UPPER BLACKFOOT TIMBER MANAGEMENT PLAN

ENVIRONMENTAL ASSESSMENT

MONTANA DEPARTMENT of NATURAL RESOURCES and CONSERVATION

SOUTHWESTERN LAND OFFICE
LINCOLN FIELD OFFICE of the CLEARWATER UNIT

UPPER BLACKFOOT
TIMBER MANAGEMENT PLAN
ENVIRONMENTAL ASSESSMENT

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ENVIRONMENTAL ASSESSMENT

Project Name: Upper Blackfoot Timber Management Plan
Proposed Implementation Date: April 2014
Proponent: Lincoln Station, Clearwater Unit, Southwestern Land Office, Montana DNRC

Location:

SECTION(S)	TOWNSHIP	RANGE	TRUST
16	15N	7W	Common Schools
16	14N	8W	Common Schools
1,2,3,9 & 16	14N	9W	Common Schools
16	14N	10W	Common Schools
2	13N	9W	Common Schools
36	15N	8W	Common Schools
4,6,8,10,28 & 34	14N	8W	Public Buildings
2,4,28 & 34	14N	9W	Public Buildings
8 & 22	14N	8W	School for the Deaf and Blind
26	14N	9W	Montana State University

Counties: Powell and Lewis and Clark

I. TYPE AND PURPOSE OF ACTION

The Montana Department of Natural Resources and Conservation (DNRC) is proposing timber management activities on approximately 3,625 acres near the town of Lincoln, MT located in the Upper Blackfoot River Watershed. The gross project area involves approximately 9,260 acres of state land. These lands are located in 12 separate parcels located in an area roughly 19 miles long by 11 miles wide. Parcel sizes range from 120 acres to 3,385 acres in size. Please see attachments A-1 and A-2 for maps of the project area. The proposed project would include:

- harvest of approximately 14 MMBF of timber from 3,625 acres
- pre-commercial thinning of approximately 440 acres of harvest units
- road maintenance would take place on approximately 75 miles of existing access roads
- 5.6 miles of new road construction

Lodgepole and ponderosa pine trees in the area are experiencing high levels of mortality as a result of the mountain pine beetle (*Dendroctonus ponderosae*). Douglas-fir, spruce, and true fir trees are suffering heavy defoliation from the western spruce budworm (*Choristoneura occidentalis*).

Project Objectives Include:

1) Manage the identified parcels intensively for healthy and biologically diverse forests.

2) Improve timber stand health and vigor.

3) Maximize revenue over the long-term for the School Trust accounts from the timber resources and salvage timber on state forests that is dead, dying or is threatened by insects, disease, fire, or windthrow as mandated by State Statute 77-5-207, MCA,

The lands involved in this proposed project are held by the State of Montana in trust for the specific trusts documented above. (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and the DNRC are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for the beneficiary institutions (Section 77-1-202, MCA).

The DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (DNRC 1996) and the Administrative Rules for Forest Management (ARM 36.11.401 through 450), DNRC Habitat Conservation Plan (DNRC, 2010) 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.

The initial proposal, which was distributed to the public, organizations, and other agencies in July 2012, proposed to harvest approximately 10 MMBF from approximately 2,600 acres.

In addition to public scoping, resource professionals in state agencies were scoped to notify them and receive input. Comments were received from within the DNRC, and three members of the public. Two of them were in favor of additional harvests and one was concerned about weeds.

These comments were used to help guide the development of the action alternative.

The mailing list of parties receiving initial scoping notices is located in the project file at the Lincoln Field Office. Public scoping comments are also located in the project file at the Lincoln Field Office.

A project update was sent to those individuals that showed interest during scoping and also posted on the DNRC environmental documents webpage. This update was intended to inform interested parties that an increase in acreage and harvest volume occurred as a result of new markets that were discovered during scoping. DNRC using comments and information gathered during scoping to shape the action alternative. This increase is an example of that process.

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.

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.

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 use of two fords through Arrastra Creek.

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

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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.

Alternative A – No Action
Under this alternative no large scale timber harvest would occur, however the DNRC would continue current uses including firewood permits and small timber permits. The bark beetle epidemic would continue, possibly killing the majority of ponderosa pine trees on the project area. The western spruce budworm would continue to defoliate Douglas-fir and spruce trees resulting in growth losses and tree mortality.

Alternative B – Timber Harvest (Action)
Under this alternative, the DNRC would continue current uses, and also harvest approximately 14 MMBF of timber from approximately 3,625 acres within a 9,620 acre project area.

During project development sections 12 and 19 T14N R8W where removed from the proposed project because timber stands in these sections are generally in better health then they originally appeared to be. Because of declining stand health in section 4 T 14N R9W approximately 70 acres is now proposed for harvest.

During further project development and field reconnaissance approximately 1,125 harvest acres were added to the proposed project. The factor that influenced the increase in proposed harvest acres was a new pulp market, which resulted in the opportunity to harvest unhealthy stands with lower board foot volumes that originally were not considered economically feasible to harvest at the time of public scoping.

Timber harvest would include both live and dead trees. Pre-commercial thinning would take place on approximately 440 acres. The proposed thinning is within the proposed harvest units, therefore the total acres proposed for silvicultural treatment is 3,625. A detailed analysis of vegetative treatments can be found in section 7 of this Environmental Assessment. Road maintenance would take place on approximately 75 miles of existing access roads and approximately 5.6 miles of roads would be constructed to access harvest units.

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.*

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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.

Issues and Concerns for Soil Resources
The following issue statements were developed from internal scoping and compliance with laws and rules regarding the effects of the proposed timber harvest and road systems to soils. No public comments were received regarding geology and soil quality, stability and moisture.

* There is a concern that road construction and timber management activities on unstable geologic material may cause slope instability.

*There is a concern that forest management activities may result in increased erosion and reduced soil productivity where excessive disturbance from compaction, displacement, or loss of nutrients occurs, depending on the extent and degree of harvest related soil effects.

Recommended Mitigation Measures for Soil Resources

The analysis and levels of effects to Soil resources are based on implementation of the following mitigation measures.

* DNRC would implement all applicable Best Management Practices (BMP's), Montana Administrative Rules for Forest Management, and reasonable mitigation and erosion control practices during timber harvest, road maintenance, and road construction and road use activities. The commitments of the DNRC Habitat Conservation Plan (HCP) would be implemented on the applicable parcels.

* DNRC would locate, clearly mark and maintain suitable water resource protection boundaries including Streamside Management Zones (SMZ's), Riparian Management Zones (RMZ's), Channel Migration Zones (CMZ's) and Wetland Management Zones (WMZ's) adjacent to streams and wetlands consistent with State Forest Land Management rules, and the DNRC Habitat Conservation Plan (HCP) where applicable.

* Harvest operations and new roads would be located to avoid areas of slumps and slide prone areas.

* Limit harvest equipment and hauling operations to periods when soils are relatively dry, (less than 20%), frozen or snow covered to minimize soil compaction and rutting, and maintain drainage features. Check soil moisture conditions prior to equipment start-up. Portions of the access roads have clayey segments that tend to remain wet later into the spring and requires strict adherence to dry or frozen season of use to limit impacts in harvest units or damage to roads.

*Avoid dispersed skidding unless on snow or frozen ground. Some moister conditions are accepted on harvest units where tractors remain on designated trails and timber will be felled and bunched or winched to trails.

* On tractor harvest units the contractor and sale administrator will agree to a general skidding plan prior to equipment operations to limit trails to 15% or less of the harvest unit. Use existing skid trails, unless they are too steep or poorly located. Limit equipment operation to slopes less than 45%.

* On moderate to densely stocked stands, whole tree skidding can reduce slash hazard, but also remove a portion of nutrients from growing sites. Target is to retain 25% fine slash and 5-15 tons/acre woody debris on salvage areas with material well distributed on site while meeting the requirements of the slash law. In areas of whole tree skidding, a portion of fines and coarse woody debris would be return skidded on areas that less than 25% of fine fuels retained. On thinning sites with lower basal area, retain large woody debris as feasible since it may not be possible to retain 5 tons/acre and the emphasis will be on providing additional CWD in the future. Slash would be placed on main skid trails to protect soils and reduce erosion potential and potential unauthorized ATV use as needed.

* Existing road segments would be improved and maintained in association with the harvest activities. Road improvements would include surface blading, installation of drainage features to prevent surface erosion and sediment delivery to the stream, ditching to improve road surface stability, gravel surfacing of selected segments as needed and designated on site to comply with BMP'S, and to protect water quality.

* Road use will be limited to dry or frozen ground conditions to reduce rutting and erosion. New road construction, including drainage features should be completed in the fall prior to freeze-up. Check snow/frozen ground conditions prior to operations. Minimal effects are expected with snow road construction.

* Temporary low standard roads would be reclaimed. Road reclamation would consist of recontouring to near natural slopes, grass seeding, and covering in slash.

*A crossing/ culvert would be removed on a tributary to Bear Creek. The existing culvert would be removed, streambanks would be reshaped to stable cross sections, and road surface drainage would be installed. The road would be closed to traffic and grass seeded.

Predicted Effects on Soil Resources

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

The No-action alternative would be similar to existing conditions described in the attached soils report and would have little effect on soil resources. There would be no additive effect of ground disturbance from timber harvest operations or road construction and soil properties affected from previous actions would continue to recover to natural conditions. The estimates of existing impacts are approximately 10% as past trails and landings, depending on site locations. Existing access roads with inadequate drainage would continue to erode without maintenance.

