all ownership and proposed activities related to the South Fitzpatrick project, including road construction within each project area watershed will be analyzed using the ECA method to estimate the water yield changes that may occur as a result of the proposed project. These watersheds were chosen as an appropriate scale of analysis for the ECA method, and will effectively display the estimated impacts of proposed activities.

Analysis Methods

Where risk is assessed in both sediment-delivery and water-yield analyses, the following definitions apply to the level of risk reported:

- *low risk* means that impacts are unlikely to result from proposed activities,
- *moderate risk* means that there is approximately a 50-percent chance of impacts resulting from proposed activities, and
- *high risk* means that impacts are likely to result from proposed activities.

Where levels or degrees of impacts are assessed in this analysis, the following definitions apply to the degree of impacts reported:

- *very low impact* means that impacts from proposed activities are unlikely to be measurable or detectable and are not likely to be detrimental to the water resource;
- *low impact* means that impacts from proposed activities would likely be measurable or detectable, but are not likely to be detrimental to the water resource;
- *moderate impact* means that impacts from proposed activities would likely be measurable or detectable, and may or may not be detrimental to the water resource;
- *high impact* means that impacts from proposed activities would likely be measurable or detectable, and are likely to have detrimental impacts to the water resource.

Sediment Delivery

Analysis methods to assess sediment delivery will include qualitative assessments where stream crossings exist within the proposed project area using visual inspection and lineal measurement to determine the road surface area delivering to a stream. Sediment from roads, harvesting activities and vegetative removal will be analyzed qualitatively through data collected during past statewide and DNRC internal BMP field reviews. In addition, in-channel sources of sediment were identified using channel-stability rating methods developed by *Pfankuch (1975)* and through the conversion of stability rating to reach condition by stream type developed by *Rosgen (1996).*

Water Yield

Analysis methods to assess the water-yield increase for the watersheds in the project area consisted of the ECA method as outlined in Forest Hydrology Part II *(Haupt 1976)*. ECA is a function of total area roaded and harvested, percent of crown removal in harvesting, and amount of vegetative recovery that has occurred in harvest areas. This method equates area harvested and percent of crown removed with an equivalent amount of clearcut area. For example, if 100 acres had 60 percent crown removed, ECA would be approximately 60, or equivalent to a 60-acre clearcut. The relationship between crown removal and ECA is not a 1-to-1 ratio, so the percent ECA is not always the same as the percent canopy removal. As live trees are removed, the water they would have evaporated and transpired either saturates the soil, or is translated to runoff. This method also calculates the recovery of these increases as new trees begin to grow and move toward water use of a fully forested condition.

Analysis methods to evaluate the watershed risk of potential water-yield increase include establishing a threshold of concern. In order to determine a threshold of concern, acceptable risk level, resource value, and watershed sensitivity are evaluated according to *Young (1989)*. The watershed sensitivity is evaluated using qualitative assessments, as well as procedures outlined in Forest Hydrology Part II (*Haupt 1976*). The stability of a stream channel is an important indicator of where a threshold of concern should be set. As water yields increase as a result of canopy removal, the amount of water flowing in a creek gradually increases. When these increases reach a certain level, the bed and banks may begin to erode. More stable streams will be able to handle larger increases in water yield before they begin to erode, while less stable streams will experience erosion at more moderate water-yield increases (*Rosgen 1996*).

Existing Conditions

General Description

The following section will describe the existing conditions within the proposed project area and the analysis areas that are relevant to the issues discussed above in this analysis.

Sediment Delivery

Sediment delivery from in-channel sources in the eastern portion of the project area was reviewed by a DNRC hydrologist in 2013. Numerous stream channels were identified in this portion of the project area. Fitzsimmons Creek flows through the eastern portion of the project area and is a perennial Class 1 stream with an approximately 20-foot bankfull width. The stream was classified as a B2/3 channel using a classification system developed by *Rosgen* (*1996*). Channel types rated as "B" are typically in the 2- to 4-percent gradient range, and have a moderate degree of meander (sinuosity). Channel-bed materials in B2/3 types are mainly boulder and cobble. Fitzsimmons Creek has several tributary stream channels ranging from 1 to 3 foot bankfull widths. Some of these channels are perennial and some flow less than 6 months. Most of these streams are B4/5 channels. Channel-bed materials in B4/5 types are mainly gravel and coarse sand. No areas of unstable or actively down-cut channels were identified during field reconnaissance on Fitzsimmons Creek. Large woody debris was found in adequate supply to support channel form and function. Woody material in a stream provides traps for sediment storage and gradient breaks to reduce erosive energy and work as flow deflectors to reduce bank erosion. No evidence of past SMZ harvesting was found. Based on these findings, no in-channel sources of erosion or deposition were identified in Fitzsimmons Creek or its tributaries.

Sediment delivery from in-channel sources in the western portion of the project area was reviewed by a DNRC hydrologist in 2013. The primary stream in this area is the Stillwater River, a perennial Class 1 stream with an approximately 45-foot bankfull width. The Stillwater River was classified as a B3/4 channel using a classification system developed by *Rosgen* (*1996*). Channel types rated as "B" are typically in the 2- to 4-percent gradient range, and have a moderate degree of meander (sinuosity). Channel-bed materials in B3/4 types are mainly cobble and gravel. No areas of unstable or actively down-cut channels were identified during field reconnaissance on the Stillwater River. The Stillwater River has several tributary stream channels ranging from 1 to 3 foot bankfull widths along its floodplain and a major perennial tributary with approximately a 20-foot bankfull channel. Most of the smaller channels are perennial and some flow less than 6 months. Most of these streams are B4/5 channels. Channel-bed materials in B4/5 types are mainly gravel and coarse sand. The large unnamed perennial tributary is a B3/4 channel very similar to Fitzsimmons Creek. No areas of unstable or actively down-cut channels were identified during field reconnaissance in these tributaries to the Stillwater River. Large woody debris was found in adequate supply to support channel form and function. Woody material in a stream provides traps for sediment storage and gradient breaks to reduce erosive energy, and work as flow deflectors to reduce bank erosion. No evidence of past SMZ harvesting was found. Based on these findings, no in-channel sources of erosion or deposition were identified in this unnamed stream or its tributaries.

An in-channel sediment source was identified on the Stillwater River in Section 5 of the proposed project area. The site is an old, failed bridge crossing of the Stillwater River. There are several rotten stringer logs still across the river that have created a debris jam. The river has carved a new channel around a portion of this site. Based on the age of the logs and the vegetation at the site, it appears that this crossing has not been maintained or used in well over 30 years, and possibly up to 50 years. Most of the in-channel adjustment has already occurred

as a result of this partial flow obstruction. The river bed has aggraded upstream from this site causing approximately a 3-4 foot drop in channel bed through the old bridge site. This site represents a moderate risk of moderate impacts due to risk of the existing obstruction washing out, causing further channel adjustments.

No sediment delivery from the existing road system was identified on any of the proposed haul routes within or leading to the project area. The existing road system in and leading to the proposed project area ranges from a two-lane graveled surface on the Stillwater River Road to a single lane, graveled surface on the Mount Marston Road (main proposed haul routes) to moderate standard native-surfaced road on the Fitzsimmons Road. Most reaches meet applicable best management practices for surface drainage and erosion control. Road surfaces on roads closed with a gate or berm are mainly densely vegetated with grass/forbs and are not actively eroding. Improvements to BMPs at specific sites may be required prior to use. Most road grades are generally under 8%. The road system was constructed to access timber harvesting by the USDA Forest Service and Montana DNRC during past entries. None of the existing road segments in the project area were identified as causing active erosion or sediment delivery to streams.

Water Yield

According to ARM 36.11.423, allowable WYI values were set at levels to ensure compliance with all water-quality standards, protect beneficial uses, and exhibit a low degree of risk. This means that the allowable level is a point below which water yields are unlikely to cause any measurable or detectable changes in channel stability. The allowable WYI for the Upper Stillwater River watershed has been set at 10 percent based on channel-stability evaluations, watershed sensitivity, and acceptable risk. This WYI would be reached approximately when the ECA level in the Upper Stillwater River reaches the estimated level of 2,410 acres. The allowable WYI for the Fitzsimmons Creek watershed has been set at 10 percent based on channel-stability evaluations, watershed sensitivity, and acceptable risk. This WYI would be reached approximately when the ECA level in Fitzsimmons Creek reaches the estimated level of 1,828 acres. Based on review of 1963 aerial photography and DNRC section records in the project area, timber-harvesting and associated road construction activities have taken place in and around the project area watersheds since the 1950's. Timber management history on land administered by the Kootenai National Forest (KNF) was also included for each of the project area watersheds. These activities, combined with the vegetative recovery that has occurred, have led to an estimated 2.7 percent WYI over a fully forested condition in the Upper Stillwater River watershed and 2.2 percent over a fully forested condition in Fitzsimmons Creek. Existing conditions for water yield and the associated ECA levels in the project area watersheds are summarized below *(**Table H-1 – Current Water Yield**)*. Estimated water yield and ECA levels are well below established thresholds in all project area watersheds.

***Table H-1 – Current Water Yield**. Water yield and ECA increases in project area watersheds.*

	Upper Stillwater River	Fitzsimmons Creek
Existing % WYI	2.7	2.2
Allowable % WYI	10.0	10.0
Existing ECA (acres)	638	383
Allowable ECA (acres)	2,410	1,828

Environmental Effects

No-Action Alternative: Direct, Secondary, and Cumulative Effects

- **Sediment Delivery**

Direct and Secondary

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

Cumulative

No additional cumulative impacts from sediment delivery would be expected. Sediment delivery sites from roads on the proposed haul routes would remain unchanged, as would the sediment sources described in Existing Conditions.

- **Water Yield**

Direct and Secondary

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

Cumulative

No increase in water yield would be associated with this alternative. As vegetation continues toward a fully forested condition, annual water yields would also be expected to gradually decline.

Action Alternative: Direct, Secondary, and Cumulative Effects

- **Sediment Delivery**

Direct and Secondary

There is a low risk of direct or secondary effects to sediment delivery to streams from the timber harvesting activities proposed in the Action Alternative. The SMZ law, Administrative Rules for Forest Management, Riparian Management Zones (RMZ), channel migration zones (CMZ) on fish-bearing Class 1 streams, and applicable BMPs would be applied to all harvesting activities, which would minimize the risk of sediment delivery to draws and streams. The Montana BMP

audit process has been used to evaluate the application and effectiveness of forest-management BMPs since 1990; this process has also been used to evaluate the application and effectiveness of the SMZ Law since 1996. During that time, evaluation of ground-based-skidding practices near riparian areas has been rated 92 percent effective, and these same practices have been found effective over 99 percent of the time from 1998 to present (*DNRC 1990 through 2012*). Since 1996, effectiveness of the SMZ width has been rated over 99 percent (*DNRC 1990 through 2012*). As a result, with the application of BMPs and the SMZ Law, proposed activities are expected to have a low risk of low impacts to sediment delivery.

There is a low risk of direct or secondary effects to sediment delivery to streams from the use of existing roads. The existing road system meets BMP standards, and no direct sources of sediment were identified. Use of existing closed roads to haul timber would present a low risk of low impacts to sediment delivery due to vegetation loss on existing grassed-in roads.

There is a moderate risk of low impacts to sediment delivery from construction of approximately 2.6 miles of new temporary road. These proposed temporary roads are located mainly on upland sites. Some ephemeral draws would be crossed with proposed new construction, and four new stream crossings are proposed with the new construction. Impacts to sediment delivery from new stream crossings are discussed below. The risk of sediment delivery would remain elevated for 2-3 years after project completion while bare soils are revegetated.

There is a moderate risk of moderate impacts to sediment delivery installation of two additional stream crossings using temporary bridges in the proposed project area. One is proposed for installation in the extreme northwest portion of the project area on a proposed 0.1-mile temporary road. This 20-foot bridge would cross a 2-foot bankfull width intermittent Class 1 tributary to the Stillwater River. The other proposed bridge would be installed on an unnamed perennial tributary to Fitzsimmons Creek in the eastern-most portion of the proposed project area. This site would install a 45-foot portable bridge across a 5.5-foot bankfull width perennial Class 1 stream. These proposed crossings would have minimal risk to the bed or banks of either stream since the approaches would lie well outside of the active channel. There is a moderate risk that these activities could release a short-term pulse of fine sediment into the stream during construction. This risk is due solely to the proximity of the activity to a stream; no in-channel work is needed at either site. Each of these bridges would remain in place until project completion, and then both bridges would be removed and all disturbed soils re-shaped and grass seeded. The risk of sediment delivery would remain elevated for 2-3 years after project completion while bare soils are re-vegetated.

There is a high risk of moderate impacts to in-channel sediment delivery from the removal of an existing partial flow obstruction on the Stillwater River in Section 5 of the proposed project area. Removal of the rotten bridge stringers and existing debris jam would likely generate in-channel adjustments of the main channel of the Stillwater River once the obstruction was removed. These adjustments would take several runoff cycles to adjust, but removal of the bridge material and associated debris jam would create a lower risk of in-channel sediment delivery than allowing the structure to remain and fail from natural causes. In addition, the material in the obstruction would not be available to form another debris jam downstream. Short-term risk of out-of-channel sediment delivery would increase at this site due to exposure of bare soil from

equipment operation. The risk of sediment delivery would remain elevated for 2-3 years after project completion while bare soils are re-vegetated.

Cumulative

Risk of sediment delivery and sediment loading to the Upper Stillwater River and Fitzsimmons Creek watersheds and waters downstream from the proposed project area would be slightly increased from current levels in the short term and below current levels in the long term. Maintenance and improvement of existing erosion control and surface drainage on the existing road system would yield similar erosion rates to current levels. Installation and subsequent removal of two temporary bridges on new temporary road construction would elevate this risk during the course of the project. Removal of the failed bridge and debris jam material from the Stillwater River would elevate this risk during the course of the project and until the river channel would adjust to the removal. Overall, there is a low to moderate risk of short-term low-level increases in sediment loading for about 2-3 years. However, water quality standards are expected to be met and there is a low risk of impacts to beneficial uses.

- **Water Yield**

Direct and Secondary

Direct and secondary effects of the Action Alternative to water yield include a 0.6% increase in annual water yield in the Upper Stillwater River watershed and a 1.3% increase in annual water yield in the Fitzsimmons Creek watershed. These levels of projected water-yield increase are incremental values that refer only to water yield generated by this Action Alternative and do not include water-yield increases from past activities. The cumulative water-yield increase will assess the impacts of the proposed Action Alternative when added to the impacts of past and planned future activities; this will be discussed in Cumulative Effects portion of this analysis. These levels of water-yield increases would produce a low risk of creating unstable channels in any of the project-area streams. Peak flow volume and duration may be elevated, and the timing of peak flows may be slightly earlier as a result of the proposed harvest activities. These changes have a low risk of low impacts to the stream channels in each of the watersheds listed above.

Cumulative

Cumulative effects of the Action Alternative on water yield include removal of trees that would increase the annual water yield in the Upper Stillwater River watershed from its current level of approximately 2.7 percent over a fully forested condition to an estimated 3.3 percent. This water-yield increase, and its associated ECA level, includes the impacts of all past management activity, existing and proposed roads, proposed timber harvesting, and vegetative hydrologic recovery in the Upper Stillwater River watershed. The water-yield increase expected from this alternative leaves the watershed below the established threshold of concern reported in the Existing Conditions portion of this analysis. This cumulative level of water-yield increase would produce a low risk of creating unstable channels in the Upper Stillwater River or its tributaries.

Cumulative effects of the Action Alternative on water yield include removal of trees that would increase the annual water yield in the Fitzsimmons Creek watershed from its current level of approximately 2.2 percent over a fully forested condition to an estimated 3.5 percent. This water-yield increase, and its associated ECA level, includes the impacts of all past management activity, existing and proposed roads, proposed timber harvesting, and vegetative hydrologic recovery in the Fitzsimmons Creek watershed. The water-yield increase expected from this alternative leaves the watershed below the established threshold of concern reported in the Existing Conditions portion of this analysis. This cumulative level of water-yield increase would produce a low risk of creating unstable channels in Fitzsimmons Creek or its tributaries.

The Action Alternative is expected to have a low risk of cumulative impacts to water yield as a result of the proposed timber harvesting. A summary of the anticipated water-yield impacts of the Action Alternative to the Upper Stillwater River and Fitzsimmons creek drainages is found in ***Table H-2*** *and* ***Table H-3.***

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

	ALTERNATIVE	
	No Action	**Action**
Allowable water-yield increase	10%	10%
Percent water-yield increase	2.7	3.3
Acres harvested	0	151
Miles of new road	0	0.1
ECA generated	0	137
Total ECA	638	775
Allowable ECA	2,410	2,410

Table H-3 – Fitzsimmons Creek Water Yield. *ECA and percent WYI results for the Fitzsimmons Creek watershed.*

	ALTERNATIVE	
	No Action	**Action**
Allowable water-yield increase	10%	10%
Percent water-yield increase	2.2	3.5
Acres harvested	0	229
Miles of new road	0	2.5
ECA generated	0	230
Total ECA	383	613
Allowable ECA	1,828	1,828

Water Resources Mitigations

Hydrologic related resource mitigations that would be implemented with the proposed Action Alternative include:

- implement Riparian Management Zones on all Class 1 streams based on site-potential tree heights in the project area
- implement BMPs on all new temporary roads and improve BMPs on existing roads where needed
- use spot-blading on existing roads to preserve as much of the existing vegetative cover as possible on vegetated road surfaces

Water Resources References

DNRC, 1990-2012. Montana Forestry Best Management Practices Monitoring. Missoula, Montana.

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

Farns, P. 1978. Hydrology of Mountain Watersheds, Preliminary Report. Soil Conservation Service. Bozeman, MT.

Haupt, H.F., et al. 1974. *Forest Hydrology Part II Hydrologic Effects of Vegetation Manipulation*. USDA Forest Service, Region 1. Missoula, MT.

Montana Department of Environmental Quality. "Clean Water Act Information Center." 30 March, 2010. <http://www.cwaic.mt.gov/>

Pfankuch, D. J. 1975. Stream reach inventory and channel stability evaluation. USDA Forest Service, $1-75-002. Government Printing Office #696-260/200, Washington D.C. 26pp.

Rosgen, David L. 1996. *Applied River Morphology.* Wildland Hydrology, Pagosa Springs, CO.

USFWS and DNRC. 2010. Montana Department of Natural Resources and Conservation Forested Trust Lands Habitat Conservation Plan, Final Environmental Impact Statement, Volumes I and II. U.S. Department of Interior, Fish and Wildlife Service, Region 6, Denver, Colorado, and Montana Department of Natural Resources and Conservation, Missoula, MT. September 2010.

Young, Stephen L. 1989. Cumulative watershed effects. Lassen National Forest.

Attachment VI:

Fisheries Resources Assessment

Assessment Prepared By:

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Introduction

The following assessment will disclose anticipated effects to fisheries resources within the South Fitzpatrick Timber Sale project area. The proposed actions include commercial timber harvest on approximately 380 acres. Approximately 15.6 miles of existing forest road would be utilized for hauling, and approximately 2.6 miles of temporary forest road would also be constructed for hauling and later reclaimed. Nine temporary road-stream crossing structures would be constructed and later reclaimed.

Assessment Areas

Assessment areas for direct, indirect and cumulative effects will be used to evaluate the existing and potential impacts to fisheries resources associated with the proposed project. The assessment areas were chosen because they include (1) the watershed of known or potential fish-bearing streams and (2) the proposed harvest units and haul routes that could have foreseeable**,** measurable**,** or detectable impacts to those fisheries resources. The initial assessment areas are: Upper Stillwater River, Fitzsimmons Creek, and Lower Stillwater River Haul Route (see Maps 1 and 2; General and Detailed information of project area). The Upper Stillwater River assessment area includes all drainages upstream of the Stillwater River and Fitzsimons Creek confluence.

The Lower Stillwater River Haul Route was initially considered for detailed assessment; however, the area is dismissed here from further analysis for the following reasons: (1) sedimentation to fisheries habitats from road-stream crossings sites is the potential effect mechanism in the area; (2) the potential road-stream crossing sites include the haul route intersections of Camp Creek, Hellroaring Creek and the Stillwater River; (3) existing sites at Camp Creek and the Stillwater River exhibit BMPs for forest road construction, including road surface drainage away from the sites and affected waterbodies and adequate filtration of any road surface drainage through surrounding vegetation and duff; (4) BMPs for road maintenance will continue to be implemented along the entire haul route; (5) large spatial separations exist between the potential sediment production and delivery zones and downstream fisheries habitats; and, (6) consequently, any potential impacts to any downstream fisheries resources are expected to be negligible as a result of the proposed actions.

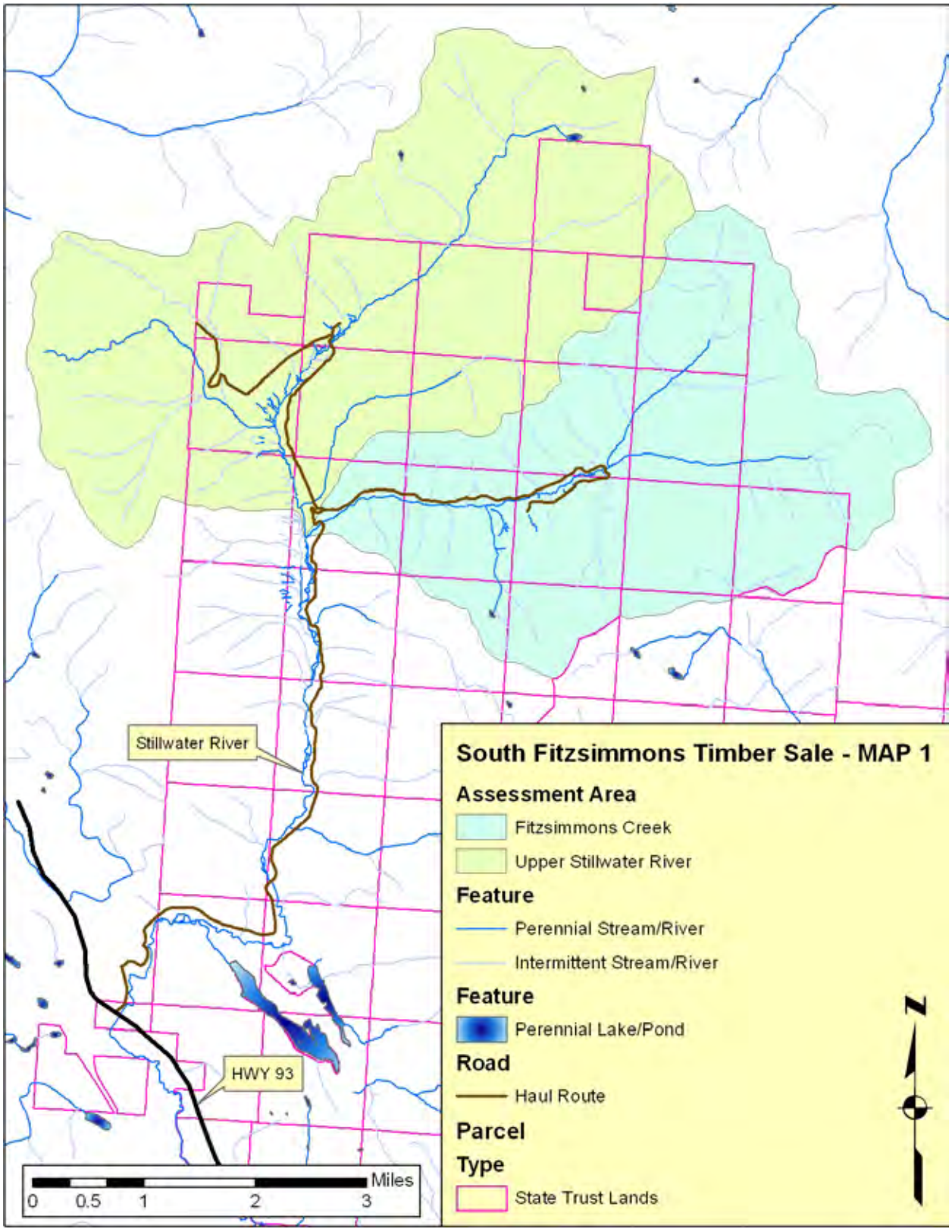
Issues

For the purposes of this environmental assessment, issues will be considered actual or perceived effects, risks, or hazards as a result of the proposed alternatives. Issues, in respect to this environmental assessment, are not specifically defined by either the Montana Environmental Policy Act or the Council on Environmental Quality.

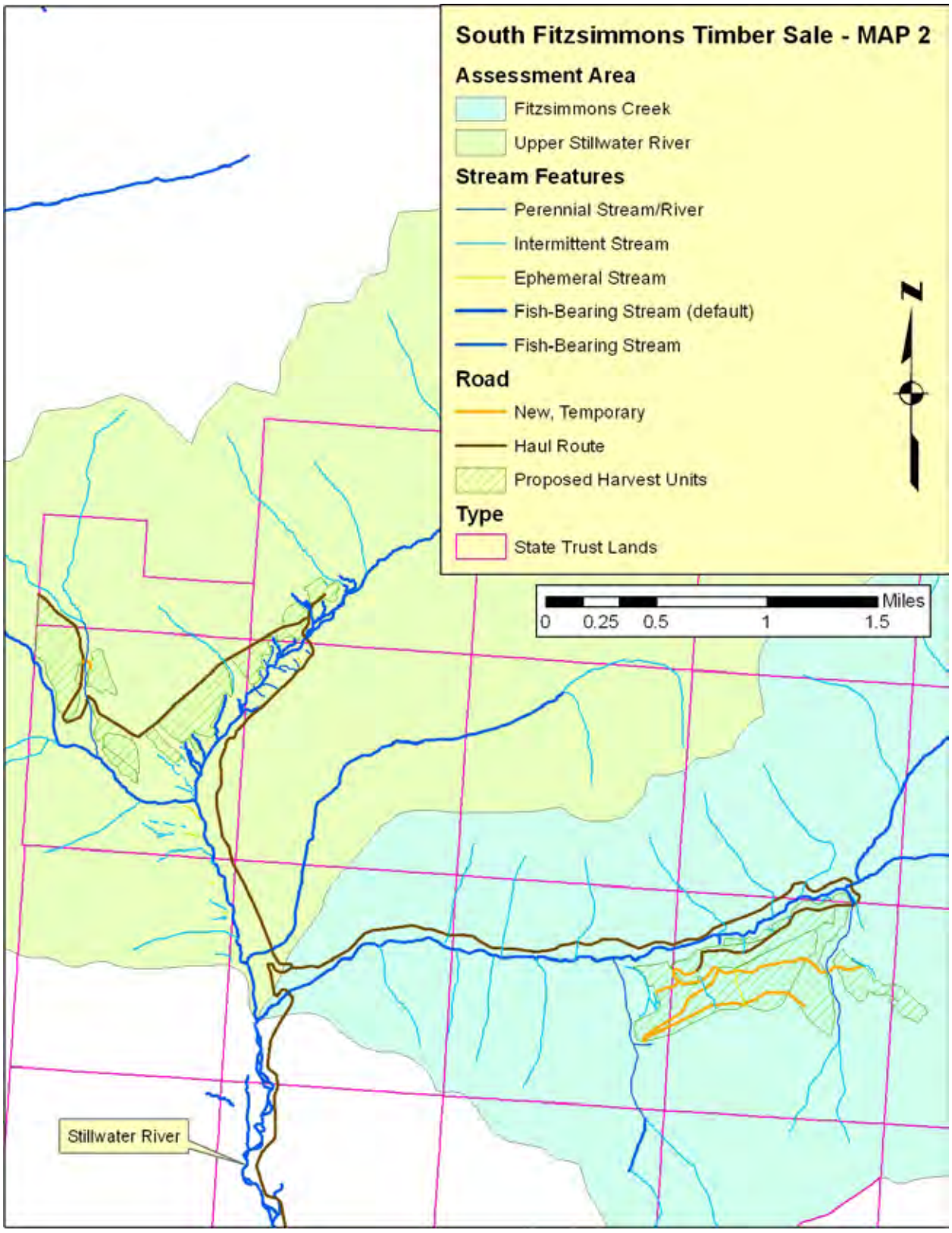
No fisheries resource issues were received during public scoping.

Fisheries resource issues raised internally include: the proposed actions may adversely affect fisheries habitat features, including channel forms and stream temperature.

Map 1 – General information of project area.



Map 2 – Detailed information of project area.



Regulatory Framework

The US Fish and Wildlife Service has listed bull trout as 'threatened' under the Endangered Species Act. Both bull trout and westslope cutthroat trout are listed as S2 Montana Animal Species of Concern. Species classified as S2 are considered to be at risk due to very limited and/or potentially declining population numbers, range, and/or habitat, making the species vulnerable to global extinction or extirpation in the state (Montana Fish, Wildlife and Parks, Montana Natural Heritage Program, and Montana Chapter American Fisheries Society Rankings). DNRC has also identified bull trout and westslope cutthroat trout as sensitive species (ARM 36.11.436).

DNRC is a cooperator and signatory to the following relevant agreements: Restoration Plan for Bull Trout in the Clark Fork River Basin and the Kootenai River Basin, Montana (2000) and Memorandum of Understanding and Conservation Agreement for Westslope Cutthroat Trout and Yellowstone Cutthroat Trout in Montana (2007). Both agreements contain land management conservation strategies or action items utilized by DNRC as decision-making tools.

Fisheries-specific forest management ARMs (36.11.425 and 36.11.427), the SMZ Law and rules, and other site-specific prescriptions would be implemented as part of any Action Alternative.

All waterbodies contained in the fisheries analysis area(s) are classified as B-1 in the Montana Surface Water Quality Standards (ARM 17.30.608[b][i]). The B-1 classification is for multiple beneficial-use waters, including the growth and propagation of cold-water fisheries and associated aquatic life. Among other criteria for B-1 waters, a 1-degree Fahrenheit maximum increase above naturally occurring water temperature is allowed within the range of 32 to 66 degrees Fahrenheit (0 to 18.9 degrees Celsius), and no increases are allowed above naturally occurring concentrations of sediment or suspended sediment that will harm or prove detrimental to fish or wildlife. In regard to sediment, naturally occurring includes conditions or materials present from runoff or percolation from developed land where all reasonable land, soil, and water conservation practices have been applied (ARM 17.30.603[19]). Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses (ARM 17.30.603[24]). The State has adopted BMPs through its Nonpoint Source Management Plan as the principle means of controlling nonpoint source pollution from silvicultural activities.

Assessment Methods

Assessment methods are a function of the types and quality of data available for analysis, which varies among the different assessment areas. The assessments may either be quantitative or qualitative. The best available data for both species and habitats will be presented for the assessment areas. In order to adequately address the issues raised the existing conditions and foreseeable environmental effects to fisheries resources in the assessment area will be explored using the following outline of issues and sub-issues. Sedimentation will be addressed through an assessment of effects to channel forms.

- Fisheries Habitat – Channel Forms
    - Fisheries Habitat – Sediment
    - Fisheries Habitat – Flow Regimes
    - Fisheries Habitat – Woody Debris

- Fisheries Habitat – Stream Temperature
    - Fisheries Habitat – Stream Shading
- Fisheries Habitat – Cumulative Effects

The descriptions of foreseeable adverse impacts to fisheries resources are described in *Table 1 – Descriptions of Foreseeable Adverse Impacts*. Positive impacts to fisheries resources will also be described, if applicable, using information on impact extent and duration.

Table 1 – Descriptions of Foreseeable Adverse Impacts.

Impact Description	Probability of Impact	Severity of Impact	Duration of Impact
Negligible	The resource impact is not expected to be detectable or measureable	The impact is not expected to be detrimental to the resource	Not applicable
Low	The resource impact is expected to be detectable or measureable	The impact is not expected to be detrimental to the resource	Short- or long-term
Moderate	The resource impact is expected to be detectable or measureable	The impact is expected to be moderately detrimental to the resource	Short- or long-term
High	The resource impact is expected to be detectable or measureable	The impact is expected to be highly detrimental to the resource	Short- or long-term

Cumulative impacts are those collective impacts on the human environment of the proposed action when considered in conjunction with other past, present, and future actions related to the proposed action by location or generic type (75-1-220, MCA). The potential cumulative impacts to fisheries resources in the assessment areas are determined by evaluating the collective anticipated direct and indirect impacts, other related existing actions, and future actions affecting the fisheries resources.

Existing Conditions

All Assessment Areas – General Existing Conditions

Fish species that occur in the two assessment areas are described in *Table 2 – Species Distribution*.

Table 2 – Species Distribution.

			ANALYSIS AREAS	
			Upper Stillwater River	Fitzsimmons Creek
SPECIES	native	bull trout	X	X
		westslope cutthroat trout	X	X
		slimy sculpin	X	X
	nonnative	eastern brook trout	X	X
		westslope cutthroat trout X rainbow trout hybrids	X	

The minimum total species extent in the Upper Stillwater River assessment area is 5.1 miles for bull trout and 9.7 miles for westslope cutthroat trout; 5.9 miles for bull trout and 8.5 miles for westslope cutthroat trout in the Fitzsimmons Creek assessment area.

Channel forms comprise the primary spatial component of fisheries habitat and include the frequency and volume of different slow and fast water features. Stream temperature is the primary thermal component of fisheries habitat and typically includes watershed-specific seasonal and daily fluctuations. Although channel forms and stream temperature are a function of numerous environmental processes, the variables of sediment, flow regime, woody debris and stream shading are major contributors that are also potentially affected by the proposed actions. Furthermore, the ranges of conditions of all of these variables throughout a watershed are highly varied, and the mechanisms by which they are naturally affected are also numerous and complex. For the purposes of this environmental assessment, potentially measureable or detectable effect mechanisms to these variables will be used to evaluate existing conditions and the foreseeable effects of the proposed actions. Site-specific surveys within project area lands serve as a resource subsample to extrapolate foreseeable effects across the assessment area.

Road-stream crossings and roads adjacent to stream channels (both perennial and intermittent stream channels) may be major sources of existing direct and indirect effects to the sediment component of fisheries habitats.

Flow regime components include total annual water yield and peak seasonal flow timing, duration and magnitude. In addition to the physical geography of a watershed, this variable is also greatly affected by both natural disturbances and land management activities.

Riparian zone vegetation heavily influences the delivery and in-channel frequency of woody debris, a major component of channel forms. The riparian zone is also a major regulator (shading) of stream temperature, since direct solar radiation is an important driver of stream thermal regimes, especially during peak seasonal periods. Riparian vegetation within a distance generally equivalent to the site potential tree height adjacent to perennial streams in the area is the primary influence on these three fisheries resource variables. The average site-potential-tree-height at 100 years for dominant and co-dominant riparian tree species in both assessment areas is 98 feet.

The Water Resources analysis indicates effects to flow regime by natural disturbances in all assessment areas may be slightly exacerbated by historic land management activities;

however, field surveys indicate that the existing conditions of flow regime are expected to be within the historic range of variability. Consequently, existing direct and indirect impacts to flow regime are negligible in all assessment areas.

Upper Stillwater River Assessment Area – Specific Existing Conditions

The entire Stillwater River watershed upstream of the confluence with Fitzsimmons Creek defines the boundary of this assessment area. The proposed activities that may affect fisheries resources in the Upper Stillwater River assessment area are: (1) upland, RMZ and SMZ timber harvest, (2) temporary forest road construction, reclamation and maintenance, (3) construction of 4 temporary road-stream crossing structures, (4) permanent forest road maintenance, (5) permanent and temporary forest road utilization for timber hauling and equipment transportation, and (6) one existing road-stream crossing structure removal and associated stream restoration on the Stillwater River. The fisheries resource variables potentially affected by the proposed actions are channel forms, sediment, flow regime, stream shading, and stream temperature. Existing effects to flow regime are discussed under General Existing Conditions.

Five existing road-stream crossings occur in the assessment area; 0.3 road-stream crossings per square mile occur in the assessment area. The length of all roads within 300 feet of all streams is 5.8 miles. The density of adjacent roads is 0.4 miles per square mile in the assessment area. No road problems exhibiting moderate or high impacts to fisheries resources were observed during field work for the project. (Moderate existing impacts to water quality from a collapsed, non-used bridge are noted in the Water Resources Assessment; however, with regard to fisheries resources, this impact is expected to have ameliorated over the past 30 to 50 years to a measureable but non-detrimental impact.) While the precise level and extent of impact from each individual road-stream crossing or adjacent road is unknown, the expected existing direct and indirect impact to sediment from road sources is low in the assessment area.

Riparian vegetation within 98 feet of perennial streams is the primary influence on in-channel frequency of woody debris, stream shading and stream temperature. (The average site-potential-tree-height at 100 years for dominant and co-dominant riparian tree species in the assessment area is 98 feet.) The estimated area within 98 feet of perennial streams that has been affected by all roads and past land management activities is 15 acres. (This value does not include areas affected by natural disturbances.) The percentage of total riparian zone affected within the assessment area is approximately 5 percent. While the level of impact from each affected riparian zone is unknown, the expected existing direct and indirect impact to both woody debris and stream temperature is low in the assessment area.

Fitzsimmons Creek Assessment Area – Specific Existing Conditions

The entire Fitzsimmons Creek watershed defines the boundary of this assessment area. The proposed activities that may affect fisheries resources in the Fitzsimmons Creek assessment area are: (1) upland, RMZ and SMZ timber harvest, (2) temporary forest road construction, reclamation and maintenance, (3) construction of 5 temporary road-stream crossing structures, (4) permanent forest road maintenance, and (5) permanent and temporary forest road utilization for timber hauling and equipment transportation. The fisheries resource variables potentially affected by the proposed actions are channel forms, sediment, flow regime, stream shading, and stream temperature. Existing effects to flow regime are discussed under General Existing Conditions.

Twelve existing road-stream crossings occur in the assessment area; 1.1 road-stream crossings per square mile occur in the assessment area. The length of all roads within 300 feet of all streams is 8.6 miles. The density of adjacent roads is 0.8 miles per square mile in the assessment area. No road problems exhibiting moderate or high impacts to fisheries resources

were observed during field work for the project. While the precise level and extent of impact from each individual road-stream crossing or adjacent road is unknown, the expected existing direct and indirect impact to sediment from road sources is low in the assessment area.

Riparian vegetation within 98 feet of perennial streams is the primary influence on in-channel frequency of woody debris, stream shading and stream temperature. (The average site-potential-tree-height at 100 years for dominant and co-dominant riparian tree species in the assessment area is 98 feet.) The estimated area within 98 feet of perennial streams that has been affected by all roads and past land management activities is 5 acres. (This value does not include areas affected by natural disturbances.) The percentage of total riparian zone affected within the assessment area is approximately 3 percent. While the level of impact from each affected riparian zone is unknown, the expected existing direct and indirect impact to both woody debris and stream temperature is low in the assessment area.

All Assessment Areas – Existing Cumulative Impacts

Other existing impacts to fisheries resources in all of the assessment areas include: (1) moderate to high impacts to native fish species through displacement and hybridization by nonnative species and (2) minor recreational fishing pressures. Past potential effects from forest management activities performed on all land ownerships are included in the assessment of existing direct and indirect effects. The combination of direct and indirect effects and other existing impacts are expected to have an existing moderate to high impact to fisheries resources in the assessment areas. The moderate to high existing cumulative impact is weighted in large part due to the profound impact on the assemblage and biodiversity of native fish species in the assessment areas. As physical habitat impacts vary in magnitude and scale throughout the watersheds, the existing biological component of fisheries resources has been adversely altered across the entire extent of the two assessment areas.

Environmental Effects

The environmental effects section will compare the existing conditions to the anticipated effects of the proposed No-Action and Action Alternatives to determine the foreseeable impacts to associated fisheries resources.

No-Action Alternative

All Assessment Areas: Direct, Indirect, and Cumulative Effects

As a result of implementing the No-Action Alternative, no additional direct or indirect effects to fisheries resources would be expected to occur within the assessment area beyond those described in the Existing Conditions.

Future-related actions considered part of cumulative impacts include (1) other forest management practices; (2) continued moderate to high impacts to native fish species by nonnative species; and (3) stable to increasing recreational fishing pressures. Open, public roads that intersect the analysis areas will continue to be utilized year-round for forest management, recreation and other purposes.

Consequently, foreseeable cumulative impacts to fisheries resources are expected to be similar to those described in Existing Conditions.

Action Alternative

All Assessment Areas: General Direct and Indirect Effects

The proposed actions and affected fisheries resources in all assessment areas are broadly described in the Introduction. Project-specific BMPs and road maintenance would be applied to all segments of the haul routes throughout the assessment areas (see Water Resources analysis). All impact descriptions are short-term unless otherwise noted.

Increased truck traffic can accelerate the mobilization and erosion of roadbed material at road-stream crossings and roads located adjacent to streams. However, through the implementation of project-specific BMPs and road maintenance, the associated road sites would be expected to deliver most mobilized sediment away from the stream and road prism and filter eroded material through roadside vegetation.

Upland harvest on sites with risk of erosion may mobilize material that could be delivered to adjacent stream channels; however, the Water Resources analysis indicates that the anticipated impacts from this action are expected to be negligible in all assessment areas. This assessment takes into consideration the implementation of the SMZ Law and Rules and supplemental ARMs for Forest Management.

Upper Stillwater River Assessment Area: Specific Direct, Indirect and Cumulative Effects

The number of road-stream crossings intersecting the haul route in the assessment area is 9 (including 4 new temporary crossings). The road-stream crossing density in the assessment area would temporarily increase from 0.3 sites per square mile to 0.6 sites per square mile, and the Action Alternative would utilize all road-stream crossings across the assessment area. The length of roads that would be used within 300 feet of all streams is 2.4 miles. The percentage of roads that would be used in the assessment area within 300 feet of all streams is 41 percent (including new, temporary road construction). Although project-specific BMPs and road maintenance would be expected to substantially offset the risk of increased sediment delivery due to project-specific vehicle traffic, low impacts to sediment are expected in the assessment area.