Direct and Indirect, Effects of the Action Alternative on Soils

The primary risks to long term soil productivity and hydrologic function are excessive impacts to soil properties caused by rutting, compaction and displacement of surface soils by equipment operation and road construction. The most sensitive soils in the area are wet sites and small areas of steep slopes over 45% which will be avoided or protected with mitigation measures (refer to Mitigation Section attached).

For the proposed harvest, BMP's and mitigations would be implemented to minimize the area and degree of detrimental soil impacts (displacement, erosion, and compaction). Mitigations include general skid trail planning, limit ground based equipment to moderate slopes less than 45%, and avoiding wet areas by marking protection boundaries. Contract administration would monitor on-going operation to control soil disturbance to avoid excessive impacts and meet silvicultural goals to reduce competition. The proposed harvest and commercial thinning would mainly use historic, existing trails and landings which will reduce the area of potential soil impacts. The improved tree spacing is expected to improve growth of retained trees, due to reduced competition for soil nutrients and moisture.

Based on DNRC soil monitoring on comparable sites, implementation of BMP's and the recommended mitigation measures, has been shown to effectively limit soil impacts to less than 20% of the harvest units. Harvest operations present low to moderate risk of detrimental impacts to soil resources if impacts are restricted to ~20% of the proposed harvest areas. We expect that by protecting at least ~80% of a harvest area in non-detrimental soil impacts, soil properties important to soil productivity will be maintained. The estimates of existing impacts are approximately 10% and additional impacts from the proposed operations are expected to add no more than 5% = 15% projected. Within the 3,625 acres proposed for harvest, up to 544 ac. would be impacted as a combination of past skid trails and landings combined with new disturbances, based on up to15% combined detrimental impacts per acre. The estimates of harvest impacts on soils are based on field review and DNRC Soil Monitoring and comparison to similar treatments. Up to 5.6 miles of new roads (17 acres in area) would be constructed and 0.1 miles of streamside road would be reclaimed in Bear Gulch.

Ground based skidding would be limited to winter or adequately dry conditions. Harvest around the perimeter of wetlands would maintain protective wetland management zones to limit ground disturbance. The selective harvest/thinning of overstocked trees would improve tree spacing, reduce competition and improve growth of retained trees. Mitigations include winter season of use limits, and retaining a portion of woody debris and fine litter for nutrients and moisture retention to support mycorrhizae for best tree growth. The mycorrhizae fungal network is connected to plant roots and helps improve nutrient and moisture flow to plants.

The proposed harvest and road operations present low to moderate risk of excessive impacts to soils based on, implementation of BMP's and the recommended mitigation measures. Sale administrators will monitor soil conditions and the on-going harvest and road construction activities to meet contract requirements, BMP'S for soil and water protection and silvicultural objectives. For all of these reasons the proposed harvest operations and mitigation measures are expected to maintain soil properties important to plant growth and hydrologic function and present low risk of excessive direct and indirect impacts to soils.

Cumulative effects of the No-Action Alternative to Soils
Cumulative effects to soils can occur from repeated ground skidding entries into the harvest area, depending on area and degree of detrimental impacts. Previous harvest effects have largely recovered with 10% or lesser impacts based on site. No operations would occur and no change in cumulative effects would occur compared to existing conditions.

Cumulative effects of the Action Alternative to Soils
There is low risk of cumulative effects to soils with the proposed harvest based on use of existing roads, skid trail planning using existing trails where feasible and implementation of mitigation measures to limit the area impacted. We expect that effects would be less than 15% of the harvest area based on; modifications to harvest since BMP inception in 1989, implementation of mitigation measures that include season of use limits, skid trail planning to use existing trails where feasible and site specific measures near wetlands. Road drainage would be improved on existing haul roads across state and shared right of ways throughout the area. Up to 5.6 miles of new roads (17 acres in area) would be constructed and .1 miles of streamside road would be reclaimed in Bear Gulch.

Considering nutrient cycling, the level of tree mortality of pine has already caused many needles and fine litter to fall to the forest floor. Most needles and fine foliage that have not already fallen would be expected to break off during logging operations. On all proposed harvest areas a portion of old and new coarse woody debris (CWD >3" dia.) at ~5-15 tons/acre and a target of 25% fine litter (similar to historic ranges) would be retained or return skidded on harvest units. Coarse wood would be well distributed throughout the units and trampled. The combination of fine litter and coarse woody debris would maintain surface organic matter that provides media for healthy soil fungi and conserves soil nutrients and moisture important to tree growth. Improved tree spacing will reduce competition for nutrients and soil moisture, enhance growth of retained trees, and promote regeneration of conifers as noted in the vegetation section.

See attachment B for the complete 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.

Issues and Concerns for Water Quality and Quantity
The following issue statements were developed from internal scoping and compliance with laws and rules regarding the effects of the proposed timber harvest and road systems to water resources. No public comments were received regarding water quality and quantity.

* Water Quality- There is a concern that the proposed action may cause impacts to water quality from sedimentation that may occur and is associated with timber management activities, road construction and road use.

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

Recommended Mitigation Measures for Water Resources:

The analysis and levels of effects to Water resources are based on implementation of the following mitigation measures.

* DNRC would implement all applicable Best management Practices (BMP's), Montana Administrative Rules for Forest Management, and reasonable mitigation and erosion control practices during timber harvest, road maintenance, and road construction and road use activities. The commitments of the DNRC Habitat Conservation Plan (HCP) would be implemented on the applicable parcels.

* DNRC would locate, clearly mark and maintain suitable water resource protection boundaries including Streamside Management Zones (SMZ's), Riparian Management Zones (RMZ's), Channel Migration Zones (CMZ's) and Wetland Management Zones (WMZ's) adjacent to streams and wetlands consistent with State Forest Land Management rules, and the DNRC Habitat Conservation Plan (HCP) where applicable.

* Adjacent to Class 1 fish bearing streams, locate a 50 ft. no cut harvest boundary and a 100 ft. Riparian Management Zone (RMZ/CMZ) where 50% of representative standing trees would be retained in the 50-100 ft. strip that would be designated parallel to the stream.

* Harvest operations and new roads would be located to avoid areas of slumps and slide prone areas.

* Limit harvest equipment and hauling operations to periods when soils are relatively dry, (less than 20%), frozen or snow covered to minimize soil compaction and rutting, and maintain drainage features. Check soil moisture conditions prior to equipment start-up. Avoid dispersed skidding unless on snow or frozen ground. Portions of the access roads have clayey segments that tend to remain wet later into the spring and requires strict adherence to dry or frozen season of use to limit impacts in harvest units or damage to roads. Some moister conditions are accepted on harvest units where tractors remain on designated trails and timber will be felled and bunched or winched to trails.

* On tractor harvest units the contractor and sale administrator will agree to a general skidding plan prior to equipment operations to limit trails to 15% or less of the harvest unit. Prefer use of existing skid trails, unless too steep. Limit ground skidding equipment to slopes less than 45% on the short steep slopes. Feller-bunchers may work on slopes up to 45% as long as displacement and turning is minimized to prevent excessive disturbance.

* On moderate to densely stocked stands, whole tree skidding can reduce slash hazard, but also remove a portion of nutrients from growing sites. Target is to retain 25% fine slash and 5-15 tons/acre woody debris on salvage areas with material well distributed on site while meeting the requirements of the slash law. In areas of whole tree skidding, a portion of fines and coarse woody debris would be return skidded on areas with less than 25% of fine fuels retained. On thinning sites with lower basal area, retain large woody debris as feasible since it may not be possible to retain 5 tons/acre and the emphasis will be on providing additional CWD in the future. Slash would be placed on main skid trails to protect soils and reduce erosion potential and potential unauthorized ATV use as needed.

* Existing road segments would be improved and maintained in association with the harvest activities. Road improvements would include surface blading, installation of drainage features to prevent surface erosion and sediment delivery to the stream, ditching to improve road surface stability, gravel surfacing of selected segments as needed and designated on site to comply with BMP'S, and to protect water quality.

* Road use will be limited to dry or frozen ground conditions to reduce rutting and erosion. New road construction, including drainage features should be completed in the fall prior to freeze-up. Check snow/frozen ground conditions prior to operations. Minimal effects are expected with snow road construction.

*The improvement of existing stream crossings or removal of culverts would meet the applicable BMP's and requirements of the FWP 124 permit issued for specific sites for erosion control and stream protection.

* Temporary low standard roads would be reclaimed. Road reclamation would consist of recontouring to near natural slopes, grass seeding, and covering in slash.

*A crossing/ culvert would be removed on a tributary to Bear Creek. The existing culvert would be removed, streambanks would be reshaped to stable cross sections, and road surface drainage would be installed. The road would be closed to traffic and grass seeded.

Direct and Indirect Effects of the No- Action Alternative on Water Quality and Quantity
No direct or indirect effects to water quality or quantity would be expected to result other than those described under existing conditions. The majority of roads on the haul route meet BMP's. Sedimentation

on segments of existing roads with inadequate surface drainage would continue to impact water quality unless mitigations or remedial actions are taken. Continued insect mortality or wildfire may increase runoff and water yield relative to increasing canopy loss. There is a climate trend towards earlier snowmelt and declines in late summer stream flow based on recent 30 years comparisons of precipitation. Grazing management within the project drainages would continue and should gradually improve over time as inspections and management modifications are made.

Direct and Indirect Effects of the Action Alternative on Water Quality and Quantity
Land management activities such as timber harvest and road construction could impact water quality primarily by accelerating sediment delivery to local stream channels and draw bottoms. The primary risk to water quality is sediment delivery at stream crossings. Potential change in water yield is addressed under cumulative effects.