A negligible to low impact to fisheries resources is expected from 0.1 miles of temporary road construction within 300 feet of a perennial, non-fish-bearing stream. Low impacts to sediment would occur during the construction and removal phases of 1 temporary bridge on a perennial, non-fish-bearing stream. Low impacts to sediment would also occur during the removal of a non-used timber bridge and associated stream restoration on the Stillwater River; long-term effects of this action would be expected to be positive.

Approximately 152 acres in the assessment area (approximately 2 percent of the watershed) would be harvested. As noted in the Water Resources analysis, this level of harvest may lead to slight increases in water yield or changes in flow regime, which can positively or negatively affect fisheries resources. For instance, while elevated water yields may increase the base flows in currently slow moving and rearing fisheries habitats and also help sustain lower peak seasonal stream temperatures, increases in peak seasonal flows may also exacerbate in-stream sedimentation rates.

However, the foreseeable levels of effects to these variables are expected to be negligible and within the range of historic conditions.

Riparian harvest of all merchantable trees would occur between 50 and 98 feet away from non-fish-bearing, perennial streams in the assessment area. [No riparian harvest would occur within 50 feet of any non-fish-bearing, perennial, Class 1 streams. No riparian harvest would occur within 98 feet of any fish-bearing, perennial, Class 1 streams.] An analysis of this same riparian

harvest prescription in the Environmental Impact Statement for the Forested State Trust Lands Habitat Conservation Plan indicates a low risk of impacts to woody debris and stream shading (and stream temperatures affected by direct solar radiation). The proportion of affected riparian area within the assessment area is approximately 2 percent. Due to the limited magnitude and extent of this management action, a low impact to woody debris and stream shading is expected in the assessment area.

Due to the potential effects to riparian shading, a consequent low impact to stream temperature is also expected in the assessment area.

As part of the consideration of cumulative effects, all direct, indirect and other related impacts described in the Existing Conditions and Environmental Effects for the No-Action Alternative would be expected to continue. Additional low direct and indirect impacts may occur to channel forms (including sediment) and stream temperature as a result of implementing the proposed actions. Compared to the No-Action Alternative, (1) low additional cumulative effects to fisheries resources would be expected, (2) the additional cumulative effects may be measureable or detectable but are not expected to be detrimental, (3) cumulative effects would remain elevated primarily due to the presence and consequent adverse impacts from nonnative fish species, and (4) the elevated cumulative effects would be expected to occur regardless of whether or not the Action Alternative is selected.

Fitzsimmons Creek Assessment Area: Specific Direct, Indirect and Cumulative Effects

The number of road-stream crossings intersecting the haul route in the assessment area is 17 (including 5 new temporary crossings). The road-stream crossing density in the assessment area would temporarily increase from 1.1 sites per square mile to 1.5 sites per square mile, and the Action Alternative would utilize 95 percent of road-stream crossings across the assessment area. The length of roads that would be used within 300 feet of all streams is 4.3 miles. The percentage of roads that would be used in the assessment area within 300 feet of all streams is 50 percent (including new, temporary road construction). Within this affected area, approximately 550 feet of the haul route occurs within 60 feet of the mainstem of Fitzsimmons Creek, which is a zone of concurrent, heightened focus on monitoring and BMP application. Although project-specific BMPs and road maintenance would be expected to substantially offset the risk of increased sediment delivery due to project-specific vehicle traffic, low impacts to sediment are expected in the assessment area.

A low impact to fisheries resources is expected from 1.2 miles of temporary road construction within 300 feet of perennial, non-fish-bearing streams. Additional low impacts to sediment would occur during the construction and removal phases of 5 road-stream crossing structures on perennial and intermittent, non-fish-bearing streams.

Approximately 229 acres in the assessment area (approximately 3 percent of the watershed) would be harvested. As noted in the Water Resources analysis, this level of harvest may lead to slight increases in water yield or changes in flow regime, which can positively or negatively affect fisheries resources. For instance, while elevated water yields may increase slow and rearing fisheries habitats at base flows and help sustain lower peak seasonal stream temperatures, increases in peak seasonal flows may also exacerbate in-stream sedimentation rates. However, the foreseeable levels of effects to these variables are expected to be negligible and within the range of historic conditions.

Riparian harvest of most merchantable trees would occur between 50 and 98 feet away from non-fish-bearing, perennial streams in the assessment area. [No riparian harvest would occur within 50 feet of any non-fish-bearing, perennial, Class 1 streams. No riparian harvest would occur within 98 feet of any fish-bearing, perennial, Class 1 streams.] An analysis of this same

riparian harvest prescription in the Environmental Impact Statement for the Forested State Trust Lands Habitat Conservation Plan indicates a low risk of impacts to woody debris and stream shading (and stream temperatures affected by direct solar radiation). The proportion of affected riparian area within the assessment area is approximately 2 percent. Due to the limited magnitude and extent of this management action, a low impact to woody debris and stream shading is expected in the assessment area.

Due to the potential effects to riparian shading, a consequent low impact to stream temperature is also expected in the assessment area.

As part of the consideration of cumulative effects, all direct, indirect and other related impacts described in the Existing Conditions and Environmental Effects for the No-Action Alternative would be expected to continue. Additional low direct and indirect impacts may occur to channel forms (including sediment) and stream temperature as a result of implementing the proposed actions. Compared to the No-Action Alternative, (1) low additional cumulative effects to fisheries resources would be expected, (2) the additional cumulative effects may be measureable or detectable but are not expected to be detrimental, (3) cumulative effects would remain elevated primarily due to the presence and consequent adverse impacts from nonnative fish species, and (4) the elevated cumulative effects would be expected to occur regardless of whether or not the Action Alternative is selected.

Fisheries Resource Mitigations

Fisheries-related resource mitigations that would be implemented with the proposed Action Alternative include:

Applying all applicable Forestry BMPs (including the SMZ Law and Rules) and Forest Management Administrative Rules for fisheries, soils, and wetland riparian management zones (ARMs 36.11.425 and 36.11.426)

Attachment VII:

Wildlife Analysis

Assessment Prepared By: Chris Forristal
Title: Wildlife Biologist, Northwestern Land Office, Montana DNRC

INTRODUCTION

This analysis discloses the existing condition of relevant wildlife resources, and displays the anticipated effects that may result from each alternative of this proposal. There is a general discussion on the analysis areas and analysis methods employed to disclose the anticipated direct, indirect, and cumulative effects to these wildlife resources in the analysis area from the proposed actions. Past and current activities on all ownerships in each analysis area, as well as known planned future agency actions, have been taken into account for the cumulative effects analysis.

Considerations and concerns raised by DNRC specialists and public comments received during initial scoping for the proposed project led to the following list of issues:

- The proposed activities could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature and old-growth forest.
- The proposed activities could reduce the abundance of snags and coarse woody debris, which could lower habitat quality for species that depend on these structural attributes.
- The proposed activities could result in the modification of habitat preferred by Canada lynx (*Felis lynx*) and decrease the area's suitability for lynx.
- The proposed activities could alter grizzly bear (*Ursus arctos*) cover, reduce secure areas, and increase human access, which could adversely affect bears by displacing them from important habitats and/or increase risk of human-caused bear mortality.
- The proposed activities could decrease habitat suitability for fishers (*Martes pennanti*) by decreasing canopy cover in mature forest stands, decreasing abundance of snags and coarse woody debris, and by increasing roads, which could elevate risk of trapping mortality.
- The proposed activities could displace gray wolves (*Canis lupus*) from the vicinity of the project area, particularly denning and rendezvous sites, and/or alter big game prey availability, which could adversely affect gray wolves.

ANALYSIS AREAS

The discussions of existing conditions and environmental effects will focus on two different spatial scales. The first scale will be the "project area," which was used to assess direct and indirect effects to wildlife species and their habitats. The "project area," totaling 4,158 acres, consists of portions of sections 2-11 in Township 34 North, Range 24 West and portions of sections 29-32, and 34, in Township 35 North, Range 24 West. This project area surrounds the proposed timber harvest units and is the area where all proposed new road construction would occur. The project area consists of lands included in DNRC's Habitat Conservation Plan (HCP). Elevation within the project area ranges between 4,120 and 7,240 feet. The proposed project area contains a variety of slope aspects and wildlife habitats.

The second scale is the "cumulative effects analysis area," which refers to the surrounding landscape for assessing cumulative effects to wildlife species and their habitat. Cumulative

effects analysis areas (CEAAs) are named according to the relative size of the area and are summarized in TABLE W-1 –WILDLIFE ANALYSIS AREAS and FIGURE W-1 – WILDLIFE ANALYSIS AREAS. CEAAs include the project area as well as lands managed by other agencies and private landowners. Detailed descriptions of each analysis area are located in the **Existing Environment** section for each issue or wildlife species evaluated. In general, CEAAs were delineated to approximate the size of a focal species' home range or to approximate a surrounding landscape in which the proposed activities could most likely have measureable cumulative effects to wildlife habitat. See FIGURE W-1- WILDLIFE ANALYSIS AREAS for a map showing the project and cumulative effects analysis areas.

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

ANALYSIS AREA NAME	DESCRIPTION	TOTAL ACRES	ISSUE(S)/SPECIES ANALYZED
Project Area	Portions of sections 2-11 in Township 34 North, Range 24 West and portions of sections 29-32, and 34 in Township 35 North, Range 24 West.	4,158	direct & indirect effects for all issues/species
Small CEAA	The project area and sections surrounding it within the Stillwater River Headwaters HUC12 watershed boundary.	11,896	mature forests and connectivity, snags and coarse, and woody debris
Canada Lynx CEAA	The Stillwater West Lynx Management Area (LMA).	39,208	Canada lynx
Large CEAA	The Stryker grizzly bear management unit (BMU) subunit.	40,860	grizzly bears, fishers, and gray wolves

In December 2011, DNRC adopted a Habitat Conservation Plan (HCP) in cooperation with the USFWS to minimize potential impacts of the Forest Management Program to grizzly bears, Canada lynx and three species of fish. As a part of the HCP, DNRC agreed to limit road construction and use for 50 years in a transportation plan developed for blocked forestlands managed by the DNRC Stillwater Unit. This comprehensive access plan is called the Stillwater Block Transportation Plan and includes blocked lands on the Stillwater and Coal Creek State Forests. The effects to wildlife associated with the full transportation plan were analyzed in the DNRC HCP EIS (USFWS and DNRC 2010). This effects assessment tiers to the detailed analyses contained in those documents.

ANALYSIS METHODS

DNRC attempts to promote biodiversity by taking a coarse-filter approach, which favors a mix of stand structures and compositions on state lands (ARM 36.11.404). Appropriate stand structures are based on ecological characteristics (e.g., landtype, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist and biodiversity would be maintained. This coarse-filter

approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a fine-filter approach for threatened, endangered, and sensitive species (ARM 36.11.406). The fine-filter approach focuses on habitat requirements of several individual species.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of information and techniques were used. Field visits, scientific literature, DNRC's stand level inventory (SLI) data, aerial photographs, USDA Forest Service Geographical Information System (GIS) data, Montana Natural Heritage Program (MNHP) data, and consultations with other professionals provided information for the following discussion and effects analysis. Specialized methodologies are discussed under the species in which they occur. Species were dismissed from further analysis if habitat did not exist in the project area, or the species would not be affected by either alternative.

Cumulative effects analyses account for known past and current activities, as well as planned future agency actions. Ongoing and proposed timber sale projects that could contribute to cumulative effects are summarized in TABLE W-2 RECENT AND PROPOSED PROJECTS.

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

Sale Name	Agency	Status	Project Area	Small CEAA	Canada Lynx CEAA	Large CEAA
Lower Herrig	DNRC	Ongoing	-	20	7	7
Ewing Central	DNRC	Ongoing	-	-	288	288
Fish Bull Face	DNRC	Ongoing	-	-	424	369
Mistle Dog	DNRC	Ongoing	-	-	42	42
Mystery Fish	DNRC	Ongoing	-	-	468	468

Changes to vegetation and forest structure resulting from all DNRC projects have been accounted for in SLI data used for this analysis. The effects of any ongoing projects on wildlife will be discussed in cumulative effects analyses.

RELEVANT AGREEMENTS, LAWS, PLANS, RULES, AND REGULATIONS

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

COARSE FILTER WILDLIFE ANALYSIS

MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY

Issue:

The proposed activities could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature and old-growth forest.

Introduction

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

Forested landscapes in the western United States were historically shaped by natural disturbance events; primarily wildfire, blowdown, and pest outbreaks. Resulting broad landscape patterns were a mosaic of forest patches varying in age, composition and development. Timber harvest, like stand-replacement fire and blowdown, is a disturbance event that can create open, non-forested patches that over time develop into young, conifer forests. Patch size, age, shape, abundance, and distance to similar patches (connectivity) can be factors influencing wildlife use. The way through which patch characteristics influence wildlife use and distribution are dependent upon the particular species and its habitat requirements. Temporary non-forested openings, patches, and forest edges created by timber harvest and associated roads may be avoided by certain wildlife species adapted to mature, well-stocked forest. In contrast, other wildlife species flourish in early seral habitats created by disturbance. Connectivity under historical fire regimes in the vicinity of the project area was likely relatively high as fire differentially burned various habitats across the landscape (Fischer and Bradley 1987).

Analysis Areas

Direct and indirect effects were analyzed on the project area (4,158 acres). Cumulative effects were analyzed on within the 11,896-acre Small CEAA (see FIGURE W-1 – WILDLIFE ANALYSIS AREAS*)*. This scale of analysis would be large enough to support a diversity of species that use mature forested habitat and/or require connected forested habitats and centers evaluation of cumulative effects on those areas most likely to be affected by the proposed action.

Analysis Methods

Mature forested habitats and landscape connectivity were assessed using field evaluations, DNRC's stand level inventory (SLI) data, aerial-photograph interpretation, USDA Forest Service data (VMap 9.1.1), and GIS analysis. Mature forested habitat was defined as forest stands typically >100 years old with ≥40% canopy cover comprised primarily of trees >9 inches dbh. Forested stands containing trees of at least this size and density were considered adequate for providing minimal conditions necessary to facilitate movements of many wildlife species that benefit from well-connected mature forest conditions across the landscape. Road density was calculated in linear miles per square mile by dividing the number of road miles by the specified analysis area in square miles. Factors considered in the analysis include: 1)

availability of mature forested habitats (≥40% canopy cover, >9 inches dbh), 2) average patch size, 3) the degree of timber harvesting, 4) open and restricted road density, and 5) the availability of potential travel corridors.

Existing Environment

The project area currently contains approximately 607 acres (14.6% of project area) of mature forest stands that have a reasonably well-developed canopy (≥40% crown closure). Approximately 844 acres (20.3% of project area) consist of mature stands with a more open canopy (<40% crown closure) within the project area. Small scattered clearings, wetlands, rock scree, unforested alpine habitat and roads occupy another 36 acres of the project area. Mature forested stands are scattered within the proposed project area, with 9 patches present averaging 67 acres in size (range 2 to 247 acres, see FIGURE W-2 - MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY CORRIDORS). Approximately 130 acres of old-growth forest, as defined by Green et al. (1992), are present within the proposed project area. With approximately 862 acres (20.7%) of the project area above 6,000 feet in elevation, environmental conditions have influenced habitat types and in some cases created forest stands with lower average tree densities and reduced overstory crown closure than what would be found in lower elevation, undisturbed mature forest. Additionally, wildfires have largely influenced the abundance and configuration of mature forest within the proposed project area. Approximately 2,671 acres (64.2%) of the project area has dense pole-sized and small-diameter sawtimber trees that regenerated after a 1926 stand-replacement and mixed-severity wildfire. Some of these regenerating areas average 2,000 trees per acre. A fully stocked timber stand of similar age would typically have between 250 and 400 trees per acre. While crown closure of these stands is generally over 40%, they were not considered mature forested habitat in this analysis due to young age and abundance of small live tree diameters. However, because of their dense stocking and canopy levels, these 60 to 85-year-old stands likely provide some suitable travel habitat for a number of wildlife species that prefer interior forest conditions. With the additional consideration of these densely-stocked stands, patch size within the project area increases to a single 3,278-acre patch (78.8% of the project area). Harvesting activities within the last 40 years have resulted in approximately 176 acres (4.2% of project area) of young, regenerating forest within the project area.

Approximately 11.4 miles (1.8 miles/sq. mile) of roads exist in the project area (see TABLE W-4 – ROAD MANAGEMENT AND CONSTRUCTION). Within the project area, 8.0 miles of road are open to public motorized use and 3.4 miles are currently restricted to non-motorized use by the public. Of the 8.0 miles of open roads, approximately 5.3 miles of shared DNRC/USFS (Stillwater River Road and Mount Marston Road) passes through the project area. Of the 3.4 miles of restricted road within the project area, approximately 2.0 miles are ingrown or sufficiently brushed in as to prevent use by authorized motorized vehicles. Due to existing mature forest cover and road attributes, habitat connectivity for species using older (100+ years), undisturbed forest is fair within the project area (see FIGURE W-2 - MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY CORRIDORS).

Similar to the project area, abundance and locations of mature, well-stocked forest within the small CEAA has been influenced by climatic conditions that limit forest growth at higher elevations, large-scale wildfire, and past timber harvest. Presently, 16.6 percent (1,972 acres) of the small CEAA contains relatively well-connected mature forest stands possessing ≥40% crown closure. Average patch size of mature forest in the small CEAA is 110 acres (18 patches, range 2.6 to 1,118 acres). Landscape connectivity of mature forest stands within the CEAA is moderate, with one 1,118-acre patch accounting for over half of the mature forest inside the CEAA. Approximately 258 acres of old-growth forest, as defined by Green et al. (1992), are present within the CEAA. Approximately 6,355 acres (53.4% of the CEAA) are

comprised of well-stocked pole-sized and small-diameter sawtimber stands regenerating from a 1926 wildfire. These stands typically contain canopy cover greater than 60 percent. When including these stands, average patch size increases to 833 acres (range 2.6 to 8,137 acres, totaling 70.0% of the CEAA). Given these assessments, landscape connectivity of mature forest stands within the CEAA is moderate. About 449 acres of the CEAA (3.8%) has been harvested with regeneration-type treatments within the last 40 years. These lands consist of young, regenerating forest with few large scattered trees and do not provide suitable habitat for species that utilize well-stocked, mature forests. Small scattered clearings, wetlands, rock scree, unforested alpine habitat, and lakes comprise 276 acres (2.3%) of the CEAA.

Approximately 22.6 miles (1.2 miles/sq. mile) of DNRC roads exist within the CEAA. Of these roads, there are 14.0 miles of open roads that equate to a density of 0.8 miles/square mile. These roads are primarily forest roads used for logging and recreational activities within the surrounding area, including 8.6 miles of shared DNRC/USFS road (Stillwater River Road and Mount Marston Road). Across the CEAA, mature forest habitat and landscape connectivity are low to moderate for species that require and/or prefer these conditions.

Environmental Effects

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

Under this alternative no timber harvesting activities would occur. This would result in: 1) no changes to existing stands; 2) no appreciable changes to forest age, the distribution of forested cover, or landscape connectivity; and 3) no changes to wildlife use. Thus, no direct or indirect effects to mature forested habitat suitability and connectivity would be expected.

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

Under the Action Alternative, approximately 380 acres (9.2% of the project area) would be harvested. Of these acres, 51 acres (1.2% of the project area) of dense, mature forest would undergo harvesting (see TABLE W-3 – MATURE FORESTED HABITAT). Approximately 46 acres of mature forest would receive regeneration harvest treatments that would reduce overstory crown closure from ≥40% to 5-20% and increase mature tree spacing to 45-80 feet. Species that rely on these mature forested habitats would experience a reduction in habitat for 50-80 years. Approximately 5 acres (3.8%) of the 130 acres of old-growth forest in the project area would receive an old-growth maintenance harvest under the Action Alternative. This selective treatment would remove some trees, but would retain large trees, coarse woody debris, and snags such that the stand would remain old-growth forest under the Green et al. (1992) definition. No old-growth forest would be removed and old-growth wildlife habitat would be minimally affected. Under the proposed regeneration harvest prescriptions, residual trees would be healthy seral species (e.g. western larch, Douglas-fir). Existing patches of regenerating conifers would be retained where available and feasible, which would provide a measure of structural complexity to treated stands. Average mature forest patch size would be reduced from 67 acres (9 patches) to 56 acres (10 patches). The largest patch size found within the project area would be reduced from 247 acres to 192 acres. Approximately 556 acres (13.4%) of mature forest in the project area would remain unharvested and could provide suitable habitat for species utilizing smaller patches of well-stocked forest, particularly those associated with riparian areas. Proposed harvesting on 316 acres (7.6%) of dense, pole-sized and small-diameter sawtimber stands within the project area would further reduce habitat and connectivity for species preferring interior forest conditions. Unharvested mature forest patches would remain connected to 2,355 acres of dense, pole-sized and small-diameter sawtimber stands within the project area, increasing effective patch size for some species to a single

2,911-acre patch. The largest remaining unharvested patch would remain connected to a larger patch of mature forest outside of the project area. Remaining mature forest would continue to be distributed throughout the project area and connectivity would be retained along riparian areas where present (see FIGURE W-2 - MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY CORRIDORS). After harvesting, the project area would continue to provide a variety of forested habitat conditions for wildlife, but the proportions of these habitats would change. Species preferring larger continuous patches of well-stocked mature forest would likely experience a minor reduction in habitat quality, as 51 acres would be altered and the amount of edge habitat would increase under the proposed harvesting. After harvest completion, the amount of young, regenerating forest stands would increase. However, approximately 2,355 acres of well-stocked, regenerating forest would continue to develop and will likely provide appreciable amounts of mature forest cover within the next 30 to 50 years. In general, under this alternative, habitat conditions would improve for species adapted to more open forest conditions with seral species, while reducing habitat quality for species that prefer dense, mature forest habitats.