The proposed project would harvest up to 3,625 acres within the 9,260 acres of State land on the project parcels. Silvicultural treatments are a combination of salvage harvest, commercial and pre-commercial thinning.

Riparian management zones would be designated for stream protection where harvest units are adjacent to class 1 streams. No harvest would occur within 50 feet of Class 1 fishery streams. Throughout the project area, the stand potential tree heights vary from 80 to 100 feet adjacent to Class 1 streams. The RMZ distance is based on stand potential tree height. As a conservative approach and for ease of layout all RMZ protective widths were set at 100 feet where proposed harvest units are adjacent to Class 1 streams. No harvest is proposed within RMZ's adjacent to Lander's Fork or Copper Creek or within the TMDL listed drainages of the Blackfoot River.

Selection harvest would occur within the RMZ of 50-100 foot in the following stream segments listed in Table WS-2. Selection harvest would retain 50% or more of representative tree in the RMZ. All harvest operations are designed to minimize surface disturbance and potential for erosion and sediment delivery by implementing adequate stream and wetland buffers and would provide adequate protection of water quality. The riparian management zones proposed for harvest have moderate slopes and well established vegetative buffers, and there is low risk of sedimentation to surface waters from the proposed harvest operations, based on BMP and RMZ monitoring. Implementations of the requirements of the RMZ's, SMZ law and BMP's have proved effective in controlling erosion and protecting riparian zones (DNRC 2012). Sediment trapping research (Lakel et. al.) on the effectiveness of stream buffers, found that > 97% of watershed erosion was trapped by vegetation prior to entering streams for SMZ's of 25' or more.

Table WS-2 Proposed Riparian Management Zone Harvest

Section Legal	Section Name	Stream Name	Lineal feet RMZ Harvest	Acres RMZ Harvest
S34 T14N R9W	Bear Gulch	Unnamed trib to Bear Gulch	(1,365' X 2 sides) = 2,730'	3.1 acres
S 4 14N R9W	Beaver Creek	Beaver Creek	3,500'	4.0 acres
S 16 14N R9W	Lincoln Gulch	Beaver Creek	1,000'	1.1 acres
S 6 T14N R8W	Sucker Creek	Sucker Creek	Up to 500ft. in the 90-100 ft outside RMZ edge	0.1 acre

DNRC focused road design and location efforts to minimize the extent of new road construction, stream crossings and construction costs and includes temporary use roads where feasible. The proposed haul routes use largely existing roads. Road maintenance and site specific road recommendations would be implemented on up to 75 miles of existing roads to maintain, restore and improve road surface drainage to control erosion and comply with Best Management Practices and mitigation measures. Up to 5.6 miles of new road would be constructed to relocate and improve access to state parcels. There would be no increase in open road density. Road reclamation would occur on .1 miles of existing road and one eroded culvert would be removed in the Bear Creek drainage to reduce sedimentation and restore channel form and floodplain. One new stream crossing would be constructed on a tributary channel to Landers Fork.

There would be a temporary increase in sediment when the culvert is removed and the channel profiles are reestablished, but sediment is expected to be low, short term and will quickly subside, based on DNRC monitoring following culvert removals (DNRC 2012). All requirements of the 124 permit and erosion control measures would be implemented, at the proposed stabilization site to minimize erosion. Temporary use roads would be located for minimal construction. Following use, temporary roads will be closed, stabilized with long-term drainage features installed, and reseeded with site adapted grass to control erosion and compete with noxious weeds.

All requirements of the SMZ laws, Forest management rules, BMP's, 124 and associated stream permits and DNRC Habitat Conservation Plan (HCP). Grazing management within the project drainages would continue and should gradually improve over time as inspections and management modifications are made, especially to the three impacted sites identified. Harvest design is consistent with TMDL mitigations for the Upper Blackfoot River. Based on implementation of Best Management Practices, site specific mitigations, and all rules and agreements, the proposed timber harvest and road construction is expected to result in moderate short term risk of low to moderate direct or in-direct water quality impacts due to erosion and sediment delivery.

Cumulative Watershed Effects of No-Action Alternative
Cumulative watershed effects can be characterized as impacts on water quality and quantity that result from the interaction of past, current or foreseeable future disturbances, both human-caused and natural such as wildfires and mortality. Timber harvest activities can affect the timing of runoff, increase peak flows and increase the total annual water yield of a particular drainage. Low to moderate cumulative effects of timber harvest, agricultural use, grazing, roads and irrigation diversions have occurred in the project area drainages since the late 1800's. Based on aerial photos and site reviews, the more extensive timber harvests and road construction on adjacent ownership area occurred between 1960 to 2000.Past management activities in the proposed project areas include timber harvest, grazing, road construction, mining, irrigation diversions, agriculture, fire suppression and recreation. Recent timber harvest projects in the general area include: Beaverlodge Timber Sale, Lincoln South Timber Sale, Liverstone Timber Sale and minor salvage permits. On each of the previous sales, road conditions and stream crossings that did not meet BMP's were improved to meet BMPS. A DNRC programmatic, BMP audit was completed on a salvage permit in 2012 to monitor administration and mitigations, and operations were found to be in compliance with all BMP's and SMZ rules. On the Landers Fork section a SMZ violation occurred where there was minor traffic within the outside edge of an overflow channel. There was very minor ground disturbance, no sediment source to the stream, and no corrective action was needed. Under the no-action alternative, cumulative effects would remain the same as described in existing conditions.

Cumulative Watershed Effects of the Action Alternative:
There would be low risk of adverse cumulative impacts from the proposed action, to water quality and beneficial uses based on implementation of BMPs, Rules, HCP requirements and mitigation measures during timber harvest and road construction operations. Within the cumulative effects analysis area, DNRC has proposed to harvest dead, high risk and overstocked trees from up to 3,625 acres in the project areas.

The proposed harvest includes salvage of trees that are dead, dying and at high risk of insect mortality and comprises 30-60% of stand volume in proposed DNRC harvest areas. Sites that are thinned would also reduce competition and promote faster growth and improved water efficiency by retained trees. There is low potential for surface runoff or measurable water yield increases from the proposed harvest and thinning, compared to no-action based on the water yield estimates in table WS-2. Over 80% of harvest sites are located on relatively low rainfall sites with less than 22 inches annual precipitation where evapotranspiration and soil infiltration rates exceed precipitation levels and surface runoff is unlikely, even during storm events.

Research has shown that water yield is not likely detectable (MacDonald & Stednick. 2003, Romme et.al.2006) for these low precipitation levels of less than 20 inches annually, even with aggressive harvests, and the proposal is low to moderate selective harvest over a broad area, using existing roads. There would continue to be moderate impacts of existing water yield increases in Copper Creek and Lander's fork drainages where fire has affected large portions of the watersheds combined with historic land management and mining activities. The minor 20 acres of salvage harvest in the Copper Creek

drainage and 152 acres in Landers Fork would affect less than 0.2% of the drainage is not expected to measurably impact water quality or water yields compared to no-action.

For all these reasons there is low risk of additive cumulative watershed effects associated with proposed actions to increased water yield or potential change in stream channel forms or flow regimes as compared to the no-action alternative and natural ranges associated with disturbances such as tree mortality and fire.

One culvert crossing of an unnamed tributary to Bear Creek would be removed and up to .1 miles of road adjacent to the stream would be reclaimed and stabilized to reduce sedimentation at the crossing sites. There would be a short term pulse in sediment at the site of the culvert removals that would subside quickly and there would be a long term reduction in sediments at these crossings.

In summary, the proposed road relocation, crossing removals, road reclamation, road drainage improvements, and road maintenance would reduce current sediments and maintain or improve water quality. The proposed ground based timber harvest is expected to result in low risk of erosion and sediment delivery to streams. All streams would be protected by implementation of the SMZ law and RMZ requirements consistent with rules and HCP requirements. The harvest of mainly dead, dying and beetle infested pine and thinning of mixed tree species to improve spacing and growth would have moderate risk of low impacts to water quality, the amount or timing of runoff (water yield), or stream stability from the proposed project area when compared to the effects anticipated under no action.

See attachment B for the complete watershed 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.

The DNRC is a member of the Montana/Idaho Airshed Group which was formed to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction (Montana/Idaho Airshed Group 2006). The Group determines the delineation of airsheds and impact zones throughout Idaho and Montana. Airsheds describe those geographical areas that have similar atmospheric conditions, while impact zones describe any area in Montana or Idaho that the Group deems smoke sensitive and/or having an existing air quality problem (Montana/Idaho Airshed Group 2006).

The project area is primarily in Airshed 6 which encompasses all of Lewis and Clark County. This airshed does not contain any impact zones. Section 16 township 14 north range 10 west, is the only parcel proposed for management that is not located in airshed 6. It is located in airshed 3B which includes all of the Blackfoot drainage in central Powell County. This section is located in Arrastra Creek, approximately 10 miles west of Lincoln, which is the nearest heavily populated area. Generally speaking the proposed project surrounds Lincoln. Numerous residential properties are found interspersed throughout the project area. The Scapegoat Wilderness area lies approximately 12 miles north of the project area. This wilderness area exceeds 5,000 acres and as such, is considered a Federal Class I Area that ultimately receives protection under the Federal Clean Air Act of 1977.

Alternative A - No Action

Under the No Action Alternative, no slash piles would be burned within the project areas. Thus, there would be no effects to air quality within the local vicinity and throughout Airsheds 6 and 3B.

Alternative B – Timber Harvest (Action)

Under the Action Alternative, slash piles consisting of tree limbs and tops and other vegetative debris would be created throughout the project area during harvesting. These slash piles would ultimately be burned after harvesting operations have been completed. Burning would introduce particulate matter into the local airshed, temporarily affecting local air quality. Over 70% of emissions emitted from prescribed burning is less than 2.5 microns (National Ambient Air Quality PM 2.5). High, short-term levels of PM 2.5 may be hazardous. Within the typical column of biomass burning, the chemical toxics are: Formaldehyde, Acrolein, Acetaldehyde, 1, 4 Butadiene, and Polycyclic Organic Matter.

Burning within the project area would be short in duration and would be conducted when conditions favor good to excellent ventilation and smoke dispersion as determined by the Montana Department of Environmental Quality and the Montana/Idaho Airshed Group. Prior to burning a "Prescribed Fire Burn Plan" would be done for the area. 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.

Burning that may occur on adjacent properties in combination with the proposed action could potentially increase cumulative affects to the local airshed and the Class I Areas. The United States Forest Service and large scale industrial forestry operations in the area participate as airshed cooperators and operate under the same Airshed Group guidelines as the DNRC. Non-industrial timberland operators are regulated by the Montana Department of Environmental Quality and burning is only allowed during seasons that provide good ventilation and smoke dispersion. Thus, cumulative effects to air quality due to slash pile burning associated with the proposed action would also be expected to be minimal.

Harvesting and log hauling could create dust which may affect local air quality. Harvesting operations would be short in duration and could occur during the winter months that would minimize dust dispersal. 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.

Issues and Concerns for Vegetative Resources

The following list of issues was developed during scoping and project development. Each is analyzed in detail below.

*There is concern losses of timber volume and growth potential are occurring due to insect and disease conditions and overstocking within the project area.

*Noxious weed infestations occur within the project area. There is concern these infestations could spread due to logging.

*There is concern new noxious weeds could be introduced during the proposed timber harvest.

Issues dismissed from further review

**There is concern the proposed project could negatively impact rare plants*

This issue has been dismissed from further study because no rare plants have been identified within the project area through field surveys or a search of the Montana Natural Heritage Program. Therefore no direct, indirect, or cumulative impacts to rare plants would be expected under either alternative.

Recommended Mitigation Measures for Vegetative Resources

*Conduct silvicultural treatments on approximately 3,625 acres to reduce insect and disease infestations and improve growth potential by decreasing tree competition for nutrients and sunlight.

*All road construction and timber harvest equipment will be cleaned of plant parts, mud and weed seed to prevent the introduction of new noxious weeds. Equipment will be subject to inspection by the forest officer prior to moving on site.

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

*Weed treatments will include roadside and spot herbicide treatment of noxious weeds. Where herbicide treatments are required by the forest officer, herbicide must be applied under the supervision of a

licensed applicator following label directions in accordance with the Department of Agriculture regulations, applicable laws and rules and regulations of the County Weed Board.

*DNRC will monitor the project area to evaluate weed control measures implemented and determine if any new noxious weeds establish that were not previously identified.

Recommended Mitigations and Adjustments of Standard Vegetative Treatments for the Benefit of Other Resources

*Snags, snag recruits, and coarse woody debris will be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch and ponderosa pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.

*Provide visual screening for grizzly bears by designing new clearcut and seed tree units such that no point in the unit is more than 600 feet from vegetation or topographic break.

*Break up sight distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx by retaining of patches of advanced regeneration of shade-tolerant trees, such as subalpine-fir and Engelmann spruce.

* Provide connectivity for fisher, Canada lynx, grizzly bears, and a host of other species by maintaining corridors of unharvested and/or lighter harvested areas along riparian areas, ridge tops, and saddles.

* Adjacent to Class 1 fish bearing streams, locate a 50 ft. no cut harvest boundary and a 100 ft. Riparian Management Zone (RMZ/CMZ) where 50% of representative standing trees would be retained in the 50-100 ft. strip that would be designated parallel to the stream.

Analysis Methods

Methods used in the analysis included:
*Review of Stand Level Inventory (SLI)
*Field visits
*Review of Scientific Literature
*Review of Remote Sensing Imagery
*Consultation with other professionals

Existing Conditions

Noxious Weeds – Existing Conditions

Noxious weeds infestations are mainly a combination of spotted knapweed, houndstongue and spots of thistle which occur along portions of the existing access road system, open forest and rangeland sites. Noxious weeds occurring in the project parcels are mostly knapweed (Centaurea maculosa), houndstongue (Cynoglossum officinale L) and spot infestations of thistle (Cirsium arvense) within project sections and on adjacent lands. Knapweed (Centaurea maculosa) was found along roadsides as well as in some forested portions of the project area. Houndstongue was found mostly along roadsides along the access haul routes. Yellow toadflax (Linaria vulgaris) also occurs in the Lincoln area and is mainly a concern in the Lander's Fork area, where toadflax occurs along the open roads and stream bottom. Historic cattle grazing, timber harvest activities, and recreational uses, are most likely the reasons for the existing rate of spread of noxious weeds and the potential future spread and introduction of noxious weeds. Reseeding of some roadcuts followed by roadside and spot herbicide treatments have been made on noxious weeds on portions of all of the project sections that has reduced the infestation and spread of noxious weeds. Yet weeds continue to spread by wind, animals and vehicles. Weed management treatments on adjacent ownerships in the area varies from no-action to combinations of revegetation, herbicide treatments and bio-control measures.

Standard Vegetative Community – Existing Conditions

The analysis area for the standard vegetative community will contain state owned portions of section 2 T. 13N., R 9W. sections 4, 6, 8, 10, 16, 22, 28, and 34 T. 14N., R 8W. sections 1, 2,3,4,9,16, 26, 28, and 34 T. 14N., R 9W section 16 T. 14N., R 10W. section 16 T. 15N., R. 7W section 36 T. 15N., R. 8W.

The total project area is 9,260 acres, however Stand Level Inventory data is not available for 1,550 acres of the analysis area because the land was purchased recently (December 2006) as part of the Blackfoot Community Project. This land is former commercial timberland. It is mostly well stocked sapling and small timber size class stands dominated by lodgepole pine on northerly aspects and ponderosa pine on southerly aspects. Douglas-fir is a component of these stands on almost all sites. Mountain pine beetle and spruce budworm are killing trees throughout these lands. Due to the lack of SLI data and the relatively recent acquisition these stands will be considered meeting desired future conditions and will not be analyzed in further detail.

The stands proposed for harvest vary widely in age, structure and species composition. However, all stands in the project area contain trees of poor health and vigor. This poor health and vigor is primarily due to the ongoing mountain pine beetle (*Dendroctonus pseudotsugae*) and spruce budworm (*Choristoneura occidentalis*) epidemics. Recent DNRC projects in the Lincoln area have been focused on salvage harvest. In the last ten years, within the proposed project area, 16 timber sales have harvested approximately 12,500 MBF from approximately 1,860 acres. Of this harvest approximately 1,590 acres and 10,800 MBF was salvage harvested. The remaining 270 acres was commercially thinned. In many of these harvest units the remaining trees are in poor health and vigor.

While most of the lodgepole pine trees in the project area have been salvage harvested, the remaining trees are in very poor health. Approximately 75% of the mature lodgepole pine trees in the project area have been killed by the mountain pine beetle. In remaining live lodgepole pine trees dwarf mistletoe (*Arceuthobium americanum*) is infecting approximately 50% of the mature trees and in some areas nearly all of the lodgepole pine regeneration is infected. In certain areas western gall rust (*Peridermium harknessii*) is infecting nearly all lodgepole pine regeneration. Nearly all Douglas-fir trees in project area are suffering some level of defoliation from spruce budworm. Across the project area approximately 25% to 35% of the mature Douglas-fir trees have suffered heavy enough defoliation to result in top kill. In some areas top kill is as high as 75% with outright tree mortality also occurring in mature trees. Understory Douglas-fir has been heavily defoliated throughout the project area resulting in top kill, tree mortality, and decreased growth rates.

The 7,710 acre analysis area is approximately 83 percent forested with Douglas-fir (28%) and ponderosa pine (28%) being the dominant cover types. Numerous other cover types exist within the project area. Compared to modeled desired future conditions the following cover types are over represented; Douglas-fir, Sub-alpine fir, mixed conifer, and non-stocked lands. Compared to modeled Desired Future Conditions the following cover types are underrepresented; ponderosa pine, Douglas-fir/Western larch, and lodgepole pine. Overall, approximately 83 percent of the project area has a cover type that meets the modeled desired future condition.

At the larger scale, DNRC lands managed by the Clearwater Unit are approximately 85% forested, mostly in the ponderosa pine and western larch/Douglas-fir cover types. Compared to the desired future condition at this scale, Douglas-fir, subalpine fir, and mixed-conifer cover types are slightly over-represented while ponderosa pine and western larch/Douglas-fir are slightly under-represented. Overall, however, about 84% of these lands do have a cover type that matches the desired future condition. This area falls within climatic section 332B, which was historically about 79% forested. Within the climatic section, the historically dominant cover type was lodgepole pine, followed by Douglas-fir and ponderosa pine on lower slopes (Losensky, 1997).

Age class distributions in conjunction with other forest stand characteristics are useful in determining general historic conditions for inferring desired future conditions. Table 7-1 displays historic age class distribution for the Bitterroot-Blackfoot Climatic Section and current age class distribution for the project area and larger Clearwater Unit. Stands 0-39 years of age are under-represented compared to the historical condition for the Clearwater Unit and analysis area landscape. Stands greater than 150 years of age are slightly under-represented at the Clearwater Unit (2%) and project levels (2%) when compared to the historical condition. This deviation from historical conditions can partially be explained by successful fire suppression increasing the interval between large, stand replacement fires and logging practices that did not necessarily create a similar disturbance to a wildfire.