TABLE W-3 – MATURE FORESTED HABITAT. *Existing acres, proposed harvest acres, and percentages of mature forested habitat possessing ≥40% canopy closure within the project area and cumulative effects analysis area.*

Analysis Area	Total Acres	Mature Forested Habitat Present (% area)	Proposed Regeneration Harvest (% area)	Mature Forested Habitat Post-Harvest (% area)
Project Area	4,158	606.9 (14.6%)	46.0 (1.1%)	560.9 (13.5%)
Small CEAA	11,896	1,972.2 (16.6%)	46.0 (0.4%)	1,926.2 (16.2%)

Under the Action Alternative, up to 2.6 miles of new temporary road would be constructed. No new permanent roads would be built under the Action. During harvest activities, up to 11.7 miles of road (open, restricted and temporary) within the project area could receive commercial use and have elevated traffic levels (see TABLE W-4 – ROAD MANAGEMENT AND CONSTRUCTION). Open road density would increase from 1.2 miles/sq. mile to 1.8 miles/sq. mile during harvest activities. All 3.4 miles of currently restricted road within the project area would remain restricted to public motorized use during and after harvest activities. Temporary roads would be reclaimed and closed to all motorized vehicles following project use. Thus, at the conclusion of the proposed project, the total amount of roads within the project area would remain the same as pre-project levels (see TABLE W-4 – ROAD MANAGEMENT AND CONSTRUCTION).

Thus, minor direct and indirect effects to connectivity and suitability of mature forested habitat in the project area would be expected since: 1) harvesting would appreciably reduce tree density and existing cover on approximately 51 acres (8.4%) of existing available mature stands; 2) connectivity of mature forest would be altered, with an increase in the number of patches from 9 to 10 and a decrease in average patch size from 67 acres to 56 acres, however the largest existing patch would be reduced from 247 acres to 192 acres (a 22.3% change); 3) a measure of connectivity would be maintained on 561 acres (13.5% of project area) of mature forest interspersed with 2,355 acres of dense regenerating forest over 60 years old; 4) approximately 5 acres of old-growth forest would undergo old-growth maintenance harvesting, but would

remain old growth postharvest; and 5) short-term open road density would increase by 0.6 miles/sq. mile for up to three years, but long-term open and total road density would not change.

TABLE W-4 – ROAD MANAGEMENT AND CONSTRUCTION. *Miles and density (miles/square mile) of existing road and new road that would be used in the project area under the proposed Action Alternative.*

Road Types	Existing Condition Road Miles (mi./sq. mi.)	During Proposed Activities Road Miles (mi./sq. mi.)	After Proposed Activities Road Miles (mi./sq. mi.)
Open	8.0 (1.2)	9.1[a] (1.4)	8.0 (1.2)
Restricted Road	3.4 (0.5)	2.3 (0.4)	3.4 (0.5)
Temporary Road	0 (0)	2.6[a] (0.4)	0 (0)
Total Roads	11.4 (1.8)	14.0 (2.2)	11.4 (1.8)

[a] *Of the 11.7 miles of road that would be functionally open during activities, 8.0 miles would be open for public motorized access.*

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

Under this alternative no timber harvesting activities would occur. Thus: 1) no changes to existing stands would occur, 2) no further changes to the suitability of mature forested cover or connectivity would be anticipated, and 3) no changes to wildlife use would be expected. Past and ongoing forest management projects have affected mature forest wildlife habitat in the CEAA, and other proposed projects could affect mature forest habitat in the future (see TABLE W-2 – RECENT AND PROPOSED PROJECTS). No additional cumulative effects to connectivity and suitability of mature forested habitat are expected to result from the No-Action Alternative that could affect wildlife in the CEAA.

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

Proposed harvesting would alter 51 acres (0.4% of the CEAA) of mature forest stands within the CEAA (see TABLE W-3 – MATURE FORESTED HABITAT). Approximately 46 acres of mature forest would undergo regeneration harvest treatments that would remove this habitat for 80-100 years. Approximately 5 acres of harvest would occur as an old-growth maintenance treatment that would not reduce the amount of old growth or mature forest within the CEAA. Harvesting would result in a reduction of 0.4% of the total 1,972 acres of mature forest habitat currently available. Reductions in mature forested habitats associated with this alternative would be additive to losses associated with past harvesting activities, recent wildfire, and any ongoing activities within the CEAA (see TABLE W-2 - RECENT AND PROPOSED PROJECTS). Across the CEAA, 16.2% of mature, forested habitats would remain and landscape connectivity would be altered to a minor degree given habitat conditions within the surrounding forested landscape. Existing landscape connectivity would be altered, as the number of mature forest patches would increase from 18 to 19. Average patch size would decrease from 110 acres to 101 acres. The largest mature patch (247 acres) within the CEAA would be reduced by 55 acres, but would remain connected to mature forest within the project area. Harvesting would alter an additional 316 acres (2.7% of CEAA) of dense, pole-sized forest stands providing travel habitat for some mature forest species. Combined mature and dense pole-timber forest patches within the CEAA would average 612 acres in size (range 1-7,768 acres). Habitat for species associated with mature forest would continue to be scattered in the CEAA, however, approximately 6,039 (50.8% of the CEAA) would continue to develop and could provide well-connected mature forest habitat within the next 30 to 50 years. Species associated with old-growth forest would be

minimally affected, as five (5) acres of old growth would be treated but the stand would remain old growth. Wildlife species using and preferring young forest stands in the CEAA would benefit from increases in habitat within harvested units for 10-30 years post-harvest.

In addition to the 11.7 miles of potential road use within the project area, approximately 1.7 miles of open road could receive appreciable amounts of increased traffic within the CEAA. Thus, a total of 13.4 miles of combined open, restricted and temporary roads would see additional use within the CEAA during project activities. Proposed harvesting and associated activities could temporarily increase (up to 4 years) open road density within the CEAA from 0.8 miles/sq. mile to 0.9 miles/sq. mile. After project completion, open road density would return to 0.8 miles/sq. mile. Thus, minor adverse cumulative effects to mature forested habitat suitability and connectivity for wildlife would be expected in the CEAA since: 1) harvesting would remove 46 acres (2.6%) of existing mature forest in the CEAA and average patch size would be reduced from 110 acres to 101 acres; 2) current availability of mature, closed canopy habitat would be reduced but connectivity would be altered to a minor degree; 3) mature forest connectivity of the largest patch in the CEAA would be maintained, especially through riparian areas; 4) approximately 5 acres of old-growth forest would undergo old-growth maintenance harvesting, but would remain old growth postharvest; and 5) no new permanent roads would be built and long-term open road density would not change within the CEAA.

SNAGS AND COARSE WOODY DEBRIS

Issue: The proposed activities could reduce the abundance of snags and coarse woody debris, which could lower habitat quality for species that depend on these structural attributes.

Introduction

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

Snags and defective trees (e.g. partially dead, spike top, broken top) are used by a variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags and defective trees may be the most valuable individual component of Northern Rocky Mountain forests for wildlife species (Hejl and Woods 1991). The quantity, quality, and distribution of snags affect the presence and abundance of many wildlife species relying upon them. Snags provide foraging sites for insectivorous species and provide structures used by primary cavity-nesting species to excavate nests. The cavities created by primary excavators (i.e. woodpeckers) provide habitat for secondary cavity users, including other birds and small to mid-sized mammals. Snags and defective trees can also provide nesting sites for secondary cavity users where cavities are formed by broken tops and fallen limbs. Large, tall snags tend to provide nesting sites, while short snags and stumps tend to provide feeding sites (Bull et al. 1997). Many species that use small-diameter snags will also use large snags; however, the opposite is not true. Typically, old stands will have greater numbers of large snags. The density of snags is another important indicator of habitat quality for some cavity-nesting species. Species such as the black-backed woodpecker tend to nest and forage in areas where snag densities are high, using one snag for nesting and others nearby for foraging and roosting.

Coarse woody debris provides food sources, areas with stable temperatures and moisture, shelter from the environment, lookout areas, and food-storage sites for several wildlife species. Several mammals rely on downed logs and snags for survival and reproduction. The size,

length, decay, and distribution of woody debris affect the capacity of various species to meet their life requisites. Single, scattered downed trees can provide lookout and travel sites for squirrels or access under the snow for small mammals and weasels, while log piles may provide foraging sites for weasels and secure areas for snowshoe hares.

Analysis Areas

Direct and indirect effects were analyzed within the project area (4,158 acres). Cumulative effects were analyzed within the surrounding sections directly adjacent to the proposed project area (11,896 acres, see FIGURE W-1 – WILDLIFE ANALYSIS AREAS*)*. Wildlife species associated with snags and coarse woody debris found in the small CEAA would be those most likely to be influenced by cumulative effects associated with nearby activities and proposed habitat alteration on the project area.

Analysis Methods

The abundance of snags and coarse woody debris were quantitatively estimated in potential harvest stands within proposed project area using 19 randomly placed plots 0.15 acres in size. Factors considered in the analysis included the level of proposed harvesting, past timber harvest, number and species of snags, and abundance of coarse woody debris.

Existing Environment

Analysis of sampling plots and field observations indicated snags within the project area occurred at a density of 15.6 snags per acre (range 0-46”). The average diameter of all snags >8” dbh was 11.2” dbh (range 8-23”); and snag species varied depending upon the stand, with the most prevalent snag species being Engelmann spruce. A single snag ≥21” dbh was documented within project area sampling plots. Snags were generally distributed unevenly; with some areas containing higher densities than others did. The abundance and distribution of large, high quality snags within the project area can be partially attributed to wildfire and harvest history. Approximately 8.0 miles of open roads in the project area facilitate firewood gathering, however the majority of the project area is inaccessible for firewood cutting due closed roads and steep, heavily vegetated terrain. Evidence of snag use for feeding and/or cavity building by wildlife was observed in most snags that were present in the project area. Coarse woody debris levels were also variable across the project area, averaging 15.7 tons per acre (range 0.7-54.8 tons per acre). Downed logs were generally small diameter (5.2” at transect line, range 3-26”), although some larger logs were observed.

Overall, snags exist at current levels to exceed DNRC’s minimum-retention thresholds (*ARM 36.11.411)*, although size classes are smaller than preferred. Large diameter (>21” dbh) snags and snag recruits are generally at low levels within the project area and CEAA due to wildfire history and resulting forest structure. Coarse woody debris in the majority of the project area is present in appropriate amounts for the current existing habitat types (Graham et. al. 1994). Thus, habitat quality for wildlife utilizing snags and/or coarse woody debris is likely moderate within the project area.

Similar to unaltered forested landscapes, snags and coarse woody debris are not distributed evenly across the project area or CEAA (Harris 1999). Snags and coarse woody debris are frequently collected for firewood near open roads, which are relatively rare and mainly concentrated in the eastern portion of the CEAA. Abundance and distribution of snags and coarse woody debris within the CEAA is likely similar to patterns observed on sampling plots, except within recently harvested stands. Within the CEAA, past harvesting on 449 acres of DNRC lands (3.7% of CEAA), has altered snags, snag recruits, and coarse woody debris levels. On these acres of harvested land within the CEAA, snag and downed wood abundance is likely

lower than levels in unharvested areas. Open road density within the CEAA is low at 0.8 miles/sq. mile, which limits firewood gathering.

Environmental Effects

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

No direct changes in the abundance or distribution of snags and downed logs would be expected. Existing snags would continue to provide wildlife habitat, and new snags and coarse woody debris would be recruited as trees die. No direct or indirect effects to habitat quality for wildlife species requiring snags and coarse woody debris would be expected since: 1) no harvesting would occur that would alter present or future snag or coarse woody debris concentrations, and 2) no changes to human access for firewood gathering would occur.

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

Existing snags, live recruitment trees and coarse woody debris would be altered due to timber harvesting on 380 acres (9.2%) in the proposed project area. Coarse woody debris amounts would likely remain similar to existing levels in harvest units. Proposed harvesting would decrease snag abundance and the number of live trees that could be recruited into snags or coarse woody debris. Harvest prescriptions call for retention of a minimum of 2 snags, and 2 large snag recruits per acre greater than 21 inches dbh where they exist, otherwise the next largest size class would be retained. Additional large-diameter recruitment trees would be left if sufficient large snags are not present. Coarse woody debris would be left in amounts ranging from 15 to 25 tons/acre, depending upon habitat type of the proposed harvest areas (Graham et al. 1994). Although current snags present in the project area are generally small diameter (average 5.2" dbh), ample live trees suitable for future snag recruitment exist within proposed harvest units. Future snag quality in the harvested areas could be enhanced with proposed silvicultural prescriptions. Proposed treatments would be expected to promote increased tree growth, larger tree diameters, and the reestablishment of seral species like western larch and Douglas-fir, which provide high-quality structures important for nesting and foraging. The potential future risk for snag and coarse woody debris loss due to firewood gathering would remain relatively low, as only 8.0 miles of open road are present within the project area. Thus, minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect habitat quality of wildlife species requiring these habitat attributes since: 1) harvesting would reduce the density of existing snags and snag recruitment trees on 380 acres (9.2% of project area), 2) coarse woody debris amounts would be retained at similar or greater levels than those existing, 3) levels of snags and coarse woody debris in unharvested areas comprising 85.8% of the project area would remain unaltered, 4) at minimum two large snags and two future recruitment trees per acre would be retained in all proposed treatment areas, and 5) open road access used for firewood gathering would remain unchanged.

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

Snags and coarse woody debris would not be altered in the project area under this alternative. Past and ongoing forest management projects have affected snag and coarse woody debris in the CEAA (see TABLE W-2 - RECENT AND PROPOSED PROJECTS). No additional cumulative effects to habitat quality for wildlife species that utilize snags and downed woody debris are expected to result from the No-Action Alternative since: 1) no further harvesting would occur that could affect existing snag and coarse woody debris abundance, and 2) no changes to human access for firewood gathering would occur.

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

Wildlife species that rely on snags and coarse woody debris would experience a reduction in habitat quality within 380 acres (3.2% of the CEAA) of harvest units. Some snags would likely be removed from the project area, whereas coarse woody debris material would remain in similar amounts or increase. Snags and coarse woody debris within the CEAA have received different levels of consideration regarding their management and retention over time. Generally, past harvesting on 449 acres across all ownerships (3.8% of the CEAA) has likely reduced these attributes. The reduction of snags associated with this alternative would be additive to the losses associated with past harvesting and any ongoing harvesting within the CEAA (see TABLE W-2 - RECENT AND PROPOSED PROJECTS). However, the project requirements to retain at minimum 2 large snags and 2 large snag recruits per acre (greater than 21 inches dbh or next largest size class), and 15 to 25 tons of coarse woody debris per acre (depending upon habitat type) would lessen additional cumulative effects associated with this project. Approximately 10,791 forested acres (90.7%) within the CEAA have not been recently harvested and likely contain moderate levels of snags and coarse woody debris, although many areas have low levels of snags >21" dbh due to the 1926 wildfire. Under the Action Alternative, long-term open road amounts would not change; the risk of potential loss of snags and coarse woody debris resulting from firewood gathering would remain unaltered. Thus, minor adverse cumulative effects to habitat quality for wildlife requiring snags and coarse woody debris would be anticipated over the next 30-100 years since: 1) 380 acres (3.2%) of the CEAA would be harvested, resulting in reduced snags and snag-recruit trees while coarse woody debris levels would increase or not appreciably change; 2) approximately 90.7% of the CEAA that has not be recently harvested would continue to provide snags and downed wood habitat attributes; 3) existing habitat quality across the CEAA is moderate; 4) long-term motorized public access and associated firewood gathering would not appreciably change; and 5) there would be increased representation of shade-intolerant and seral tree species within harvest units that could become high-quality snags in the long term.

FINE-FILTER WILDLIFE ANALYSIS

In the fine-filter analysis, individual species of concern are evaluated. These species include those listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and animals managed as big game by Montana DFWP. TABLE W-5 – FINE FILTER summarizes how each species considered was included in detailed subsequent analysis or removed from further consideration, since suitable habitat either did not occur within the project area or proposed activities would not affect their required habitat components.

TABLE W-5 – FINE FILTER. *Species considered in the fine-filter analysis for the South Fitzpatrick Timber Sale.*

	SPECIES/HABITAT	DETERMINATION – BASIS
Threatened and Endangered Species	**Canada lynx** (*Felis lynx*) Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zones	***Detailed analysis provided below –*** Potential lynx habitat types occur within the project area.
	Grizzly bear (*Ursus arctos*) Habitat: Recovery areas, security from human activity	***Detailed analysis provided below*** – The proposed project area occurs in the Stryker grizzly bear management subunit of the Northern Continental Divide Ecosystem (NCDE) Recovery Area (USFWS 1993).

Sensitive Species	**Bald eagle** (*Haliaeetus leucocephalus*) Habitat: Late-successional forest less than 1 mile from open water	No known nest territories are present in the vicinity of the project area and no large water bodies exist within one mile of the project area that might provide suitable locations for nesting. Thus, no direct, indirect, or cumulative effects to bald eagles would be expected to occur as a result of either alternative.
	Black-backed woodpecker (*Picoides arcticus*) Habitat: Mature to old burned or beetle-infested forest	No burned areas less than 5 years old are in the project area. Thus, negligible direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
	Coeur d'Alene salamander (*Plethodon idahoensis*) Habitat: Waterfall spray zones, talus near cascading streams	No low-elevation moist talus or streamside talus habitat occurs in the project area. Thus, negligible direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
	Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*) Habitat: Grassland, shrubland, riparian, agriculture	No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
	Common loon (*Gavia immer*) Habitat: Cold mountain lakes, nest in emergent vegetation	No suitable lakes occur within 500 feet of the project area. Thus, no direct, indirect or cumulative effects to common loons would be expected to occur as a result of either alternative.
	Fisher (*Martes pennanti*) Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	***Detailed analysis provided below*** – Potential fisher habitat occurs within the project area.
	Flammulated owl (*Otus flammeolus*) Habitat: Late-successional ponderosa pine and Douglas-fir forest	No potentially suitable dry ponderosa pine or Douglas-fir stands exist in the project area. Thus, no direct, indirect or cumulative effects to flammulated owls would be expected to occur as a result of either alternative.
	Gray Wolf (*Canis lupus*) Habitat Features: Ample big game populations, security from human activities	***Detailed analysis provided below*** – Wolves have been documented in the vicinity of the proposed project area in the past, and future use of the area by wolves is possible (Kent Laudon, MFWP, pers. comm. January 18, 2013).

	Harlequin duck (*Histrionicus histrionicus*) Habitat: White-water streams, boulder and cobble substrates	The upper Stillwater River and Fitzsimmons Creek flow through the project area and contains some potentially suitable whitewater habitat, however these streams do not have any records of harlequin duck sightings within 3 miles of the project area (MNHP 2014, DNRC unpublished data). Appreciable amounts of use by harlequin ducks within the project area is not expected. The proposed activities would not likely occur until July 1 or later, after most nesting activity has occurred. Additionally, no harvesting would occur within 100 feet of these streams. Thus, negligible direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
	Northern bog lemming (*Synaptomys borealis*) Habitat: Sphagnum meadows, bogs, fens with thick moss mats	No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
	Peregrine falcon (*Falco peregrinus*) Habitat: Cliff features near open foraging areas and/or wetlands	Suitable cliffs/rock outcrops for nest sites are present within the project area, however peregrine aeries have not been documented in the vicinity of the project area (MNHP 2014). The proposed activities would not likely occur until July 1 or later, after most nesting activity has occurred. Should a peregrine falcon aerie be found in the project area, appropriate mitigations would be enacted to minimize disturbance during the nesting season. Thus, negligible direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
	Pileated woodpecker(*Dryocopus pileatus*) Habitat: Late-successional ponderosa pine and larch-fir forest	Approximately 83 acres of potentially suitable stands exist within the proposed project area, and use of the area by pileated woodpeckers is possible. However, proposed harvesting would alter approximately 2.6 acres of this habitat for a short time period. Overall habitat suitability of the project area for pileated woodpeckers is low due to the lack of preferred covertypes, high elevation, and the lack of large blocks of mature forest >100 years old. Harvesting under the Action Alternative would not be expected to appreciably affect habitat suitability or use of the area by pileated woodpeckers. Thus, negligible direct, indirect or cumulative effects to pileated woodpeckers are anticipated as a result of either alternative.
	Townsend's big-eared bat (*Plecotus townsendii*) Habitat: Caves, caverns, old mines	No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats are anticipated as a result of either alternative.