Table 7-1 Historic and Current Age Class Distribution

Percent of Analysis Area by Age Class Group (years):					
Analysis Area	00 – 39	40- 99	100 - 149	150-199	200+
Bitterroot-Blackfoot Climatic Section (historic)	29%	29%	21%	21%	
Clearwater Unit*	7%	24%	34%	12%	7%
Upper Blackfoot Timber Management Project Area**	10%	14%	53%	11%	9%

***Approximately 16% of the Clearwater Unit does not have age data.**
**** Approximately 20% of The Upper Blackfoot Timber Management Project does not have age data.**

DNRC has adopted old-growth definitions based on minimum age and number of large live trees as described in Green et al. (1992). Based on Stand Level Inventory age data and field reconnaissance approximately 445 acres of old growth exists on the project area. At the larger scale approximately 4,087 acres of old growth currently exist on the Clearwater Unit.

Predicted Effects on Vegetation

Direct and Indirect Effects of the No-Action Alternative on Noxious Weeds

With no action, noxious weeds will continue to spread along roads and may increase on the drier site habitats. Following disturbance events such as timber harvest activities, fires, or grazing, the establishment and spread of noxious weeds can be more prevalent than in undisturbed areas. DNRC would treat selected sites on DNRC roads based on priorities and funding availability. If new weed invader species are found they would have highest priority for management. The grazing licensees would be required to continue weed control efforts consistent with their use.

Cumulative Impacts of No-Action Alternative on Noxious Weeds

Impacts of noxious weeds within the project areas are moderate. Weeds have spread through the drainage across ownerships over time and are prone to more dispersal along open roads. Weeds also have spread by multiple uses from wind, traffic, forest management and wildlife. Current weed infestations are mainly limited to roadsides within the project parcel and open forest sites. No control occurs along the main county access road, and this increases the potential for windblown seed. Timber harvest and roads throughout these drainages has increased grass growth and the risk for noxious weeds to spread though ground disturbance. As tree density and vegetation increase, weeds are reduced through vegetative competition.

Direct and Indirect Effects of the Proposed Action Alternative on Noxious Weeds

The action alternative will involve ground-disturbing activities that have the potential to introduce or spread noxious weeds in susceptible habitat types. For the action alternative, an Integrated Weed Management (IWM) approach was considered for treatment of existing and prevention of potential noxious weeds. For this project: prevention, revegetation and weed control measures for spot outbreaks are considered the most effective weed management treatments. Prevention measures would require off-road equipment to be cleaned. Roadsides would be sprayed prior to operations. Weed control and revegetation would slow noxious weed spread and reduce weed density and occurrence compared to no-action. There would be a similar or potential slight increase in weed infestation within harvest units due to soil disturbance and reduction of tree canopy. The silvicultural prescriptions are designed to control disturbance and scarification to goals need for sustained forest growth. Control efforts will promote rapid revegetation and emphasize treatment of any new noxious weeds found.

Herbicide application would be completed on segments of DNRC roads along the haul route, to reduce weed spread along roads and promote desired vegetation for weed competition and to reduce sedimentation. Herbicide would be applied according to labeled directions, laws and rules, and would be applied with adequate buffers to prevent herbicide runoff into surface waters. Implementation of IWM measures listed in the mitigations would reduce existing weeds, limit the possible spread of weeds, and improve current conditions, to promote existing native vegetation. More weed control would occur compared to the no-action alternative and grass and competitive vegetation would increase along roads.

Cumulative Effects of the Proposed Action Alternative on Noxious Weeds
Impacts of noxious weeds within the project areas are moderate. Weeds have spread through the project areas across ownerships over time, mainly along roadsides and open forest sites with multiple uses and by seed dispersal from wind, traffic and wildlife. Timber harvest throughout these drainages has increased grass growth and the risk for noxious weeds to spread though ground disturbance. Within the project area, overall cumulative effects of increased noxious weeds are expected to be low to moderate, based on herbicide treatments of existing weeds along roads and implementing prevention measures to reduce new weeds, by cleaning equipment and planting grass on roads to compete against weeds.

Direct, Indirect, and Cumulative Effects of the No-Action Alternative Standard Vegetation
No large scale timber harvest would occur at this time. Small timber permits, firewood permits, grazing, and pre-commercial thinning projects would likely continue. Stagnant overstocked stands would not be harvested and regenerated, resulting in continued unrealized growth potential. The mountain pine beetle would likely continue to kill trees. Defoliation from western spruce budworm would likely continue, resulting in growth loss and possible mortality. Some openings in the canopy from tree mortality would be expected. Over time, natural regeneration would be expected in these openings. With the expected tree mortality stand ages in the project area would decline. It is likely some stands would no longer meet age and size class requirements to be considered old growth. Overall, the no action alternative would result in a high likelihood of moderate impacts beyond the existing conditions based on continued mortality and stagnation in existing stands beyond what currently exists.

Alternative B – Timber Harvest (Action)
The proposed action alternative would harvest approximately 14 MMBF from approximately 3,625 acres. The harvest would be designed not only to capture the value of dead, dying and at risk timber, but also to emulate natural disturbance and promote desired future conditions (table 7-2).

Table 7-2: Existing and Projected Cover Types for the Proposed Timber Harvest Alternative

Cover Type	Current Acres	Current Percent of Project Area	Desired Future Condition Percent of Project Area	Post Harvest Acres	Post Harvest Percent of Project Area
Douglas-fir	2,179	28%	16%	1,730	22%
Ponderosa pine	2,192	28%	43%	3,084	40%
Non-forested	1,293	17%	17%	1,293	17%
Lodgepole pine	989	13%	18%	974	13%
Sub-alpine fir	393	5%	1%	104	1%
Mixed Conifer	291	4%	1%	99	1%
Non-stocked	162	2%	0%	161	2%
Western larch/ Douglas-fir	155	2%	4%	209	3%
Hardwoods	56	< 1%	< 1%	56	1%
Total (excluding uninventoried lands)	7,710	100%	100%	7,710	100%

The following silviculture prescriptions (table 7-3) would be used based on the current health of the stand, emulating natural disturbance and to promote desired future conditions: uneven-aged management, overstory removal clearcut, seedtree, shelterwood. Where needed mitigations described in Recommended Mitigation Measures of Standard Vegetative Treatments for the Benefit of Other Resources (page 14) would be implemented.

Table7-3: Proposed Harvest by Silviculture Prescription

Silviculture Prescription	Acres	MBF proposed for harvest
Uneven-aged Management	820	2,870
Overstory Removal	1,320	4,165
Clearcut	195	670
Seedtree	425	2,345
Shelterwood	865	3,950
Total	3,625	14,000

Approximately 820 acres of **Uneven-aged management** would be used to mimic the natural disturbance of a frequent fire regime. It would generally be used on sites having a ponderosa pine cover type and where ponderosa is the desired future condition. Approximately half of the volume and 65% of the trees would be removed under this prescription. Establishing a new age class and increasing stand health and vigor are the primary goals of the proposed uneven-aged management harvests. The proposed harvest would reduce competition among trees in the stands resulting in higher growth rates for individual trees and less susceptibility to insects and disease. If time and funding allow, overstocked seedling and sapling sized, trees within these stands would be pre-commercially thinned.

Overstory Removal would be used on approximately 1,320 acres that have been harvested in the past and have adequate regeneration. The harvest is designed to harvest those trees that were left in a previous shelterwood or seedtree harvest that mimicked a stand replacement fire regime. The primary purpose of the proposed overstory removal harvests is to; create only one canopy layer thus making the stand less susceptible to spruce budworm defoliation, (Fellin 1986) (USDA Forest Service 2011) reduce the competition within the stand, and salvage the economic value of dead, dying, or at risk overstory trees. The proposed overstory removal would remove all mature trees except one large snag (>21 in. dbh) and one large snag recruit tree (>21 in. dbh) per acre. Target condition for these stands is approximately 300 seedling/sapling trees per acre, with preference toward leaving ponderosa pine, and at least one large snag and recruit per acre. To reach this target, pre-commercial thinning will be required on approximately 440 acres. Unhealthy non-merchantable trees would be slashed in all stands.

Clearcut silviculture prescriptions will be used on approximately 195 acres where stand health is so poor no adequate seed trees exist, or where no adequate seed trees of the desired species exist. The proposed clearcut harvests would mimic stand replacing fire regimes. The proposed clearcut harvest would remove all trees from within the stand except as outlined in Recommended Mitigations and Adjustments of Standard Vegetative Treatments for the Benefit of Other Resources.

Approximately 425 acres of **Seedtree** harvests would be used to mimic stand replacing fire regimes and promote seral species, particularly ponderosa pine. Generally those stands proposed for seed tree harvest are in very poor health and are moving away from desired future conditions as a result of fire suppression. However they do have adequate healthy trees of the appropriate species to leave approximately 6 to 10 trees per acre to produce seed for natural regeneration. Additionally, one snag per acre would be retained. Leave trees would be the best trees in the stand with good form and vigor and the desired species. Many of the stands proposed for seedtree harvest have advanced regeneration but it has been severely defoliated by the spruce budworm, or is infected with western gall rust. Therefore it would be slashed as part of this project to provide growing space for new seedlings.

On approximately 865 acres **shelterwood** harvests would be employed to mimic a mixed severity fire. Under this silvicultural system approximately 35 leave trees per acre would remain following harvest.

Leave tree species would be site specific, where available ponderosa pine would be the most desired leave species followed by Douglas-fir, then other species. These trees would provide seed and shade for natural regeneration. Natural regeneration of desired species would be expected within approximately five years, with a target regeneration level of approximately 300 trees per acre.
Under the action alternative approximately 242 acres of old growth would be harvested and no longer meet old growth requirements. However, following harvest approximately 170 acres of the stands would still retain old growth characteristics, such as large trees and downed woody debris. This would reduce the old growth on the Clearwater Unit to approximately 3,845 acres, a change of approximately 0.3%.

At a larger scale the proposed harvest represents approximately 5% of the Clearwater Unit land base. The proposed timber harvest, in combination with timber harvests completed in the last ten years and on-going projects represents approximately 20 percent of the Clearwater land base (76,414 acres). Many of these projects have been salvage harvest operations. However all projects have been designed to maintain or promote desired cover types on the project areas thus contributing to the trend toward desired future conditions on the Clearwater Unit.

Under the proposed action alternative there would likely be a low risk of negative direct or indirect effects beyond the existing condition. When compared to the no action alternative, the proposed action alternative would likely result in positive effects of increasing stand vigor, maintaining stands in or moving them towards desired future conditions, and a decreased timeframe for regeneration.

References:

Fellin, D.G., and J.E. Dewey. 1986. Western spruce budworm. USDA Forest Service, Forest Insect and Disease Leaflet 53.

Furniss, R.L. and V.M. Carolin. 1977. Western Forest Insects. USDA Forest Service. pg. 168.

Hawksworth, F.G. and O.J. Dooling. 1984. Lodgepole pine dwarf mistletoe. USDA Forest Service, Forest Insect and Disease Leaflet 18.

Peterson, R. 1960. Western gall rust on hard pines. USDA Forest Service, Forest Insect and Disease Leaflet 50.

USDA Forest Service. 2011. Forest insect and disease management guide for the northern and central Rocky Mountains.

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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.

The following list of wildlife-related issues were raised during project scoping and project development. Each is analyzed in detail in the wildlife analysis included at the end of this document (see Attachment D)

Terrestrial and Avian Issues and Concerns

There is concern that proposed activities could alter forested connectivity and/or wildlife corridors, which could affect wildlife movements across the landscape.

There is concern that the proposed activities could alter cover, increase access, and reduce secure areas, which could affect grizzly bears by displacing them from important habitats and/or increasing risk to bears of human-caused mortality.

There is concern that the proposed activities could negatively affect Canada lynx by altering lynx summer foraging habitat, winter foraging habitat, and other suitable habitat, rendering it unsuitable for supporting lynx.

There is concern that the proposed activities could negatively affect bald eagles by reducing nesting and perching structures and/or disturbing nesting bald eagles

There is concern that the proposed activities could reduce the amount and/or quality of fisher habitats, which could alter fisher use of the area.

There is concern that the proposed activities may alter flammulated owl habitat by reducing canopy closure and increasing tree spacing, and could remove snags needed by flammulated owls for nesting.

The proposed activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.

There is concern that the proposed activities could reduce suitable nesting and foraging habitat for pileated woodpeckers, which could alter pileated woodpecker use of the area.

There is concern that the proposed activities could reduce the amount and/or quality of wolverine habitats, which could alter wolverine use of the area.

There is concern that the proposed activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range

There is concern that the proposed activities could remove big game security cover, which could affect hunter opportunity and local quality of recreational hunting.

There is concern that the proposed activities could alter northern goshawk habitats and/or displace nesting goshawks from active nests, resulting in increased mortality to goshawk chicks.

Issues Eliminated from Further Study

The following species were considered but eliminated from detailed study due to lack of habitat present: black-backed woodpecker, Coeur d'Alene salamander, Columbian sharp-tailed grouse, common loon, harlequin duck, mountain plover, northern bog lemming, peregrine falcon, and Townsend's big-eared bat. Thus there would be a low risk of adverse direct, indirect, or cumulative effects as a result of either alternative.

Suggested Wildlife Mitigations

- A DNRC biologist will be consulted if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435) are needed.

- Motorized public access will be restricted at all times on restricted roads that are opened for harvesting activities; motorized public access would revert to existing levels following harvesting. Efforts to discourage additional motorized access (legal and illegal) by reclaiming temporary roads and obstructing skid trails would benefit several wildlife species.

- Snags, snag recruits, and coarse woody debris will be managed according to *ARM 36.11.411* through*36.11.414*, particularly favoring western larch and ponderosa pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.

- Contractors and purchasers conducting contract operations will be prohibited from carrying firearms while on duty.

- Food, garbage, and other attractants will be stored in a bear-resistant manner.

- Harvesting would be prohibited between April 1 and June 15 to minimize the potential for disturbance to grizzly bears, bald eagles, red-tailed hawks, and a host of other avian species.

- Provide visual screening for grizzly bears by designing new clearcut and seed tree units such that no point in the unit is more than 600 feet from vegetation or topographic break.

- Break up sight distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx by retaining of patches of advanced regeneration of shade-tolerant trees, such as subalpine-fir and Engelmann spruce.

- Minimize potential for disturbance to nesting bald eagles by restricting harvesting and related activities in nest and primary use areas between February 1 and August 15.

- Minimize potential for disturbance to nesting northern goshawks by restricting harvesting and related activities within 0.5 miles of last known nest along Bear Creek between April 1 and July 15.

- Provide connectivity for fisher, Canada lynx, grizzly bears, and a host of other species by maintaining corridors of unharvested and/or lighter harvested areas along riparian areas, ridge tops, and saddles.

Aquatic Life and Habitats

Ten analysis areas are considered in the fisheries resources assessment for the UBTMP. Existing moderate to high cumulative impacts to fisheries resources are likely across all analysis areas, except Lincoln Gulch and Copper Creek. An existing moderate cumulative effect to fisheries resources is expected in Lincoln Gulch and Copper Creek. The elevated existing cumulative effects are primarily related to the presence and consequent to effects from nonnative fish species.

As a result of implementing the proposed actions, low to moderate direct and indirect impacts may occur to channel forms, and low direct and indirect impacts may occur to stream temperature. These potential direct and indirect impacts could affect native fisheries associated with these resources. These potential effects would also be in addition to those direct and indirect effects already occurring.

As part of the consideration of cumulative effects, all direct, indirect and other related existing impacts described in the Fisheries Resources analysis (attached) would be expected to continue. Additionally, low to moderate direct and indirect existing impacts may occur to channel forms, and low direct and indirect existing impacts may occur to stream temperature as a result of implementing the proposed actions. Considering all of these impacts collectively, moderate to high cumulative impacts to fisheries resources are expected across all analysis areas, except Lincoln Gulch and Copper Creek. A moderate cumulative effect to fisheries resources is expected in Lincoln Gulch and Copper Creek. The foreseeable cumulative effects to fisheries resources are fundamentally unchanged from the existing conditions, and they would remain elevated and slightly variable primarily due to the presence and consequent adverse impacts from nonnative fish species.

Internal and any public issues raised with regard to fisheries resources have been addressed through the attached detailed assessment.

See attachment C for fisheries analysis and attachment D for 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.

Unique and/or endangered fisheries and terrestrial species analyses are included in attachment C and attachment D of this document.

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10. HISTORICAL AND ARCHAEOLOGICAL SITES:

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

A DNRC archaeologist has reviewed the proposed project. The proposed project lies in areas that have been inventoried for cultural resources during the Environmental Analysis of previous projects. During those reviews historic and prehistoric cultural resources have been identified in the project area. Those resources consist of cairns, road routes, trail routes, lithic scatters, homestead locales/remnants, a grave, and irrigation ditches.

The no action alternative would not have any direct, indirect, or cumulative effects to these sites.

Under the proposed action alternative a DNRC archaeologist would be consulted during harvest design to ensure harvest operations avoid these sites. If any historical or archaeological sites are discovered during the course of the project they would be protected and a DNRC archaeologist would be notified immediately.

Therefore the proposed action alternative would not be expected to have any direct, indirect, or cumulative effect on historical or archaeological resources.

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.

The proposed project is located on scattered lands surrounding Lincoln, Montana. Harvest units would be visible from highway 200 and nearby residences. Public roads go through portions of the project area and are used year-round by local landowners and recreationists. Much of the traffic that drives through the area is accessing National Forest land including the Scapegoat Wilderness Area. The area is also used by walk-in recreationists for activities such as hunting.

Alternative A - No Action

If the No Action Alternative were selected tree mortality on the parcels would be noticeable to varying degrees. Where these stands are visible from public areas or public access is allowed the tree mortality would first be noticed by red needled trees. This would be noticeable both in the foreground, from within the stand, and in middleground and distance viewing from select vantage points. Over time these trees would lose their needles, leaving just the bole of the tree standing, and the forest would appear more open. Eventually the dead trees would fall over creating an open forest with a deep layer of toppled over trees.

Alternative B – Timber Harvest (Action)

If the action alternative were selected the visual impact of harvest would vary greatly based on silviculture prescription, steepness of slope, visibility of harvest from high use areas and distance from viewpoints. Approximately 820 acres would be treated using uneven aged management and 865 acres would be treated using a shelterwood harvest. These areas would retain a forested appearance with numerous healthy mature trees remaining in these stands. Approximately 1,320 acres would be harvested using an overstory removal prescription. In this prescription all mature trees would be removed except two wildlife trees per acre. Wildlife trees would be a combination of dead or live trees, at least 21" in diameter or the largest trees on site if no trees over 21 inches are available. This prescription is being utilized in areas that have fully stocked and healthy stand of regeneration growing under a canopy of mature trees from a previous harvest. If viewed in the foreground, the removal of these overstory trees and skid trails through the regeneration would be noticeable. Except to the trained observer overstory removal would not be noticeable from a distance. Approximately 620 acres would be harvested under a seedtree or clearcut harvest. These harvests would remove all, or nearly all of the trees from an area creating a drastic change in appearance in foreground, middleground and distant viewing. While this change is drastic it is not out of the ordinary for the local area. None of the areas proposed for these treatments are visible from heavily populated areas, but they would be visible to people travelling the Sucker Creek Road on the Helena National Forest and to walk-in recreationists.