	Wolverine (*Gulo gulo*) Habitat: Alpine tundra and high-elevation boreal and mountain coniferous forests, areas that maintain deep persistent snow into late spring	Small amounts of potentially suitable wolverine habitat exist within the proposed project area. Wolverines have been recorded in the vicinity of the project area in the past (MNHP 2014) and occasional use of the area by wolverines is possible. While a wolverine could pass through the project area during its extensive movements, appreciable use of the project area is not expected. Given the large home range area wolverines occupy (average 150+ sq. miles) and long distances wolverines typically cover during their movements, the proposed activities would not be expected to measurably affect use of the area by wolverines. Thus, negligible direct, indirect or cumulative effects to wolverines would be expected to occur under the proposed action.
Big Game Species	**Elk** (*Cervus canadensis*) **Moose** (*Alces americanus*) **Mule Deer** (*Odocoileus hemionus*) **White-tailed Deer** (*Odocoileus virginianus*)	The project area does not contain deer or elk winter range habitat identified by DFWP (DFWP, 2008). Hiding cover is abundant within the project area (see Grizzly Bear section below). The quality of hiding cover would be reduced on 380 acres proposed for harvest; however, patches of advanced regenerating conifers would be retained where feasible and suitable hiding cover would be expected to develop over time. Long-term open road density would not change and no new permanent roads would be built. Visual screening along open roads would be maintained where present and practicable. Proposed harvesting would likely improve short-term foraging habitat conditions for big game during the summer and fall seasons. Thus, negligible direct, indirect or cumulative effects to big game would be expected to occur as a result of either alternative.

THREATENED AND ENDANGERED SPECIES

CANADA LYNX

Issue: The proposed activities could result in the modification of habitat preferred by Canada lynx and decrease the area's suitability for lynx.

Introduction

Canada lynx are listed as "threatened" under the Endangered Species Act. Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). Lynx abundance and habitat use are strongly associated with snowshoe hare populations; thus activities which decrease habitat quality for snowshoe hares can reduce the availability of prey for lynx. Lynx habitat in western Montana consists primarily of stands that provide habitat for snowshoe hares including young and mature coniferous stands with high levels of horizontal cover (Squires et al. 2010). Forest type, tree densities, natural disturbance history, and time since harvesting play important roles in shaping the suitability of young foraging habitat for lynx. Mature subalpine fir stands with abundant horizontal cover and coarse woody debris provide structure important for foraging, denning,

travel, and security. These conditions are found in a variety of habitat types (Pfister et al. 1977), particularly within the subalpine fir series. Historically, northwest Montana contained a variety of stand types with differing fire regimes. This variety of stand types combined with patchy elevation and snow-depth gradients preferred by lynx, likely formed a non-continuous mosaic of lynx and non-lynx habitats (Fischer and Bradley 1987, Ruggiero et. al. 1999, Squires et al. 2010). Forest management considerations for lynx include providing a mosaic of young and mature lynx habitats that are well connected across the landscape.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the 4,158-acre project area. The cumulative effects analysis area consists of the Stillwater West Lynx Management Area (39,208 acres, see FIGURE W-1 – WILDLIFE ANALYSIS AREAS), which approximates the home range size of a Canada lynx. Lynx Management Areas (LMAs) are designated portions of DNRC land “where resident lynx populations are known to occur or where there is a high probability of periodic lynx occupancy over time,” (USFWS and DNRC 2010, Vol. II, p. 2-46). Thus, this defined area provides a reasonable analysis area for Canada lynx that could be influenced by project-related activities.

Analysis Methods

Analysis methods include field evaluations, aerial photograph interpretation, and GIS analysis of SLI data and suitable lynx habitats. Suitable lynx habitat was subdivided into the following lynx habitat types: 1) winter foraging, 2) summer foraging, 3) "other" suitable, and 4) temporary non-habitat. These classifications are based on DNRC HCP lynx habitat mapping protocols (DNRC 2010) that consider a variety of vegetation characteristics important to lynx and snowshoe hares (i.e., forest habitat type, canopy cover, stand age class, stems/acre, and coarse woody debris). "Other" suitable lynx habitat is defined as habitat that has the potential to provide habitat connectivity and lower quality foraging habitat. The temporary non-habitat category consists of non-forest and open forested stands that are not expected to be used appreciably by lynx until adequate horizontal and vertical cover develops. Factors considered in the analysis include: 1) the abundance of lynx habitat types, 2) landscape connectivity of potential and suitable lynx habitat, and 3) the level of harvesting.

Existing Environment

Approximately 4,048 acres (97.4%) of potential lynx habitat occurs in the 4,158 acre project area. Of this potential habitat, approximately 3,822 acres (94.4%) currently provide suitable habitat (TABLE W-6 – LYNX HABITAT). Suitable lynx habitat within the project area is defined as the sum of the summer foraging, winter foraging, and “other" suitable lynx habitat categories. In the project area, winter foraging habitat is the most abundant type of suitable habitat (TABLE W-6 – LYNX HABITAT). Amounts of coarse woody debris were quantitatively assessed within the project area and found to be appropriate for the habitat types present (see SNAGS AND COARSE WOODY DEBRIS section of this analysis for further detail). Additionally, ridges and riparian areas are present within the proposed project area that provide a number of potential travel corridors for lynx, should lynx be present in the area. Past harvesting of 176 acres (4.2% of the project area) within the proposed project area has altered lynx habitat, however the majority of these acres have regenerated sufficiently to provide suitable habitat for lynx. Throughout the project area, habitat and connectivity conditions are favorable for use by lynx.

DNRC manages 100% of the CEAA. Habitat types preferred by lynx are abundant within the CEAA (TABLE W-6 – LYNX HABITAT). The distribution of the various lynx habitat elements within the CEAA is the result, primarily, of environmental factors affecting vegetation growth at higher elevations, past timber harvesting, and wildfire. The lack of recent fire disturbance in the

CEAA (influenced by modern-day fire suppression) has likely led to a smaller proportion of young foraging habitat and a greater proportion of mature foraging habitat or forested travel/other habitats on DNRC lands than was typically present pre-European settlement (Losensky 1997). Suitable habitat is well connected within the CEAA, particularly along ridges and in riparian areas. Timber harvesting on 8,534 acres (21.7%) within the CEAA in the last 40 years has altered lynx habitat, however those harvest units older than 20 years are now providing suitable summer foraging or other suitable habitat. Overall, habitat suitability and connectivity for lynx within the CEAA is moderate to high.

TABLE W-6 – LYNX HABITAT. *Estimates of existing lynx habitat and habitat that would persist post-harvest on DNRC lands in the project area and cumulative effects analysis area. Percent refers to the percent of the lynx habitat category of the total potential habitat present on DNRC-managed lands.*

LYNX HABITAT CATEGORY	**Acres of lynx habitat (percent of DNRC lynx habitat)**			
	Project Area		**Cumulative Effects Analysis Area**	
	Existing	Post-Harvest	Existing	Post-Harvest
OTHER SUITABLE	202.5 (5%)	214.6 (5.3%)	4,496.0 (12.6%)	4,508.0 (12.6%)
SUMMER FORAGE	890.6 (22%)	890.5 (22%)	6,413.4 (18%)	6,413.3 (18%)
TEMP NONSUITABLE	226.2 (5.6%)	587.0 (14.5%)	5,018.3 (14.1%)	5,379.2 (15.1%)
WINTER FORAGE	2,728.8 (67.4%)	2,356.0 (58.2%)	19,782.4 (55.4%)	19,409.6 (54.4%)
Grand Total: Suitable Lynx Habitat	3,822.0 (94.4%)	3,461.1 (85.5%)	30,691.8 (85.9%)	30,331.0 (84.9%)

[a] *Total potential lynx habitat is a habitat category that describes all areas that are providing suitable lynx habitat now, or those likely to provide suitable habitat at some time in the future. Total potential lynx habitat is the sum of the other suitable, summer forage, temporary non-suitable, and winter forage habitat categories.*

Environmental Effects

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

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

Direct and Indirect Effects of the Action Alternative on Canada Lynx

Approximately 379 acres (9.1% of project area) of suitable lynx habitat would be subject to harvesting with this alternative. Proposed harvest prescriptions on 361 acres of suitable lynx habitat would decrease mature tree abundance to 6-20 trees per acre and reduce overstory crown closure to <20%. These acres of suitable lynx habitats would be converted to temporary non-suitable habitat (TABLE W-6 – LYNX HABITAT) for the next 15-20 years. Harvest prescriptions on an additional 17 acres would alter lynx habitat but would retain enough total crown closure (≥40%) to remain suitable for use by lynx after harvesting (TABLE W-6 – LYNX

HABITAT). Where operationally feasible, existing patches of shade-tolerant sub-merchantable conifers would be retained in all harvest units. The total area of these patches would not be expected to comprise more than 10% of the acres proposed for harvest. Growth of retained mature trees and patches of sapling to pole-sized conifers, combined with post-harvest conifer regeneration following harvest, would lessen the time logged stands would be temporarily unsuitable for lynx. Activities associated with active logging operations could temporarily displace any lynx using the area for 1-3 years. Following proposed logging, 3,461 acres (85.5% of project area) of suitable lynx habitat would remain within the project area. Suitable lynx habitat would be largely retained along streams and ridges in the project area, although some of these potential travel corridors could be affected by cable logging operations, and could be less effective for lynx movement. While vegetation retention along important travel features could facilitate lynx movement in the project area, appreciable use by lynx within seedtree or shelterwood harvest unit boundaries would not be expected for 15 to 20 years. In the proposed harvest units, 15 to 25 tons/acre of coarse woody debris would be retained that would provide horizontal cover and security structure for lynx and lynx prey once harvest units regenerated into suitable habitat in 15-20 years. Overall, minor adverse direct and indirect effects to habitat suitability for Canada lynx would be expected since: 1) the amount of existing suitable lynx habitat in the project area would be reduced by 8.9% (TABLE W-6– LYNX HABITAT), 2) suitable lynx habitat would likely develop on 176 acres of past harvest units during the next 10 to 15 years within the project area, 3) moderate levels of landscape connectivity would persist along important travel features despite a minor overall reduction in landscape connectivity, and 4) coarse woody debris and small shade-tolerant conifers would be retained to promote forest structural complexity in harvest units, expediting their growth back into suitable lynx habitat.

Cumulative Effects of the No-Action Alternative on Canada Lynx

No appreciable change in lynx habitats would occur under this No-Action Alternative, and no further changes in landscape connectivity would be anticipated. Past forest management projects not associated with the proposed South Fitzpatrick Timber Sale have affected lynx habitat in the CEAA, and ongoing and proposed projects could alter lynx habitat in the future (see TABLE W-2 – RECENT AND PROPOSED PROJECTS). Activities on non-DNRC lands could continue altering lynx habitat and create disturbance within the CEAA. Thus, no additional cumulative effects to suitable lynx habitat are expected to result from the No-Action Alternative that could affect lynx habitat suitability in the CEAA.

Cumulative Effects of the Action Alternative on Canada Lynx

Under the Action Alternative, approximately 380 acres (1.0%) of the 39,208-acre CEAA would be altered by harvesting. Of these acres, harvesting would affect 379 acres of currently suitable lynx habitat. Following proposed harvesting, DNRC lands within the CEAA would contain 30,331 acres (84.9%) of suitable lynx habitat (TABLE W-6 – LYNX HABITAT). The proposed harvesting would alter approximately 1.2% of the 30,692 acres of potentially suitable habitat present within the CEAA. Expected reductions in suitable lynx habitat and increases in temporary nonsuitable habitat in the proposed harvest units would not be expected to appreciably alter lynx use of the CEAA, particularly given that habitat suitability and connectivity is relatively high in the surrounding landscape. Following harvest treatments, connectivity of suitable lynx habitat would also be maintained along riparian areas and features frequently used by lynx during daily movements (i.e. drainages, ridges etc.) throughout the majority of the CEAA. Suitable lynx habitat within the CEAA has been altered by past timber sales (see TABLE W-2 – RECENT AND PROPOSED PROJECTS) and large-scale wildfire. Increased levels of motorized activities associated with the Action Alternative would be additive to current and proposed timber sales, which could temporarily displace lynx should they be present near the proposed project area and associated roads. Thus, minor adverse cumulative effects to

lynx and the suitability of lynx habitat would be expected as a result of proposed activities since: 1) overall baseline habitat suitability would remain moderate to high with 84.9% of the CEAA in suitable habitat; 2) existing suitable lynx habitat within the CEAA would be reduced by 1.0% and those areas would remain unsuitable for at least 15 years, 3) stands converted to temporary non-suitable habitat in old harvest units would continue maturing and developing into suitable habitat within the CEAA in the absence of natural disturbance, 4) habitat connectivity within the CEAA would be affected by proposed activities to a minor degree, and 5) lynx could be temporarily displaced by logging activities in the portion of CEAA overlapping the project area.

GRIZZLY BEAR

Issue: The proposed activities could alter grizzly bear cover, reduce secure areas, and increase human access, which could adversely affect bears by displacing them from important habitats and/or increase risk of human-caused bear mortality.

Introduction

Grizzly bears are generalist omnivores that use a diversity of habitats found in western Montana, and they are currently listed as "threatened" under the Endangered Species Act. Preferred grizzly bear habitats are meadows, riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. Primary threats to grizzly bears are related to human-bear conflicts, habituation to unnatural foods near high-risk areas, and long-term habitat loss associated with human development (Mace and Waller 1997). Forest-management activities may affect grizzly bears by altering cover, and/or by creating roads, which can increase access for humans in otherwise secure areas (Mace et. al. 1997). These actions could lead to the displacement of grizzly bears from preferred areas, and/or result in an increased risk of human-caused mortality. By developing roads and reducing forest cover, forest management activities can bring humans and bears into closer contact, and make bears more detectable, which can increase their risk of being shot illegally. Displacing bears from preferred areas may increase their energetic costs, potentially lowering their ability to survive, and/or reproduce successfully.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the 4,158-acre project area. Cumulative effects were analyzed in a 40,860-acre area (see FIGURE W-1 – WILDLIFE ANALYSIS AREAS) that encompasses the project area and approximates the home range size of a female grizzly bear in northwest Montana (Mace and Roberts 2011). This CEAA contains the Stryker Grizzly Bear BMU Subunit.

Analysis Methods

Field evaluations, aerial photograph interpretation, scientific literature and GIS queries were the basis for this analysis. Grizzly bear hiding cover was considered to be forest vegetation that will hide 90% of a grizzly bear at a distance of 200 feet. Within the CEAA, open road densities were calculated using the simple linear calculation method (road length in miles divided by area in square miles). Factors considered within this CEAA include availability of timbered stands for hiding cover, level of human disturbance, secure areas, and miles of open, restricted, and temporary roads.

Existing Environment

All 4,158 acres of the proposed project area occurs in the NCDE Recovery Area (USFWS 1993). Grizzly bears have been observed in the vicinity of the project area in the past and

continued use by bears is anticipated. The proposed project area contains approximately 1,491 acres of Class A lands that are managed as secure "quiet areas" requiring special management under the DNRC HCP (USFWS and DNRC 2010). Approximately 3,607 acres (86.7% of project area) of grizzly bear hiding cover is present within the proposed project area. The abundance of vegetative cover contributes to security for bears, and facilitates their ability to move freely within the project area. Most stands harvested approximately 20 years ago (179 acres, 4.2% of project area) within the project area contain sufficient regenerating conifers and brush that provide suitable hiding cover for grizzly bears. Preferred avalanche chutes, berry patches, and riparian/wetland areas are present within the project area. Managing human access is a major factor in management of grizzly bear habitat. Presently, open road density in the proposed project area is 1.2 miles/sq. mile and total road density is 1.8 miles/sq. mile. Most of these open road miles consist of the Stillwater River Road and Mount Marston Road, which are shared USFS/DNRC roads. In addition to being blocked by gates or berms, many of the restricted roads within the project area are overgrown with brush and conifers, rendering them impassible to any motorized vehicle use. Due to abundant vegetative cover, relatively low amounts of open roads, and presence of preferred grizzly bear habitat, most of the project area likely provides security for grizzly bears.

The entire 40,860-acre CEAA is within the NCDE Recovery Area (USFWS 1993). The CEAA is a relatively intact, mostly undeveloped forested area with a variety of preferred grizzly bear habitats (avalanche chutes, berry fields, riparian areas). Grizzly bear use of the area is well-documented and use of the CEAA by bears is likely. Approximately 10,928 acres of Class A lands occur within the CEAA, which provide some secure areas for bears. Forest stands that provide hiding cover persist on over 58.0% of the CEAA (approximately 23,691 acres). Forested habitat across the CEAA is a combination of age classes, ranging from recently harvested and burned stands to old-growth stands. Approximately 13.8% of the CEAA (5,650 acres) has been harvested within the last 40 years and consists of younger stands with regenerating trees. Recent timber sale projects within the CEAA (see TABLE W-2 - RECENT AND PROPOSED PROJECTS) have been sources of disturbance and altered grizzly bear habitat. Reductions in vegetative cover and increased disturbances, such as those associated with timber harvest, can lower effective use of habitat by bears and render bears more vulnerable to human-caused mortality (Servheen et. al. 1999). Human disturbance levels are closely tied to road abundance and access. Open road density within the CEAA is approximately 0.9 miles/sq. mile and total road density is approximately 1.9 miles/sq. mile (simple linear calculations). Roads present in the CEAA are primarily used to access Forest Service and DNRC lands for wildfire and forest management, as well as public recreation. The greatest risk factors for bears within the CEAA are likely associated with homes, pets, and livestock in the vicinity of US Highway 93 along the westernmost portion of the CEAA. Areas where high levels of human recreational use occur (e.g. campgrounds) are also higher-risk localities for grizzly bears. Unnatural attractants potentially associated with these areas could increase the probability of human-bear conflicts, which can result in bear mortalities.

Environmental Effects

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

None of the proposed forest management activities would occur. No changes to grizzly bear habitat would be expected. Visual screening, existing secure areas, risk of displacement, and open and restricted road density would remain the same. Thus, since: 1) no timber harvesting would alter existing visual screening cover, 2) risk of displacement from important habitat would not increase, 3) no existing secure areas would be affected, and 4) no changes to open or restricted road density would occur, no direct or indirect effects associated with grizzly bear

displacement or human-caused bear mortality risk would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Grizzly Bears

Under the Action Alternative, grizzly bear hiding cover would be altered by commercial harvest on approximately 380 acres (9.2%) of the project area. Grizzly bear hiding cover would be removed on approximately 363 acres receiving seed-tree and shelterwood harvest treatments and hiding cover would be altered by commercial thin and old-growth maintenance treatments on another 17 acres. Harvesting associated with the Action Alternative would increase sight distances within all proposed harvest units. While vegetation density would be reduced, hiding cover would be expected to persist within the 17 acres undergoing intermediate treatments. Current levels of patchy cover in the form of sub-merchantable trees would be retained where present and feasible in all harvest units, although many of these stands lack appreciable understory vegetation suitable for hiding cover. Existing stands of adjacent dense regenerating conifers, unharvested forest patches, and topographic breaks would exist in such a manner that no point in any harvest unit would be greater than 600 feet to screening cover. Existing riparian cover along 27.9 miles of Class 1 and 2 streams would be largely protected and offer movement corridors as well as hiding cover for bears in this preferred habitat. Hiding cover adjacent to open roads within the project area would be maintained in tractor-harvesting units, whereas hiding cover along 0.9 miles of open road adjacent to cable-harvested units would be removed. However, most of these 0.9 miles of open road are adjacent to a steep slope break that would limit visibility into harvest units from vehicles on the road. Levels of hiding cover would be expected to recover within 15 to 20 years following proposed treatments as shrub and tree regeneration proceeds. Should grizzly bears be present in the area at the time of harvest operations, they could be affected by increased road traffic, noise, and human activity, and by reduced amounts of hiding cover. Proposed activities in grizzly bear habitats would reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditures to endure the disturbance, or causing bears to move away from the area. These potential disturbances would only occur during harvesting operations (1 to 3 years). Continued use of the project area by grizzly bears would be anticipated. No harvest activities would occur within Class A lands. Seasonal restrictions on motorized activity and commercial harvest restrictions would apply to the project area, which would minimize disturbance to bears during the spring period. Additionally, contract requirements would assist in mitigating bear-human conflict risk by specifying that contractors are not permitted to carry firearms on the work site and that unnatural attractants must stored or disposed of in a bear-resistant manner.

Motorized activities associated with the Action Alternative, such as the use of restricted roads and the construction of new temporary roads, could affect grizzly bears by temporarily (1 to 3 years) displacing them from previously secure areas. See TABLE W-4 – ROAD MANAGEMENT AND CONSTRUCTION for road summaries within the project area. No new permanent roads would be built. Up to 2.6 miles of temporary road would be built, and 1.0 miles of existing restricted road could be used under the Action Alternative. The use of 3.6 miles of existing restricted and temporary roads would contribute to open road density in the short term (1-3 years); increasing potential for disturbance to grizzly bears during the non-denning season. All restricted roads that would be used temporarily for 1 to 3 years to complete proposed project activities would remain restricted from public motorized access during and after harvesting activities. All temporary roads would be reclaimed and closed to all motorized vehicles. Including temporary roads, functionally open road amounts could increase temporarily from 8.0 miles (density 1.2 mi./sq. mi.) up to 11.7 miles (density 1.8 mi./sq. mi.) during project operations. At the conclusion of the proposed project, the total amount of roads within the project area would remain the same as pre-project levels (see TABLE W-4 – ROAD MANAGEMENT AND

CONSTRUCTION). Given that no new permanent restricted roads would be constructed in this project, existing secure areas would revert back to their pre-project status following project completion.

Thus, minor adverse direct or indirect effects to grizzly bears associated with displacement and mortality risk would be expected since: 1) moderate levels of temporary (1-3 years) disturbance and displacement would be anticipated; 2) hiding cover would be removed on 363 acres (8.7%) and reduced on 17 acres (0.4%) of the project area, but would be expected to recover in 15-20 years; 3) hiding cover would remain on approximately 3,244 acres (78.0%) of the project area; 4) reductions in hiding cover would be mitigated through vegetation retention patches within and between harvest units, vegetation retention along riparian corridors, and reduced sight distances associated with varied topography; 5) Class A lands would be unaffected; 6) commercial harvest and public motorized activities would be restricted during the spring period; and 7) a short-term increase in functional open road density of 0.6 miles/sq. mi. would be anticipated but long-term open road density would not change.

Cumulative Effects of the No-Action Alternative on Grizzly Bears

Under the No-Action Alternative, no proposed project activities would occur. No additional cumulative changes to the level of disturbance to grizzly bears or secure areas would be anticipated. No additional cumulative changes in open-road densities or hiding cover from the existing conditions would be anticipated. Past and ongoing forest management projects not associated with the proposed South Fitzpatrick Timber Sale have affected grizzly bear habitat in the project area, and other ongoing projects (see TABLE W-2 – RECENT AND PROPOSED PROJECTS) could continue to alter grizzly bear habitat and/or disturb bears in the future. Thus, since no additional changes in available habitats or level of human disturbance would be anticipated as a result of the No-Action Alternative, no cumulative effects to grizzly bear displacement or effects involving mortality risk would be anticipated.

Cumulative Effects of the Action Alternative on Grizzly Bears

Approximately 380 acres (0.9% of the CEAA) of grizzly bear hiding cover would be altered within the CEAA. Of these acres, 363 acres (0.9% of the CEAA) would receive harvest treatments that would remove hiding cover. Reductions in hiding cover on 380 acres and anticipated elevated disturbance levels would be additive to past timber harvesting that has affected approximately 5,650 acres (13.8%), as well as current harvest projects (see TABLE W-2 – RECENT AND PROPOSED PROJECTS). Harvesting and road building within the last 40 years in the CEAA has altered grizzly bear cover and habitat connectivity, however 57.1% (23,328 acres) of the area would remain suitable hiding cover for grizzly bears. Additionally, approximately 3,120 acres (7.6% of the CEAA) harvested over 10 years ago will likely provide additional hiding cover within the next 5-10 years. Vegetation adjacent to preferred riparian areas would remain largely unaltered by harvesting. Continued use of the CEAA by grizzly bears would be anticipated during and after proposed activities. Early successional stages of vegetation occurring in harvest units could provide foraging opportunities that do not exist in some older regenerated stands across the CEAA.

Collectively, short-term (1 to 3 years) increases in human disturbance would be anticipated in the CEAA, but contract requirements would lessen risk of human-bear conflicts during active harvest operations (e.g. proper storage/disposal of unnatural attractants, prohibit possession of firearms, etc.). The increased use of road systems during the proposed project would temporarily increase human disturbance and displacement risk for grizzly bears within a portion of the CEAA. A short-term increase in open road density would occur, increasing from 0.9 mi/sq. mi. to 1.0 miles/sq. mile in the CEAA. Timing restrictions on commercial timber activities would minimize risk of disturbing grizzly bears during the spring period. Density of all

permanent roads within the CEAA would not change. Disturbance associated with temporarily accessed roads would be additive to that occurring on roads used for other ongoing forest management projects (see TABLE W-2 – RECENT AND PROPOSED PROJECTS). Within the CEAA, high-risk factors for bears associated with human developments would continue to be present at low levels. Thus, minor adverse cumulative effects to grizzly bears associated with displacement or effects involving mortality risk would be expected in the short term (1 to 4 years) and long term (15 to 20 years) since: 1) short-duration (1 to 4 years) increases in human disturbance levels would be expected within the CEAA, 2) hiding cover would be removed for approximately 15 to 20 years on a relatively small portion (0.9%) of the CEAA, 3) approximately 57.1% of the CEAA would continue to provide hiding cover, 4) grizzly bear habitat alteration and disturbance due to harvest activities would be additive to several concurrent projects within the CEAA, and 5) short-term increases in functional open road density of 0.1 miles/sq. mi. would be anticipated and long-term open road density would not change.

SENSITIVE SPECIES

When conducting forest-management activities, the *SFLMP* directs DNRC to give special consideration to sensitive species. These species may be sensitive to human activities, have special habitat requirements, are associated with habitats that may be altered by timber management, and/or, could become listed under the *Federal Endangered Species Act* if management activities result in continued adverse impacts. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful 'fine filter' for ensuring that the primary goal of maintaining healthy and diverse forests is met. A search of the *Montana Natural Heritage Database* was used to locate historical records of sensitive species (as shown in TABLE W-5 – FINE FILTER) in the vicinity of the project area.

FISHER

Issue: The proposed activities could decrease habitat suitability for fishers by decreasing canopy cover and snag/coarse woody abundance, and by increasing risk of trapping mortality through greater road access.

Introduction

Fishers are generalist predators that prey upon a variety of small mammals and birds, as well as snowshoe hares and porcupines. They also eat carrion and seasonally available fruits and berries (Foresman 2012). Fishers use a variety of forest successional stages, but are disproportionately found in low to mid elevation mature stands with dense canopies (Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994). They generally avoid openings or young forested stands (Buskirk and Powell 1994). However, some use of openings does occur for hunting forays or if sufficient overhead cover (shrubs, saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites, and tend to use areas containing large snags, trees, and logs (Raley et. al. 2012). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest management considerations for fisher involve maintaining large snags, retaining abundant coarse woody debris, providing habitat suitable for resting and denning, and maintaining travel corridors.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the 4,158-acre project area. The proposed project area ranges from 4,120 and 7,240 feet in elevation. Cumulative effects for fisher habitat were analyzed on the Large CEAA (40,860 acres, see TABLE W-1 –

WILDLIFE ANALYSIS AREAS and FIGURE W-1 – WILDLIFE ANALYSIS AREAS). The large CEAA is defined according to geographic features (i.e. ridgelines, major rivers), which are likely to influence movements of fisher in the vicinity of the project area. Thus, this defined area provides a reasonable analysis area for fisher that could be influenced by project-related activities.

Analysis Methods

Analysis methods include field evaluations, aerial photograph interpretation, and GIS analysis of travel corridors, preferred fisher cover types (*ARM 36.11.403(60)*), and habitat structure. To assess potential fisher habitat and travel cover on DNRC managed lands, sawtimber size class stands (≥9 inches dbh average) within preferred fisher cover types below 6,000 feet in elevation with 40 percent or greater overstory canopy closure were considered potential habitat suitable for use by fishers (*ARM 36.11.403(60)*). On non-DNRC lands, mature forest below 6,000 feet in elevation with ≥40% crown closure was considered to be potentially suitable habitat for fishers. Fisher habitat was further divided into upland and riparian-associated areas depending upon the proximity to Class 1 and Class 2 streams (*ARM 36.11.403(15)* and *(16)*). DNRC manages preferred fisher cover types within 100 feet of Class 1 and 50 feet of Class 2 streams, so that at least 75 percent of the acreage (Trust Lands only) remains in the sawtimber size class in moderate to well-stocked density (*ARM 36.11.440(1)(b)(i)*). Effects were analyzed using field evaluations, GIS analysis of SLI stand data to estimate potential habitat, and aerial photograph interpretation to evaluate habitat conditions on non-DNRC lands. Potential suitable fisher habitat on non-DNRC lands was considered to be mature forest with ≥40% crown closure generally below 6,000 feet in elevation. Snags and coarse woody debris were assessed using plot data (described in the snag and coarse woody debris analysis subsection above), site visits, and by reviewing past DNRC harvesting information. Factors considered in this analysis include the level of harvesting, number of snags, relative amounts of coarse woody debris, and risk level of firewood harvesting and trapping mortality.

Existing Environment

The proposed project area contains 1,771 acres (42.6% of project area) of suitable fisher habitat (TABLE W-7 – FISHER HABITAT). Riparian fisher habitat within the project area is comprised of approximately 344 acres of preferred fisher cover types, of which 330 acres (96.0% of preferred cover types) of riparian habitat are currently suitable for use by fishers. Snags and coarse woody debris (CWD) were quantified at sampling plots within proposed harvest units and were generally found to be within levels recommended by Graham et al. (1994) for the habitat types present (see SNAGS AND COARSE WOODY DEBRIS). Suitable fisher habitat that provides good habitat connectivity occurs along most of the perennial streams in the project area below 6,000 feet, although some stream reaches higher in the watershed lack suitable fisher cover types. Existing suitable stands are providing the forest conditions (≥40 crown closure) necessary for use as fisher travel habitat in upland areas. Across the project area, suitable fisher is well-connected but overall amounts of habitat are limited by the presence of high-elevation ridges and non-preferred cover types. Approximately 176 acres of harvesting has potentially altered suitable fisher habitat in the past. Open roads facilitate firewood gathering, which can affect the abundance of snags and CWD used by fishers. Additionally, roads near streams can also offer trappers convenient access to forested riparian areas, which increase trapping risk to fishers should they be using the area. There are 8.0 miles of open roads within the project area and firewood gathering is generally low. The lack of convenient vehicle access to the project area and high amounts of winter snow likely limit trapper access and associated mortality risk for fisher, although roads accessed by snowmobile are adjacent to Class 1 streams in some areas. Overall, fisher habitat suitability and connectivity within the project area is moderate and risk factors are moderate.

Historical records of fisher occurring in the CEAA within the last 50 years are generally lacking with only one sighting, however fishers have been documented in Lincoln and Flathead Counties (MNHP 2012, Foresman 2012) and fishers potentially use the CEAA. Within the CEAA, there are 10,736 acres (26.3% of the CEAA) of potentially suitable fisher habitat (TABLE W-7 – FISHER HABITAT). Riparian fisher habitat within the CEAA consists of approximately 1,368 acres of preferred fisher cover types on DNRC lands, of which 1,160 acres (84.8% of preferred fisher cover types) are currently suitable for use by fishers. Abundance and connectivity of suitable riparian habitat is influenced by wet meadows, swamps, rock/scree fields, and past timber harvesting within the CEAA. Approximately 1,307 acres adjacent to Class 1 and 2 streams within the CEAA (below 6,000 feet elevation) have accompanying riparian vegetation that would facilitate fisher travel, and contribute to habitat suitability and connectivity. Suitable upland habitat is somewhat scattered within the CEAA; shaped by high-elevation ridges and many of the same factors affecting riparian habitat. Within the CEAA, past harvesting has modified mature crown closure, snags and coarse woody debris levels on about 5,650 acres (13.8% of the CEAA). The CEAA contains a network of existing roads (density = 1.9 mi/sq. mile) that facilitate trapper access. Collectively, habitat suitability for fishers within the CEAA is moderate and risk factors are moderate.

Environmental Effects

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

No change to the stands providing fisher denning and foraging habitats would be expected as no timber harvesting activities would occur under this alternative. Thus, since: 1) no changes to existing habitats would be anticipated; 2) landscape connectivity would not be altered; 3) no appreciable changes to canopy cover, snags, snag recruits, and coarse woody debris levels would be anticipated; and 4) no changes to human access or potential for trapping mortality would be anticipated, no direct or indirect effects associated with fisher habitat suitability would be expected in the project area.

Direct and Indirect Effects of the Action Alternative on Fishers

Approximately 305 acres of the 1,771 acres (17.2%) of suitable fisher habitat in the project area would be harvested under the Action Alternative (TABLE W-7 – Fisher HABITAT). Approximately 295 acres of upland fisher habitat within the project area harvest units would receive harvest treatments that would likely yield stands too sparsely forested for appreciable use by fishers for 40-80 years. An additional 5 acres of upland fisher habitat would receive harvest treatments that would reduce tree densities but retain adequate overstory crown closure (≥40%) for use by fishers. Up to 2.2 acres of suitable riparian habitat (0.7% of riparian habitat) within 100 feet of Class 1 or Class 2 streams could undergo selective harvesting that would leave adequate overstory crown closure (≥40%) suitable for use by fishers after treatment, however habitat quality would be lower within these acres. Another 2.8 acres of suitable riparian habitat (0.8% of riparian habitat) within 50 to 100 feet of Class 1 or Class 2 streams could undergo harvest treatments that would remove enough overstory crown closure to render the habitat temporarily unsuitable for use by fishers. Approximately 93.9% (323 acres) of preferred fisher cover types in riparian areas would remain suitable for use by fishers. After harvest activities, remaining suitable fisher habitat and habitat connectivity would be primarily associated with riparian areas running through the project area. In all areas, harvest prescriptions call for retention of at least, 2 snags and 2 snag recruits per acre (≥21 in. dbh) where they exist, otherwise the next largest size class. In addition, 15 to 25 tons of coarse woody debris per acre would be planned for retention within harvest units. While the proposed

harvest may reduce density of snags and their recruits in the near future, the sustainability and development of snags in the area would be maintained by retention of appreciable numbers of large snags and snag recruitment trees. These large snags and trees could be a source for fisher denning and resting sites in the future when intensively harvested stands regenerate and develop mature stand characteristics (40 to 80 years). Approximately 191 acres of riparian and upland preferred fisher covertypes that currently do not provide ample structural attributes found in suitable fisher habitat would continue maturing and could provide suitable habitat in the next 20 to 40 years.

Long-term open road density would not change under the Action Alternative. Because roads would remain restricted during the trapping season, fisher mortality risk due to trapping would be expected to remain the same. The potential future risk for snag and coarse woody debris loss due to firewood gathering would be expected to remain the same, as no new permanent roads would be built. Appreciable loss of snags or coarse woody debris due to firewood gathering would not be expected. Thus, moderate adverse direct and indirect effects would be anticipated that would affect fisher habitat suitability in the project area since: 1) existing baseline suitability and connectivity of fisher habitat within the project area is moderate, 2) harvesting would remove 20.4% and modify 0.3% of suitable upland fisher habitat in the project area, 3) reductions in upland habitat connectivity would occur but existing levels of riparian fisher habitat would be minimally affected, 4) some large snags and snag recruits would be retained, and 5) overall risk factors associated with motorized human access levels would not appreciably change.

Cumulative Effects of the No-Action Alternative on Fishers

No additional effects to riparian or upland fisher habitats on DNRC-managed lands would be expected, as no timber harvesting activities would occur under the No-Action Alternative. Thus, no further cumulative effects to fisher habitat suitability would be anticipated in the cumulative effects analysis area since: 1) no changes to existing habitats on DNRC ownership would occur; 2) landscape connectivity afforded by the stands on DNRC ownership would not change; 3) no changes to canopy cover, snags, snag recruits, or coarse woody debris levels would be expected; and 4) no changes to human access or potential for trapping mortality would be anticipated. Ongoing forest management projects not associated with the proposed South Fitzpatrick Timber Sale have affected fisher habitat in the CEAA and other proposed projects could alter fisher habitat suitability in the future (see TABLE W-2 – RECENT AND PROPOSED PROJECTS).

Cumulative Effects of the Action Alternative on Fishers

Approximately 305 acres (2.8%) of 10,735 acres of potentially suitable fisher habitat in the CEAA would be harvested. Of these proposed acres, 300 acres would be upland fisher habitat and 5 acres would be riparian habitat. Approximately 2.2 acres of riparian fisher habitat would receive harvest treatments that would reduce tree densities but retain adequate overstory crown closure (≥40%) suitable for use by fishers, whereas 2.8 acres of harvested riparian habitat would likely be too open for appreciable use by fishers. Of the approximately 1,368 acres of preferred fisher cover types associated with Class 1 and 2 streams on DNRC lands, 1,158 acres (84.6% of preferred fisher cover types) would remain suitable for use by fishers (*ARM 36.11.440(1)(b)(i)*). Reductions in upland fisher habitat would be additive to the changes associated with current timber harvesting in the CEAA (see TABLE W-2 – RECENT AND PROPOSED PROJECTS) and past harvesting within the last 40 years. Approximately 10,441 acres of the 40,860-acre cumulative effects analysis area (25.6%) would remain as suitable fisher habitat (TABLE W-7 – FISHER HABITAT). Reductions in landscape connectivity of suitable upland fisher habitat within the CEAA would occur; however suitable forest stands

along riparian areas would persist and appreciable affects on fisher use of the CEAA would not be expected. The potential future risk for snag and coarse woody debris loss due to firewood gathering would not be expected to change, as no new permanent roads would be built and all existing restricted roads would remain restricted. Potential trapping mortality would be minimally influenced, as there would be no change in public access. Thus, minor adverse cumulative effects would be anticipated that would affect fisher habitat suitability within the CEAA since: 1) harvesting would alter tree density, snags, and stand structure in 2.8% of suitable fisher habitat within the CEAA, 2) minor changes to fisher habitat associated with riparian areas in the CEAA would be anticipated and 84.6% of the total preferred cover type acreage would remain moderately to well-stocked, 3) suitable fisher habitat would remain connected within riparian areas, and 4) minimal risk of snag/coarse woody debris loss and trapping mortality would be expected.

TABLE W-7– Fisher HABITAT. *Estimates of existing and post-harvest acreages of suitable fisher habitat within the project area and CEAA for the South Fitzpatrick Timber Sale. Values in parentheses refer to the percentage of the fisher habitat in a category of the total area within the corresponding analysis area.*

Fisher Habitat Category	**Project Area** (4,158 acres)		**Cumulative Effects Analysis Area** (40,860 acres)	
	Existing	Post-Harvest	Existing	Post-Harvest
Suitable Upland Fisher Habitat (DNRC)	1,440.6 (34.6%)	1,145.6 (27.6%)	8,410.1 (20.6%)	8,115.1 (19.9%)
Upland Fisher Habitat (non-DNRC)	0.0 (0%)	0.0 (0%)	1,018.2 (2.5%)	1,018.2 (2.5%)
Riparian Fisher Habitat (DNRC)	330.3 (7.9%)	327.5 (7.9%)	1,160.1 (2.8%)	1,157.3 (2.8%)
Riparian Fisher Habitat (non-DNRC)	0.0 (0%)	0.0 (0%)	147.4 (0.4%)	147.4 (0.4%)
Total Suitable Fisher Habitat (DNRC)	1,770.9 (42.6%)	1,473.1 (35.4%)	9,570.2 (23.4%)	9,272.4 (22.7%)
Total Suitable Fisher Habitat (DNRC lands & non-DNRC lands)	1,770.9 (42.6%)	1,473.1 (35.4%)	10,735.7 (26.3%)	10,437.9 (25.5%)

GRAY WOLF

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

Introduction

In April 2011, gray wolves were removed from the federal list of threatened and endangered species in Montana, Idaho and parts of Washington, Oregon, and Utah. DNRC currently

considers them as a sensitive species for the purpose of analyzing impacts associated with forest management activities.

Wolves are wide-ranging opportunistic carnivores that prey primarily on white-tailed deer, and, to a lesser extent, elk and moose, in northwest Montana (Kunkel et al. 2004). In general, wolf densities are positively correlated to prey densities (Oakleaf et al. 2006, Fuller et al. 1992). Some studies have shown that wolves may prey upon elk more frequently during certain portions of the year (particularly winter) or in areas where elk numbers are higher (Arjo et al. 2002, Kunkel et al. 2004, Garrott et al. 2006). Thus, reductions in big game numbers and/or winter range productivity could indirectly be unfavorable to wolves.

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

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the 4,158-acre project area. Cumulative effects were analyzed on a 40,860-acre CEAA around the project area (see FIGURE W-1 – WILDLIFE ANALYSIS AREAS). This scale approximates an area large enough to support a wolf pack in northwest Montana (based upon DFWP wolf pack home range data, 2010-2013).

Analysis Methods

Direct, indirect, and cumulative effects were analyzed using field evaluations, DFWP wildlife data, aerial photograph interpretation, and a GIS analysis of habitat components. Factors considered in the analysis include the amount of big game winter range modified and level of human disturbance in relation to any known wolf dens or rendezvous sites.

Existing Conditions

Wolf presence has been recently documented in the vicinity of the project area, however no denning or rendezvous sites are known or have been recorded in the project area (Kent Laudon, DFWP, personal comm. September 30, 2013). Landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water and in gentle terrain, are largely absent within the project area, as most of the area is relatively high elevation with steep, brushy slopes. Additionally, the project area does not contain deer or elk winter range. Thus, while current or future presence of wolves in the vicinity of the project area is possible during the non-winter periods, year-round occupancy of the project area is unlikely.

In northwest Montana, wolves and habitats they use generally mirror those of their ungulate prey - primarily white-tailed deer, elk, and moose. The proposed project area contains summer habitat for the aforementioned prey species, but the only ungulate winter range habitat present is for moose. Signs of use by elk and moose in summer were observed during field visits. The proposed project area contains 8.0 miles of open roads and 3.4 miles of restricted roads that could serve as a source of disturbance and mortality for both wolves and big game (see TABLE W-4– ROAD MANAGEMENT AND CONSTRUCTION).