Should some of the proposed actions take place during the summer, skidding equipment and log trucks may cause dust clouds. These would quickly disperse and only occur during harvest. Some noise from harvesting equipment and log hauling may be heard within the project area and on haul routes.

The potential effects of each alternative would be perceived differently by different people, but overall it could be said that the Action Alternative would likely result in a high risk of low to moderate direct, indirect, or cumulative effects, beyond what is expected under the No Action Alternative.

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 negative direct, indirect or cumulative effects are expected to occur as a result of the no action or the proposed action alternative.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

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

State Forest Land Management Plan EIS, DNRC 1996, set the strategy that guides DNRC management decisions statewide.

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.

Liverstone Park Timber Sale EA, DNRC 2012, Harvest 1.00 MMBF from sections 2, 4, 9, 10, and 12 T14N R9W.

The Lincoln Rural Fire District Fire Risk Management Strategy Community Protection Plan was completed in January 2005. This plan was developed in part to provide improved wildfire protection for the Lincoln community, the wildland/urban interface in and around Lincoln, and wild land surrounding Lincoln. This plan characterizes the areas proposed for harvest as urban interface and "vulnerable to large and catastrophic wildfire."

South Lincoln Timber Salvage EA, DNRC 2009, Harvest 3.00 MMBF on sections 22, 28, and 34 T14N R8W and section 34 T14N R9W

Beaver Lodge Salvage Timber Sale EA, DNRC 2009, harvest 3.00 MMBF on sections 4 and 16 T14N R9W and section 16 T14N R10W.

Draft Humbug Creek Restoration/Management Plan, Montana Fish, Wildlife and Parks and Big Blackfoot Chapter of Trout Unlimited 2008.

Still Cool Bugs Salvage Timber Sale EA, DNRC 2007, harvest of 1.0 MMBF on section 10 T14N R08W.

Keep Cool Bugs Timber Sale EA, DNRC 2005, harvest of 1.3 MMBF on section 10 T14N R08W.

Golden Arches EA, DNRC 2004, harvest of 5.6 MMBF in the Landers Fork drainage.

Cool Flat 4X4 EA, DNRC 2005, harvest of 1.5 MMBF on Sections 8, 16, 19, and 22 of T14N, R8W.

IV. IMPACTS ON THE HUMAN POPULATION

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

14. HUMAN HEALTH AND SAFETY:

Identify any health and safety risks posed by the project.

Human health would not be impacted by the proposed timber sale or associated activity. Safety considerations and temporary risks would increase for the professional contractors working within the sale area. Log truck traffic would increase but safety concerns would be minimized by posting signs and, imposing a speed limit, if necessary. There are no unusual safety considerations with the proposed timber sale. The general public and local residents would not face increased health or long term safety hazards because of the proposed timber sale

No additional negative effects would be expected as a result of the proposed action

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:

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

Existing Conditions

There are 9 grazing leases currently existing within the proposed timber sale. These leases produce approximately $30,500.00 per year. People are also currently employed in the wood products industry in the region.

Alternative A - No Action

Under the no action alternative no short term changes would be expected. As trees die and expose the forest floor to more sunlight an increase in forage production would be expected, eventually these trees would fall over possibly impeding livestock's ability to use these areas.

Alternative B – Timber Harvest (Action)

The proposed action would lead to a small, temporary increase in industrial activity during implementation. This would include timber harvesting, pre-commercial thinning and log hauling. This alternative would take place over the next ten to fifteen years and produce approximately 14 MMBF of timber for mills in Western Montana. This timber harvest would be a part of the DNRC's statewide annual harvest as such these increases would be at the local level and not additive to current statewide timber harvest levels. A similar increase in forage production would be expected, although additional slash from harvest activities could impede livestock's' ability to use the areas, much like in the no action alternative. No negative direct, indirect or cumulative effects are expected to occur as a result of the no action or the proposed action alternative.

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.

According to the Montana Bureau of Business and Economic Research a general rule of thumb is that for every million board feet of sawtimber harvested in Montana ten person years of employment occur in the forest products industry.

This harvest is viewed as a continuation of a sustained yield and as such would not create any new jobs but rather sustain approximately 140 person years of employment in the forest products industry. A few short-term jobs would also be created/sustained by contracting of pre-commercial thinning following harvest. Additionally, local businesses in Lincoln, such as hotels, grocery stores, and gas stations would likely receive additional revenues from personnel working on the proposed project.

No negative direct, indirect or cumulative effects are expected to occur as a result of the no action or the proposed action alternative.

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.

The proposed action has only indirect, limited implications for tax collection. No negative direct, indirect or cumulative effects are expected to occur as a result of the no action or the proposed action alternative.

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

Aside from contract administration there would be minimal impacts related to demand for government services due to the relatively small size of the timber sale the short-term impacts to traffic, and the small possibility of a few people temporarily relocating to the area.

No negative direct, indirect or cumulative effects are expected to occur as a result of the no action or the proposed action alternative.

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.

The Lincoln Rural Fire District Fire Risk Management Strategy Community Protection Plan was completed in January 2005. This plan was developed in part to provide improved wildfire protection for the Lincoln community, the wildland/urban interface in and around Lincoln, and wild land surrounding Lincoln. This plan characterizes the areas proposed for harvest as urban interface and "vulnerable to large and catastrophic wildfire."

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 project area is used by the public primarily for hunting and snowmobiling. The open roads that go through the project area are used primarily by people accessing Trust Lands and National Forest Land, including the Scapegoat Wilderness Area, which is approximately 10 miles north.

Some short term closures or rerouting of snowmobile trails would likely be needed to facilitate winter log hauling under the proposed action alternative. The DNRC would work with the local snowmobile club to minimize these impacts.

No direct, indirect, or cumulative effects to this recreational access or to the Wilderness Areas would be expected as a result of the proposed project.

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

There would be no measurable direct, indirect or cumulative impacts related to population and housing under either alternative.

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

There would be no measurable direct, indirect or cumulative impacts related to social structures and mores under either alternative.

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

No direct, indirect, or cumulative impacts related to cultural uniqueness or 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.

Alternative A - No Action
Currently 9 grazing leases are active on the project. These grazing leases generate a total of approximately $30,500.00 annually.

Alternative B – Timber Harvest (Action)
Revenue from grazing would continue. The timber harvest would generate approximately $1,680,000.00 of distributable revenue for the trusts involved in the project (14,000 MBF $120.00/MBF stumpage) and approximately $318,000.00 in Forest Improvement Fees would be collected for forest Improvement projects. This stumpage rate was derived by comparing attributes of the proposed timber sales with attributes and results of other DNRC timber sales recently advertised for bid and results of those timber sales. This estimate is intended for comparison of alternatives, not as an absolute measure of return.

EA Checklist prepared by:	**Names:** Neil Simpson, Jeff Collins, Jim Bower, Garrett Schairrer, Sam Whitney **Titles:** Service Forester, Hydrologist, Fisheries Biologist, Wildlife Biologist, Management Forester **Date:** January 9, 2014

V. FINDING

25. ALTERNATIVE SELECTED:

This assessment provided a reasonable range of alternatives for my decision regarding this proposed project. Given the following interpretation, I have come to my decision and selected the Action Alternative (*Timber Harvest*) including the mitigations noted within the EA.

1) *Manage the identified parcels intensively for healthy and biologically diverse forests.*

- By following the suggested mitigations for the soil resource within part 4 (Geology and Soil Quality, Stability and Moisture) of the EA and the Best Management Practices (BMP's), it is likely that low to moderate risks of excessive impacts to soils. This would promote tree growth, mychorizzae growth (through course woody debris and minimized soil compaction), and allow the soil to remain stationary and not be eroded and not compacted.

- The use of Streamside Management Zones, BMP's, and newer water protection boundaries that the Montana DNRC uses such as; Riparian Management Zones (RMZ's), Channel Migration Zones (CMZ's), Wetland Management Zones (WMZ's), and the suggested mitigation measures (within the EA part 5 (Water Quality, Quantity, and Distribution) a moderate short term risk of low to moderate direct or indirect water quality impacts. Several road relocations, crossing removals, road relocations and maintenance, and road drainage would result in a low risk or erosion and sedimentation.

- Cumulative Watershed Effects would see low effects given this project. As said within the EA in part 5 (Water Quality, Quantity and Distribution), "*The harvest of mainly dead, dying and beetle infested pine and thinning of mixed tree species to improve spacing and growth would have moderate risk of low impacts to water quality, the amount or timing of runoff (water yield), or stream stability from the proposed project area when compared to the effects anticipated under no action.*"

- Concerns over Air Quality would be minimal for direct, indirect, and cumulative effects given potential burning or the harvesting and hauling as part of this project. Much of the regulation of the burning would actually be done through the Montana Department of Environmental Quality and the Montana / Idaho Smoke Management Group. The DNRC also develops a burn plan for all prescribed burning.