Within the larger CEAA, winter range for white-tailed deer and mule deer is limited (10.2% and 31.3%, respectively), elk winter range is moderate (44.3%), whereas moose (79.9%) winter

range is more abundant. Because winter range for most prey species is limited within much of the CEAA, year-round habitat suitability of the CEAA for wolves is moderate. Landscape features commonly associated with denning and rendezvous sites, including meadows, openings near water, and gentle terrain, occur within the CEAA. Past harvesting on all ownerships in the CEAA has altered mature forest on 5,650 acres (13.8% of CEAA), which could influence use of the area by big game. Current and proposed harvesting within the CEAA (see TABLE W-2 – RECENT AND PROPOSED PROJECTS) could potentially alter big game habitat and indirectly influence wolves by potentially changing the distribution of big game. The CEAA contains an extensive network of restricted and open roads (total road density 1.9 miles/sq mile), which has increased human access and the potential for wolf-human interactions. Increasing access to these areas can elevate risk of wolf/human encounters and elevate the vulnerability of their ungulate prey, especially during the hunting season. Big game habitat suitable for non-winter use within the CEAA remains largely intact and undeveloped; thus, continued wolf use of the area during the summer and fall months is possible.

Environmental Effects

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

No timber harvesting or associated activities would occur under the No-Action Alternative. Thus, since: 1) no additional changes in human disturbance levels would occur; and 2) no changes to the vegetation on big game winter ranges would occur, no direct or indirect effects would be expected to affect gray wolf displacement risk, or big game prey availability that could subsequently affect wolves.

Direct and Indirect Effects of the Action Alternative on Gray Wolves

The proposed activities would affect 257 acres (6.2% of the project area) of moose winter range. However, overall, moose are fairly tolerant of winter conditions due to their large body size and the proposed activities are not expected to adversely affect moose. Additional big game winter range does not occur in the project area, but the proposed activities could lead to a shift in big game use of the area during the summer and fall, which could cause a shift in wolf use of the project area (should they be present). There are no known wolf rendezvous or den sites in the project area. However, if documented in the vicinity of the project area, mechanized activities would be restricted within one (1) mile of wolf dens (ARM 33.11.430(1)(a)) and 0.5 miles of wolf rendezvous sites (ARM 33.11.430(1)(b)). Wolf use of the area is possible, and if present in the vicinity of the project area, wolves could be displaced by forest management activities for up to 3 years. No changes in long-term open road or total road density would occur. Thus, minor adverse direct and indirect effects to wolves associated with displacement or changes in prey availability would be anticipated as a result of the Action Alternative since: 1) known wolf den or rendezvous sites do not occur in the vicinity of the project area, but restrictions would apply if one or both are encountered during operations (ARM 33.11.430(1)(a)(b)); 2) year-round suitability of the project area for wolves is likely low, 3) some canopy cover would be removed, but the proposed activities are not expected to appreciably affect prey availability for wolves, and 4) no long-term changes in road density or public access would occur.

Cumulative Effects of the No-Action Alternative on Gray Wolves

No additional disturbance of gray wolves, their prey, or their habitat would occur under this alternative as no timber harvesting activities would occur. Past and ongoing forest management projects not associated with the proposed South Fitzpatrick Timber Sale have affected wolf prey availability in the CEAA (see TABLE W-2 – RECENT AND PROPOSED PROJECTS), and other

proposed projects could displace wolves and/or alter wolf prey availability in the future. Activities occurring on non-DNRC lands could continue altering big game winter range habitat and create disturbance within the CEAA. No additional cumulative effects to wolves associated with displacement or prey availability would be expected to result from the No-Action Alternative within the CEAA.

Cumulative Effects of the Action Alternative on Gray Wolves

In the CEAA, temporary displacement of big game and wolves is possible, should they occur in the area within close proximity to proposed timber harvest and hauling activities. Disturbance associated with the Action Alternative would be additive to ongoing and proposed forest management activities within the CEAA (see TABLE W-2 – RECENT AND PROPOSED PROJECTS). Proposed harvesting would not affect deer or elk winter range. Reductions in cover may cause moderate decreases in use by deer, moose, and elk in the immediate area; however, appreciative changes in deer and elk distribution or abundance would not be expected at the scale of the CEAA. Reductions in cover would be additive to 5,650 acres (13.8% of CEAA) of past timber-harvesting activities within the last 40 years in the CEAA. The reductions to cover that would occur under this alternative would not be expected to affect the overall potential for use of the CEAA by wolves. In addition to the 10.7 miles of potential road use within the project area, approximately 6.5 miles of open road could receive appreciable amounts of increased traffic within the CEAA. Under this alternative, motorized disturbance associated with harvest activities would increase for up to 3 years, however public motorized use would remain restricted on existing restricted roads during harvesting. All temporary roads would be closed to motorized public use during harvest and following completion of harvest activities. No substantive change in long-term potential for wolf use of the CEAA would be expected. Thus, minor adverse cumulative effects to gray wolf displacement risk and changes to big game prey availability would be expected under the Action Alternative since: 1) localized, temporary disturbance and displacement could occur due to logging activities in the area for up to 3 years; 2) winter range habitat quality for deer or elk would not be affected, and the proposed activities are not expected to adversely affect overall prey availability for wolves; and 3) there would be no long-term change in public motorized access.

Wildlife Mitigations associated with the Action Alternative

- If a threatened or endangered species is encountered, consult a DNRC biologist and develop additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*).
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per *ARM 36.11.444(2)* and GB-PR2 (*USFWS AND DNRC 2010, Vol. II p. 2-5*).
- Contractors will adhere to food storage and sanitation requirements as per GB-PR3 (*USFWS AND DNRC 2010, Vol. II p. 2-6*).
- Public access would be restricted at all times on restricted roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.).

- Manage road closures and commercial restrictions in accordance with the Stillwater Block Transportation Plan as per GB-ST1 (*USFWS AND DNRC 2010, Vol. II p.2-21)*
- Maintain visual screening adjacent to open roads where present and feasible per GB-RZ2 (*USFWS AND DNRC 2010, Vol. II pp. 2-17, 2-18*).
- In a portion of harvest units, retain patches of advanced regeneration of shade-tolerant trees as per LY-HB4 (*USFWS AND DNRC 2010, Vol. II pp. 2-50, 2-51*).
- Retain at least 2 snags per acre and 15-25 tons of coarse woody debris per acre. Emphasize the retention of downed logs ≥15 inches dbh where they occur as per LY-HB2(1) and (2) (*USFWS AND DNRC 2010, Vol. II p. 2-48).* Favor western larch and Douglas-fir for snag retention and recruitment.
- Close roads and trails to the extent possible following the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags due to firewood gathering.

Literature Cited:

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

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

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

DFWP 2008. Maps of moose, elk, mule deer, and white-tailed deer distribution in Montana. Individual GIS data layers. August 12, 2008. Montana Fish, Wildlife and Parks. Helena, MT. http://fwp.mt.gov/gisData/imageFiles/distributionElk.jpg. http://fwp.mt.gov/gisData/imageFiles/distributionMoose.jpg. http://fwp.mt.gov/gisData/imageFiles/distributionMuleDeer.jpg. http://fwp.mt.gov/gisData/imageFiles/distributionWhiteTailedDeer.jpg

DNRC 2010. DNRC Canada lynx habitat mapping protocols for implementation of the HCP. Montana Department of Natural Resources and Conservation Forested Trust Lands Habitat Conservation Plan Final EIS. September 2010. Vol. II, Appendix B, pp. B-5 to B-19.

Foresman, K.R.. 2012. Mammals of Montana. Second Edition. Mountain Press Publishing Co., Missoula, MT. 429pp.

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

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

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

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

Harris, R.B. 1999. Abundance and Characteristics of Snags in Western Montana Forests. General Technical report RMRS-GTR-31. USDA Forest Service, Rocky Mountain Research Station, Ogden, UT. 19pp.

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

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

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

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

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

Mace, R. and L. Roberts. 2011. Northern Continental Divide Ecosystem Grizzly Bear Monitoring Team Annual Report, 2009-2010. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.

Mace, R.D., and J.S. Waller. 1997. Final Report: Grizzly Bear Ecology in the Swan Mountains, Montana. Montana Fish, Wildlife and Parks, Helena, MT. 191pp.

Mace, R.D., J.S. Waller, T.L. Manley, L.J. Lyon, and H. Zuuring. 1997. Relationships among Grizzly Bears, Roads, and Habitat in the Swan Mountains, Montana. Pages 64-80 *in* Mace, R.D., and J.S. Waller. 1997. Final Report: Grizzly Bear Ecology in the Swan Mountains, Montana. Montana Fish, Wildlife and Parks, Helena, MT. 191pp.

Oakleaf, J.K., D. L. Murray, J. R. Oakleaf, E. E. Bangs, C. M. Mack, D. W. Smith, J. A. Fontaine, M. D. Jimenez, T. J. Meier, and C. C. Niemeyer. 2006. Habitat Selection by Recolonizing

Wolves in the Northern Rocky Mountains of the United States. Journal of Wildlife Management 70:554-563.

MNHP. 2014. Tracker data. Montana Natural Heritage Program online database query for the South Fitzpatrick Timber Sale project area. http://mtnhp.org/Tracker/NHTMap.aspx

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

Pfister, R., B. Kovalchik, S. Arno, and R. Presby. 1977. Forest habitat types of Montana. USDA For. Serv. Gen. Tech. Rep. INT-34. Intermountain Forest and Range Experiment Station Ogden, Utah. 174pp.

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

Raley, C. M., Lofroth, R. L., Truex, J. S. Y., and J. M. Higley. 2012. Habitat ecology of fishers in Western North America. Pages 231-254 *in* K. B. Aubry, W. J. Zielinski, M. G. Raphael, G. Proulx, and S. W. Buskirk, eds. Biology and conservation of martens, sables, and fishers: a new synthesis. Cornell University Press, Comstock Publishing Associates, Ithaca, NY. 580pp.

Ruggiero, L. F., Aubry, K. B., Buskirk, S. W., Koehler, G. M., Krebs, C. J., McKelvey, K. S., and J. R. Squires. 1999. Ecology and conservation of lynx in the United States. General Technical Report RMRS-GTR-30WWW. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Fort Collins, CO. 473 pp.

Ruediger, B., J. Claar, S. Mighton, B. Nanaey, T. Tinaldi, F. Wahl, N. Warren, D. Wenger, A. Williamson, L. Lewis, B. Holt, G. Patton, J. Trick, A. Vandehey, and S. Gniadek. 2000. Canada Lynx Conservation Assessment (2nd Edition). USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Missoula, MT. 122 pp.

Servheen, C., S. Herrero, and B. Peyton (compilers). 1999. Bears. Status survey and conservation action plan. IUCN/SSC Bear and Polar Bear Specialist Groups, IUCN, Gland, Switzerland and Cambridge, U.K. 309 pp.

Squires, J.R., N.J. DeCesare, J.A. Kolbe, and L. F. Ruggiero. 2010. Seasonal resource selection of Canada lynx in managed forests of the Northern Rocky Mountains. Journal of Wildlife Management 74:1648-1660.

USFWS and DNRC. 2010. Montana Department of Natural Resources and Conservation Forested Trust Lands Habitat Conservation Plan, Final Environmental Impact Statement, Volumes I and II. U.S. Department of Interior, Fish and Wildlife Service, Region 6, Denver, Colorado, and Montana Department of Natural Resources and Conservation, Missoula, MT. September 2010.

USFWS. 1993. Grizzly Bear Recovery Plan. Missoula MT. 181pp.

FIGURE W-1 – WILDLIFE ANALYSIS AREAS. *Areas used to assess effects of the Action and No-Action alternatives on wildlife and wildlife habitat for the proposed DNRC South Fitzpatrick Timber Sale.*

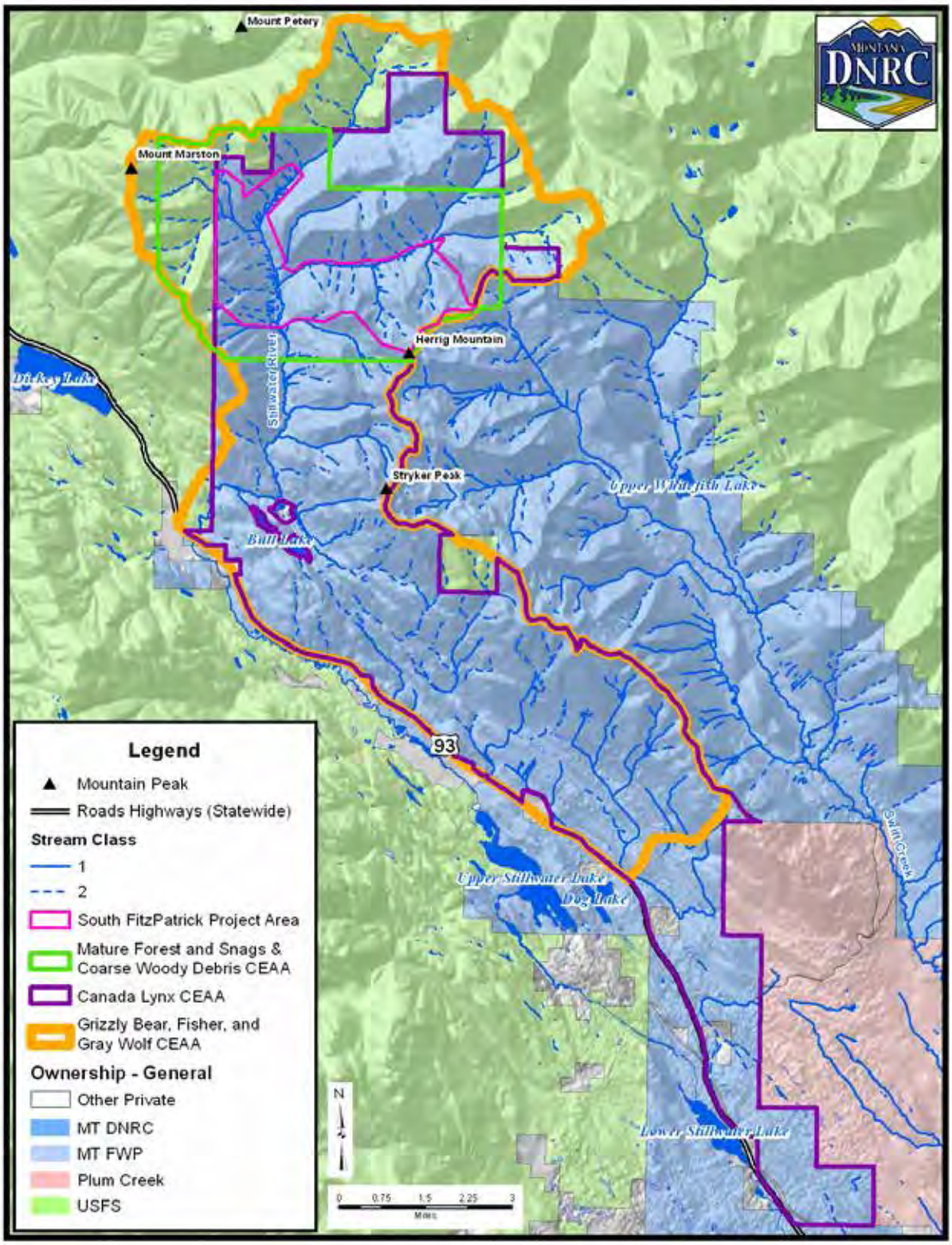
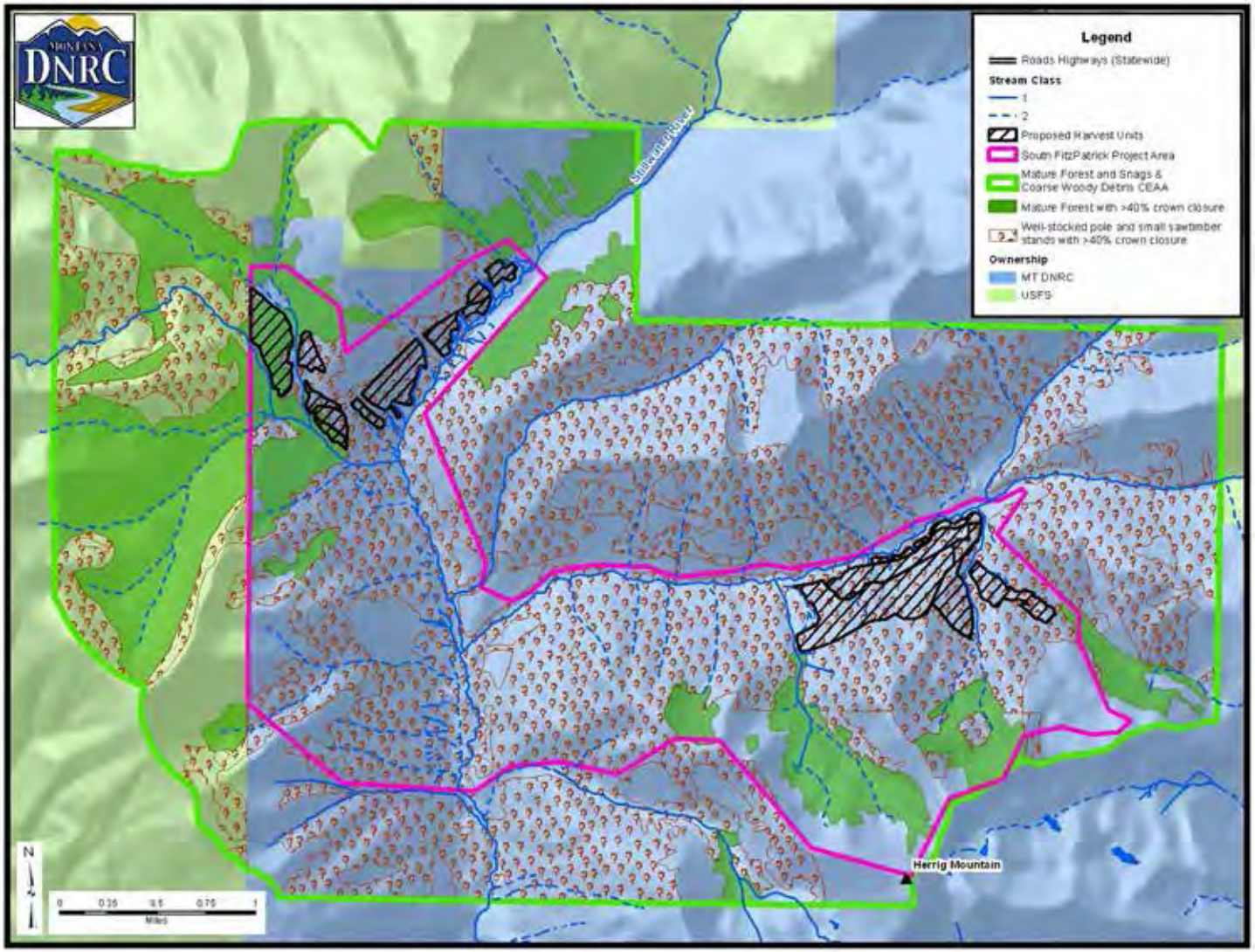


FIGURE W-2 – MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY. *Relationship of the project area and proposed units to mature forested stands and potential connectivity for the DNRC South Fitzpatrick Timber Sale.*



Attachment VIII:

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Attachment IX:

References

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

Brown, J.K. 1974. Handbook for inventorying downed woody material. In: USDA and Forest Service (Editors). Ogden, Utah: Intermountain Forest and Range Experiment Station.

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

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

DFWP 2008. Maps of moose, elk, mule deer, and white-tailed deer distribution in Montana. Individual GIS data layers. August 12, 2008. Montana Fish, Wildlife and Parks. Helena, MT. http://fwp.mt.gov/gisData/imageFiles/distributionElk.jpg. http://fwp.mt.gov/gisData/imageFiles/distributionMoose.jpg. http://fwp.mt.gov/gisData/imageFiles/distributionMuleDeer.jpg. http://fwp.mt.gov/gisData/imageFiles/distributionWhiteTailedDeer.jpg

DNRC 2010. DNRC Canada lynx habitat mapping protocols for implementation of the HCP. Montana Department of Natural Resources and Conservation Forested Trust Lands Habitat Conservation Plan Final EIS. September 2010. Vol. II, Appendix B, pp. B-5 to B-19.

DNRC 2011. DNRC update to the Compiled Monitoring Report. Includes data from 1988 through 2011. Unpublished. Prepared by J. Schmalenberg, Forest Management Bureau, Missoula, MT.

DNRC, 1990-2012. Montana Forestry Best Management Practices Monitoring. Missoula, Montana.

DNRC, 1996. State Forest Land Management Plan Final Environmental Impact Statement. Montana Department of Natural Resources and Conservation, Forest Management Bureau. Missoula, MT.

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

Farns, P. 1978. Hydrology of Mountain Watersheds, Preliminary Report. Soil Conservation Service. Bozeman, MT.

Foresman, K.R.. 2012. Mammals of Montana. Second Edition. Mountain Press Publishing Co., Missoula, MT. 429pp.

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

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

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

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

Harmon, M.E.; J.F. Franklin, and F. J Swanson. 1986. Ecology of coarse woody debris in temperate ecosystems. Advances in Ecological Research, Vol. 15. New York: Academic Press: 133-302.

Harrington, Timoth B.; Kirkland, John 2012. Logging debris matters: better soil, fewer invasive plants. Science Findings 145. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 6 p.

Harris, R.B. 1999. Abundance and Characteristics of Snags in Western Montana Forests. General Technical report RMRS-GTR-31. USDA Forest Service, Rocky Mountain Research Station, Ogden, UT. 19pp.

Haupt, H.F., et al. 1974. *Forest Hydrology Part II Hydrologic Effects of Vegetation Manipulation*. USDA Forest Service, Region 1. Missoula, MT.

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

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

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

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

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

Mace, R. and L. Roberts. 2011. Northern Continental Divide Ecosystem Grizzly Bear Monitoring Team Annual Report, 2009-2010. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, MT 59901. Unpublished data.

Mace, R.D., J.S. Waller, T.L. Manley, L.J. Lyon, and H. Zuuring. 1997. Relationships among Grizzly Bears, Roads, and Habitat in the Swan Mountains, Montana. Pages 64-80 *in* Mace, R.D., and J.S. Waller. 1997. Final Report: Grizzly Bear Ecology in the Swan Mountains, Montana. Montana Fish, Wildlife and Parks, Helena, MT. 191pp.

Martinson, A. H. and W. J. Basko. 1998. Soil Survey of Flathead National Forest Area, Montana. USDA Forest Service, Flathead National Forest, Kalispell, Montana.

MNHP. 2014. Tracker data. Montana Natural Heritage Program online database query for the South Fitzpatrick Timber Sale project area. http://mtnhp.org/Tracker/NHTMap.aspx

Montana Department of Environmental Quality. "Clean Water Act Information Center." 30 March, 2010. <http://www.cwaic.mt.gov/>

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

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

Pfankuch, D. J. 1975. Stream reach inventory and channel stability evaluation. USDA Forest Service, $1-75-002. Government Printing Office #696-260/200, Washington D.C. 26pp.

Pfister, R., B. Kovalchik, S. Arno, and R. Presby. 1977. Forest habitat types of Montana. USDA For. Serv. Gen. Tech. Rep. INT-34. Intermountain Forest and Range Experiment Station Ogden, Utah. 174pp.

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

Raley, C. M., Lofroth, R. L., Truex, J. S. Y., and J. M. Higley. 2012. Habitat ecology of fishers in Western North America. Pages 231-254 *in* K. B. Aubry, W. J. Zielinski, M. G. Raphael, G. Proulx, and S. W. Buskirk, eds. Biology and conservation of martens, sables, and fishers: a new synthesis. Cornell University Press, Comstock Publishing Associates, Ithaca, NY. 580pp.

Rosgen, David L. 1996. *Applied River Morphology.* Wildland Hydrology, Pagosa Springs, CO.

Ruediger, B., J. Claar, S. Mighton, B. Nanaey, T. Tinaldi, F. Wahl, N. Warren, D. Wenger, A. Williamson, L. Lewis, B. Holt, G. Patton, J. Trick, A. Vandehey, and S. Gniadek. 2000. Canada Lynx Conservation Assessment (2nd Edition). USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Missoula, MT. 122 pp.

Ruggiero, L. F., Aubry, K. B., Buskirk, S. W., Koehler, G. M., Krebs, C. J., McKelvey, K. S., and J. R. Squires. 1999. Ecology and conservation of lynx in the United States. General Technical Report RMRS-GTR-30WWW. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Fort Collins, CO. 473 pp.

Servheen, C., S. Herrero, and B. Peyton (compilers). 1999. Bears. Status survey and conservation action plan. IUCN/SSC Bear and Polar Bear Specialist Groups, IUCN, Gland, Switzerland and Cambridge, U.K. 309 pp.

Squires, J.R., N.J. DeCesare, J.A. Kolbe, and L. F. Ruggiero. 2010. Seasonal resource selection of Canada lynx in managed forests of the Northern Rocky Mountains. Journal of Wildlife Management 74:1648-1660.

USFWS and DNRC. 2010. Montana Department of Natural Resources and Conservation Forested Trust Lands Habitat Conservation Plan, Final Environmental Impact Statement, Volumes I and II. U.S. Department of Interior, Fish and Wildlife Service, Region 6, Denver, Colorado, and Montana Department of Natural Resources and Conservation, Missoula, MT. September 2010.

USFWS. 1993. Grizzly Bear Recovery Plan. Missoula MT. 181pp.

Wicklow, M.C., W. B. Bolen, and W.C. Denison. 1973. Comparison of Soil micro-fungi in 40-year-old stands of pure alder, pure conifer and alder-conifer mixtures. Soil Biology and Biochemistry, 6:73-78.

Young, Stephen L. 1989. Cumulative watershed effects. Lassen National Forest.

Attachment X:

Glossary

Administrative road use: Road use that is restricted to DNRC personnel and contractors or for purposes such as monitoring, forest improvement, fire control, hazard reduction, etc.

Airshed: An area defined by a certain set of air conditions; typically, a mountain valley in which air movement is constrained by natural conditions such as topography.

Basal area: A measure of the number of square feet of space occupied by the stem of a tree.

Best Management Practices: A practice or combination of land use management practices that are used to achieve sediment control and protect soil productivity and prevent or reduce non-point pollution to a level compatible with water quality goals. The practices must be technically and economically feasible and socially acceptable.

Biodiversity: The variety of life and its processes. It includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Board foot: A unit for measuring wood volumes. One board foot is a piece of wood 1 foot long, 1 foot wide, and 1 inch thick (144 cubic inches). This measurement is commonly used to express the amount of wood in a tree, saw log, or individual piece of lumber.

Canopy: The upper level of a forest consisting of branches and leaves of the taller trees.

Canopy closure: The percentage of a given area covered by the crowns, or canopies, of trees.

Cavity: A hollow excavated in trees by birds or other animals. Cavities are used for roosting and reproduction by many birds and mammals.

Coarse down woody material: Dead trees within a forest stand that have fallen and begun decomposing on the forest floor; generally larger than 3 inches in diameter.

Coarse-filter: An approach to maintaining biodiversity as described in the State Forest Land Management Plan (DNRC 1996) that involves maintaining a diversity of structures and species composition within stands and a diversity of ecosystems across the landscape.

Co-dominant tree: A tree that extends its crown into the canopy, receiving direct sunlight from above and limited sunlight on its sides. One or more sides are crowded by the crowns of other trees.

Compaction: Increased soil density caused by force exerted at the soil surface, modifying aeration and nutrient availability.

Connectivity: The quality, extent, or state of being joined; unity; the opposite of fragmentation.

Connectivity (fish): The capability of different life stages of HCP fish species to move among the accessible habitats within normally occupied stream segments.

Connectivity (lynx): Stand conditions where sapling, pole or sawtimber stands possess at least 40% crown canopy closure, in a patch greater than 300 feet wide.

Cover: See *Hiding cover* and/or *Thermal cover.*

Covertype: A classification of timber stands based on the percentage of tree species composition.

Crown cover or crown closure: The percentage of the ground surface covered by vertical projection of tree crowns.

Cull: A tree of such poor quality that it has no merchantable value in terms of the product being cut.

Cutting units: Areas of timber proposed for harvesting.

Cumulative effect: The impact on the environment that results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor actions, but collectively they may compound the effect of the actions.

Desired future conditions: The land or resource conditions that will exist if goals and objectives are fully achieved. It is considered synonymous with appropriate conditions.

Direct effect: Effects on the environment that occur at the same time and place as the initial cause or action.

Ditch relief: A method of draining water from roads using ditches and corrugated metal pipe. The pipe is placed just under the surface of the road.

Dominant tree: Those trees within a forest stand that extend their crowns above surrounding trees and capture sunlight from above and around the crown.

Drain dip: A graded depression built into a road to divert water and prevent soil erosion.

Ecosystem: An interacting system of living organisms and the land and water that make up their environment; the home place of all living things, including humans.

Edge: The border between two or more habitats such as a wetland and mature forest.

Equivalent clearcut acres (ECA): This method equates the area harvested and the percent of crown removed with an equivalent amount of clearcut area.

Allowable ECA - The estimated number of acres that can be clearcut before stream channel stability is affected.

Existing ECA - The number of acres that have been previously harvested, taking into account the degree of hydrologic recovery that has occurred due to revegetation.

Remaining ECA - The calculated amount of harvesting that may occur without substantially increasing the risk of causing detrimental effects to the stability of the stream channel.

Excavator piling: The piling of logging residue using an excavator.

Fire regimes: Describes the frequency, type, and severity of wildfires. Examples include: frequent nonlethal underburns; mixed-severity fires; and stand-replacement or lethal burns.

Forage: All browse and nonwoody plants available and acceptable to grazing animals or that may be harvested for feeding purposes.

Forest improvement: The establishment and growing of trees after a site has been harvested. Associated activities include:

- Ø site preparation,
- Ø planting,
- Ø survival checks,
- Ø regeneration surveys, and
- Ø stand thinnings.

Fragmentation (forest): A reduction of connectivity and an increase in sharp stand edges resulting when large contiguous areas of forest with similar age and structural character are interrupted through disturbance (stand-replacement fire, timber harvesting, etc.).

Habitat: The place where a plant or animal naturally or normally lives and grows.

Habitat type: Forest vegetation types that follow the habitat type climax vegetation classification system developed by Pfister et. al. (1977).

Hazard reduction: The reduction of fire hazard by processing logging residue with methods such as separation, removal, scattering, lopping, crushing, piling and

burning, broadcast burning, burying, and chipping.

Hiding cover: Vegetation capable of hiding some specified portion of a standing adult mammal from human view, at a distance of 200 feet.

Historical forest condition: The condition of the forest prior to settlement by Europeans.

Homogeneous: Of uniform structure or composition throughout.

Indirect Effects: Secondary effects that occur in locations other than the initial action or significantly later in time.

Interdisciplinary team (ID Team): A team of resource specialists brought together to analyze the effects of a project on the environment.

Intermediate trees: A characteristic of certain tree species that allows them to survive in relatively low light conditions, although they may not thrive.

Landscape: An area of land with interacting ecosystems.

Live Crown Ratio: The percentage of the length of tree having live limbs divided by the tree's height.

Meter: A measurement equaling 39.37 inches.

Mitigation measure: An action or policy designed to reduce or prevent detrimental effects.

Multistoried stands: Timber stands with 3 or more distinct stories.

Nest-site area (bald eagle): The area in which human activity or development may stimulate abandonment of the breeding area, affect successful completion of the nesting cycle, or reduce productivity. This area is either mapped for a specific nest based on field data, or, if that is impossible, is defined as the area within a quarter-mile radius of all nest sites in the breeding area that have been active within 5 years.

No-action alternative: The option of maintaining the status quo and continuing present management activities; the proposed project would not be implemented.

Nonforested area: A naturally occurring area where trees do not establish over the long term, such as bogs, natural meadows, avalanche chutes, and alpine areas.

Old growth: For this analysis, old growth is defined as stands that meet the minimum criteria (number of trees per acre that have a minimum dbh and a minimum age) for a given site (old-growth group from habitat type). These minimums can be found in the *Green et al Old Growth Forest Types of the Northern Region* (see *REFERENCES).*

Old growth maintenance: Silviculture treatments in old growth stands designed to retain old growth attributes, including large live trees, snags and CWD, but that would remove encroaching shade-tolerant species, create small canopy gaps generally less than one acre in size, and encourage regeneration of shade-intolerant species. This type of treatment is applicable on sites that historically would be characterized by mixed severity fire regimes, either relatively frequent or infrequent. ARM 36.11.403 (49)

Open-Road Densities: Percent of the grizzly bear subunit exceeding a density of 1 mile per square mile of open roads.

Overstory: The level of the forest canopy including the crowns of dominant, codominant, and intermediate trees.

Patch: A discrete area of forest connected to other discrete forest areas by relatively narrow corridors; an ecosystem element (such as vegetation) that is relatively homogeneous internally, but differs from what surrounds it.

Phloem: The living tissue of the tree.

Project file: A public record of the analysis process, including all documents that form

the basis for the project analysis. The project file for the Mystery Fish Timber Sale is located at the Stillwater State Forest office near Olney, Montana.

Redds: The spawning ground or nest of various fish species.

Regeneration: The replacement of one forest stand by another as a result of natural seeding, sprouting, planting, or other methods.

Restricted road: A road that is managed to limit the manner in which motorized vehicles may be used. Restricted roads have a physical barrier that restricts the general use of motorized vehicles. Restriction s may be man-made or naturally occurring.

Residual stand: Trees that remain standing following any harvesting operation.

Road: Any created or evolved access route that is greater than 500 feet long and is reasonably and prudently drivable with a conventional two-wheel-drive passenger car or two-wheel-drive pickup.

Road-construction activities: In general, the term 'road construction activities' refers to all the activities conducted while building new roads, reconstructing existing roads, and obliterating roads. The activities may include any or all of the following:

- Ø road construction;
- Ø right-of-way clearing;
- Ø excavation of cut/fill material;
- Ø installation of road surface and ditch drainage features;
- Ø installation of culverts at stream crossings;
- Ø burning right-of-way slash;
- Ø hauling and installation of borrow material; and
- Ø blading and shaping road surfaces.

Road improvements: Construction projects on an existing road to improve ease of travel, safety, drainage, and water quality.

Saplings: Trees 1 to 4 inches in diameter at breast height.

Sawtimber trees: Trees with a minimum dbh of 9 inches.

Scarification: The mechanized gouging and ripping of surface vegetation and litter to expose mineral soil and enhance the establishment of natural regeneration.

Scoping: The process of determining the extent of the environmental assessment task. Scoping includes public involvement to learn which issues and concerns should be addressed and the depth of assessment that will be required. It also includes a review of other factors, such as laws, policies, actions by other landowners, and jurisdictions of other agencies that may affect the extent of assessment needed.

Security: For wild animals, the freedom from the likelihood of displacement or mortality due to human disturbance or confrontation.

Seedlings: Live trees less that 1 inch dbh.

Sediment: In bodies of water, solid material, mineral or organic, that is suspended and transported or deposited.

Sediment yield: The amount of sediment that is carried to streams.

Seral: Refers to a biotic community that is in a developmental, transitional stage in ecological succession.

Shade intolerant: Describes the tree species that generally can only reproduce and grow in the open or where the overstory is broken and allows sufficient sunlight to penetrate. Often these are seral species that get replaced by more shade-tolerant species during succession. In Stillwater State Forest, shade-intolerant species generally include ponderosa pine, western larch, Douglas-fir, western white pine, and lodgepole pine.

Shade tolerant: Describes tree species that can reproduce and grow under the canopy in poor sunlight conditions. These species replace less shade-tolerant species during succession. In Stillwater State

Forest, shade-tolerant species generally include subalpine fir, grand fir, Engelmann spruce, and western red cedar.

Sight distance: The distance at which 90% of an animal is hidden from view. On forested trust lands, this is approximately 100 feet, but may be more or less depending on specific vegetative and topographic conditions.

Siltation: The process of very fine particles of soil (silt) settling. This may occur in streams or from runoff. An example would be the silt build-up left after a puddle evaporates.

Silviculture: The art and science of managing the establishment, composition, and growth of forests to accomplish specific objectives.

Site preparation: A hand or mechanized manipulation of a harvested site to enhance the success of regeneration. Treatments are intended to modify the soil, litter, and vegetation to create microclimate conditions conducive to the establishment and growth of desired species.

Slash: Branches, tree tops, and cull trees left on the ground following a harvest.

Snag: A standing dead tree or the portion of a broken-off tree. Snags may provide feeding and/or nesting sites for wildlife.

Snow intercept: The action of trees and other plants in catching falling snow and preventing it from reaching the ground.

Spur roads: Low-standard roads constructed to meet minimum requirements for harvest-related traffic.

Stand: An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition so as to be distinguishable from the adjoining forest.

Stand density: Number of trees per acre.

Stocking: The degree of occupancy of land by trees as measured by basal area or number of trees, and as compared to a stocking standard (which is an estimate of either the basal area) or the number of trees per acre required to fully use the growth potential of the land.

Stream gradient: The slope of a stream along its course, usually expressed in percentage indicating the amount of drop per 100 feet.

Stumpage: The value of standing trees in the forest; sometimes used to mean the commercial value of standing trees.

Succession: The natural series of replacement of one plant (and animal) community by another over time in the absence of disturbance.

Suppressed: The condition of a tree characterized by a low growth rate and low vigor due to competition.

Temporary road: Roads built to the minimal standards necessary to prevent impacts to water quality and provide a safe and efficient route to remove logs from the timber sale area. Following logging operations or site preparations, the road would no longer function as an open road, restricted road or trail. DNRC would assure that they no longer could be accessed for commercial, administrative or public motorized use.

- Segments near the beginning of the new temporary road systems would be reshaped to their natural contours and reclaimed for approximately 200 feet by grass seeding and strewing slash and debris.

- The reclamation of the remaining road would include a combination of ripping or mechanically loosening the surface soils on the road, removing culverts or bridges that were installed, spreading forest debris along portions of the road, and allowing the surface to revegetate naturally.

Texture: A term used in visual assessments indicating distinctive or identifying features of the landscape depending on distance.

Thermal cover: For white-tailed deer, thermal cover has 70 percent or more

coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

For elk and mule deer, thermal cover has 50 percent or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

Timber-harvesting activities: In general, the term timber-harvesting activities refers to all the activities conducted to facilitate timber removal before, during, and after the timber is removed. These activities may include any or all of the following:

- Ø felling and bucking standing trees into logs;
- Ø skidding logs to a landing;
- Ø processing, sorting, and loading logs onto trucks at the landing;
- Ø hauling logs by truck to a mill;
- Ø slashing and sanitizing residual vegetation damaged during logging;
- Ø machine piling logging slash;
- Ø burning logging slash;
- Ø scarifying and preparing the site for planting; and
- Ø planting trees.

Total Road Densities: Percent of grizzly bear subunit with more than 2 miles per square mile of total road.

Understory: The trees and other woody species growing under a, more or less, continuous cover of branches and foliage formed collectively by the overstory of adjacent trees and other woody growth.

Uneven-aged stand: Various ages and sizes of trees growing together on a uniform site.

Ungulates: Hoofed animals, such as mule deer, white-tailed deer, elk, and moose, that are mostly herbivorous; many are horned or antlered.

Vigor: The degree of health and growth of a tree or stand of trees.

Visual screening: Vegetation and/or topography providing visual obstruction capable of hiding a grizzly bear from view. The distance or patch size and configuration required to provide effective visual screening depends on the topography and/or type and density of cover available.

Watershed: The region or area drained by a river or other body of water.

Water yield: The average annual runoff for a particular watershed expressed in acre-feet.

Water-yield increase: Due to forest canopy removal, an increase in the average annual runoff over natural conditions.

Windthrow: A tree pushed over by wind. Windthrows (blowdowns) are common among shallow-rooted species and in areas where cutting or natural disturbances have reduced the density of a stand so individual trees remain unprotected from the force of the wind.

Acronyms

ARM .....*Administrative Rules of Montana*

BMP .....*Best Management Practices*

BMU .....*Bear Management Unit*

CEAA .....*Cumulative Effects Analysis Area*

cmp .....*corrugated metal pipe*

CWD.....*Coarse Woody Debris*

dbh.....*diameter at breast height*

DEQ .....*Department of Environmental Quality*

DFWP .....*Montana Department of Fish, Wildlife, and Parks*

DNRC.....*Department of Natural Resources and Conservation*

EA .....*Environmental Assessment*

ECA .....*Equivalent Clearcut Acres*

EIS.....*Environmental Impact Statement*

FIA .....*Forest Inventory and Analysis group*

FI.....*Forest Improvement*

FNF .....*Flathead National Forest*

FRTA .....*Federal Roads and Trails Act*

FOGI.....*Full Old-Growth Index*

GBS……*Grizzly Bear Subunit*

GIS .....*Geographic Information System*

HCP .....*Habitat Conservation Plan*

ID Team....*Interdisciplinary Team*

MCA .....*Montana Codes Annotated*

MEPA..... *Montana Environmental Policy Act*

Mbf..... *Thousand Board Feet*

MMbf ..... *Million Board Feet*

MNHP..... *Montana Natural Heritage Program*

NCDE..... *Northern Continental Divide Ecosystem*

NWLO..... *Northwestern Land Office*

RL ..... *Random Lengths*

RMZ ..... *Riparian Management Zone*

SFLMP..... *State Forest Land Management Plan*

SLI ..... *Stand Level Inventory*

SMZ..... *Streamside Management Zone*

STW..... *Stillwater Unit*

TLMD..... *Trust Land Management Division*

TMDL..... *Total Maximum Daily Load*

USFS..... *United States Forest Service*

USFWS..... *United States Fish and Wildlife Service*

WFP..... *Washington Forest Practices Board*

WMZ..... *Wetland Management Zone*

WYI ..... *Water Yield Increases*

124 Permit…*Stream Protection Act Permit*

318 Authorization .*A Short-Term Exemption from Montana's Surface Water Quality and Standards*

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