- Vegetative concerns are an obvious matter given this project. Regarding noxious weeds, methods of transport within the proposed sale area (wind, cattle grazing, recreation, etc.) is the largest potential concern. This sale will not correct "sins from the past", or address future occurrences, but it will spray roads in the sale area to help control existing populations. It will ensure that vehicles used off the roads will be washed and cleaned in accepted ways and will grass seed newly constructed roads. By

using these activities on the sale, it will help control travel paths of existing populations and decrease the chance of new weeds taking hold within the sale area.

The treatment of these timber stands within this sale are designed to treat stands that exhibit poor health and vigor. Inherently, these stands are not "healthy". Responsible treatment of these stands will help promote healthy conditions over the long term. The proposed action calls for the harvest of 14 mmbf. from over 3,600 acres. This will mean that this sale will remove less than 4 thousand board feet per acre. The silvicultural prescriptions are designed to establish regeneration of the area or to promote existing trees. These prescriptions are scientifically based and are not done to remove volume in an expeditious manner. The recent increase in the spruce budworm population has significantly affected existing Douglas-fir and spruce regeneration. This will lead to slashing of these stands, or at very least, pre-commercial thinning. This will allow regeneration in the former situation, and increase the amount of nutrients for existing trees. Many of these stands are stagnant in condition, and do not meet the long term desired future conditions. For the regeneration of ponderosa pine, for example, the stand must be open. In many conditions, often because of fire suppression, the stocking of these stands is too heavy to allow regeneration of these seral species. Similarly as to before, if these stands are not healthy, they are not biologically diverse. Minimal changes to the Clearwater Unit levels occur under this proposal.

- Wildlife habitat concerns regarding this proposed project are generally met given the *Suggested Wildlife Mitigations* within part 8 *Terrestrial, Avian and Aquatic Life and Habitats*. Several roads will have restricted travel, and other areas will be closed generally by obstruction. This will be beneficial for a number of wildlife species. Snags and coarse woody debris would be administered by amounts detailed in the Montana Rules for Forest Management. "Spring break-up" times would be used to meet the necessary movement and nesting times of several species. Visual screening will be used to allow quickly reached hiding areas for grizzly bears. Connectivity of corridors of unharvested or lightly harvested areas in vicinity of riparian areas or breaks along ridges (ridge tops and saddles) will be maintained and promoted. These are all done in an effort to ensure a biologically diverse and healthy forest.

  Concerns over the stated cumulative impacts to fisheries within the analysis area may be raised given this environmental assessment. Although the first portion within *Aquatic Life and Habitats* states that moderate to high cumulative impacts exists, the following sentence explains that this is due to nonnative fish. Addressing this portion of the concern is not part of this proposed action. Although these drainages are within the analysis area, they are not a portion of the "forest" per se and would not be treated. Within the next paragraph, low to moderate direct and indirect effects are expected. Given the second discussion part described earlier, the implementation of a host of protective boundaries used bordering streams and wetland areas, these risks will be short term. Within *Attachment C – Fisheries*, the last sentence states "*The foreseeable cumulative effects to fisheries resources are fundamentally unchanged from the existing conditions, and they would remain elevated and slightly variable primarily due to the presence and consequent adverse impacts from nonnative fish species."* Although this is of concern regarding bull and cutthroat trout populations, this is not better or worse by these proposed projects. There are expected to be low to moderate direct and indirect impacts to channel forms. This is inherently considered true as there will be a decrease in potential woody material causing changes within the existing or potential stream channel, changing flow rates, and providing sediment traps. None of these potential concerns would inhibit the "healthy and biologically diverse forest" as described within the *Type and Purpose of Action*.

2) *Improve timber stand health and vigor.*

- As described earlier within the discussion of the vegetative concerns, this is the major purpose behind the silvicultural prescriptions. A fine sample of this is found within the overstory removal definition found in part 7 *Vegetation Cover, Quantity and Quality*, *"The primary purpose of the proposed overstory removal harvests is to; create only one canopy layer thus making the stand less susceptible to spruce budworm defoliation, (Fellin 1986) (USDA Forest Service 2011) reduce the competition within the stand, and salvage the economic value of dead, dying, or at risk overstory trees."* The first two portions of that description answer this objective. The silvicultural definitions within the *Timber Harvest – Action Alternative* describe how each method achieves health and vigor. The last sentence within part 7 states how the objective is met: *"When compared to the no action alternative, the proposed action alternative would likely result in positive effects of increasing stand vigor,*

maintaining stands in or moving them towards desired future conditions, and a decreased timeframe for regeneration."

3) *Maximize revenue over the long-term for the School Trust accounts from the timber resources and salvage timber on state forests that is dead, dying or is threatened by insects, disease, fire, or windthrow as mandated by State Statute 77-5-207, MCA,*
   - Given part 24 *Other Appropriate Social and Economic Circumstances*, the obvious differences between the No Action (≈ $30,500.00 annually) and the Action Alternative (≈$30,500.00 annually **and** an approximated $1,680,000.00 distributed revenue), the proposed action meets this objective.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

I have read the analysis of effects contained in this environmental analysis. Implementation of the Action Alternative with mitigations and in compliance with the State Forest Land Management Plan (DNRC 1996), Administrative Rules for Forest Management (ARM 36.11.401 through 450), and DNRC Habitat Conservation Plan as well as other applicable state and federal laws will not result in significant environmental effects.

The actions proposed are of relatively short time duration, geographic extent, and the effects are largely mitigated by time. The proposed activities are not unique and there is a reasonable certainty of effects. Similar forest management treatments are common throughout western Montana and there will be little growth inducing or inhibiting impacts associated with this proposal. The project is primarily located within the Lincoln valley of the Blackfoot River in western Montana. The lands involved have been managed as commercial forests for many decades and the proposed activities are in no way precedent setting. Treatments were designed with natural disturbance patterns in mind and with the intent of copying them to the extent possible.

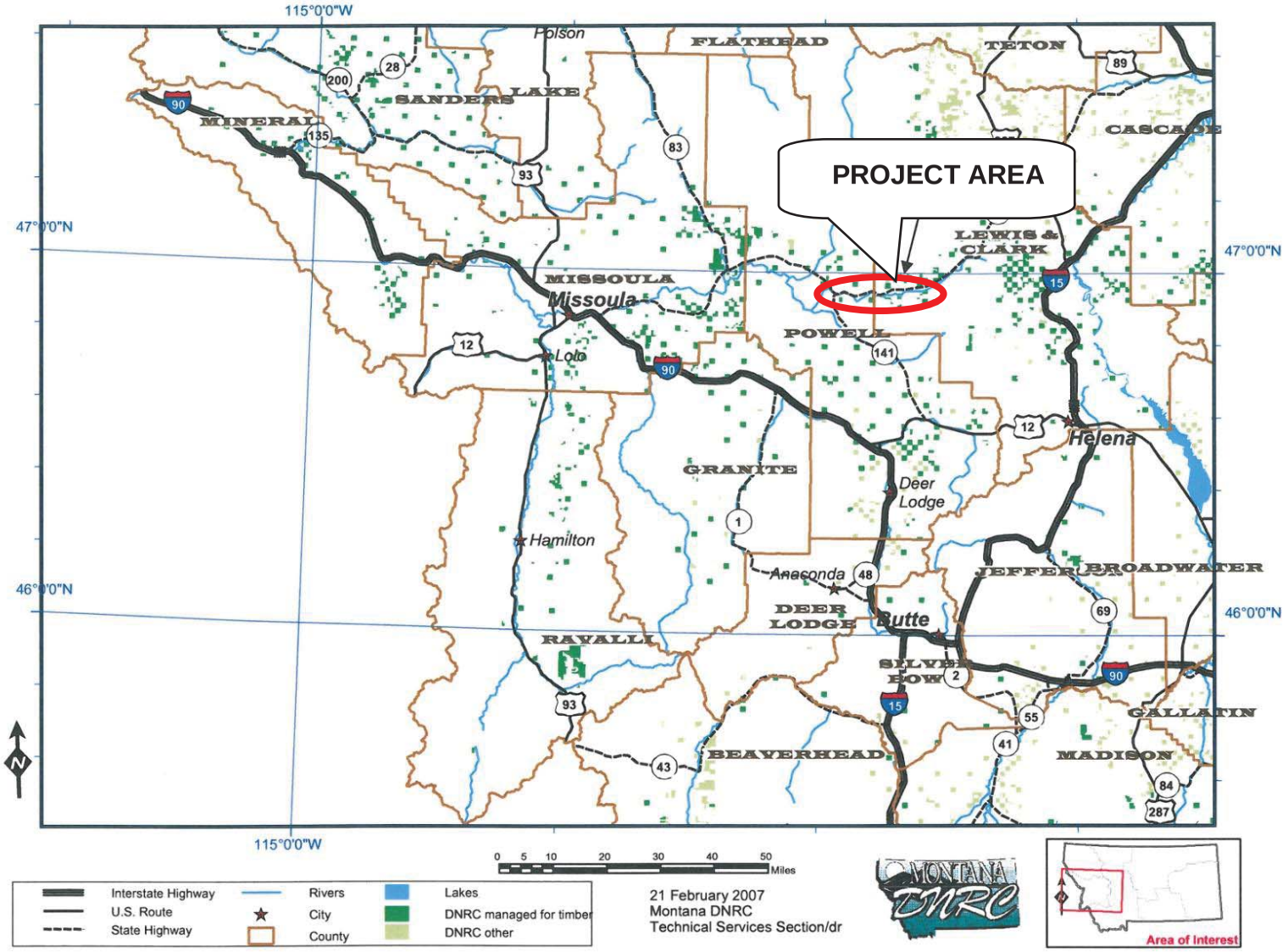
27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

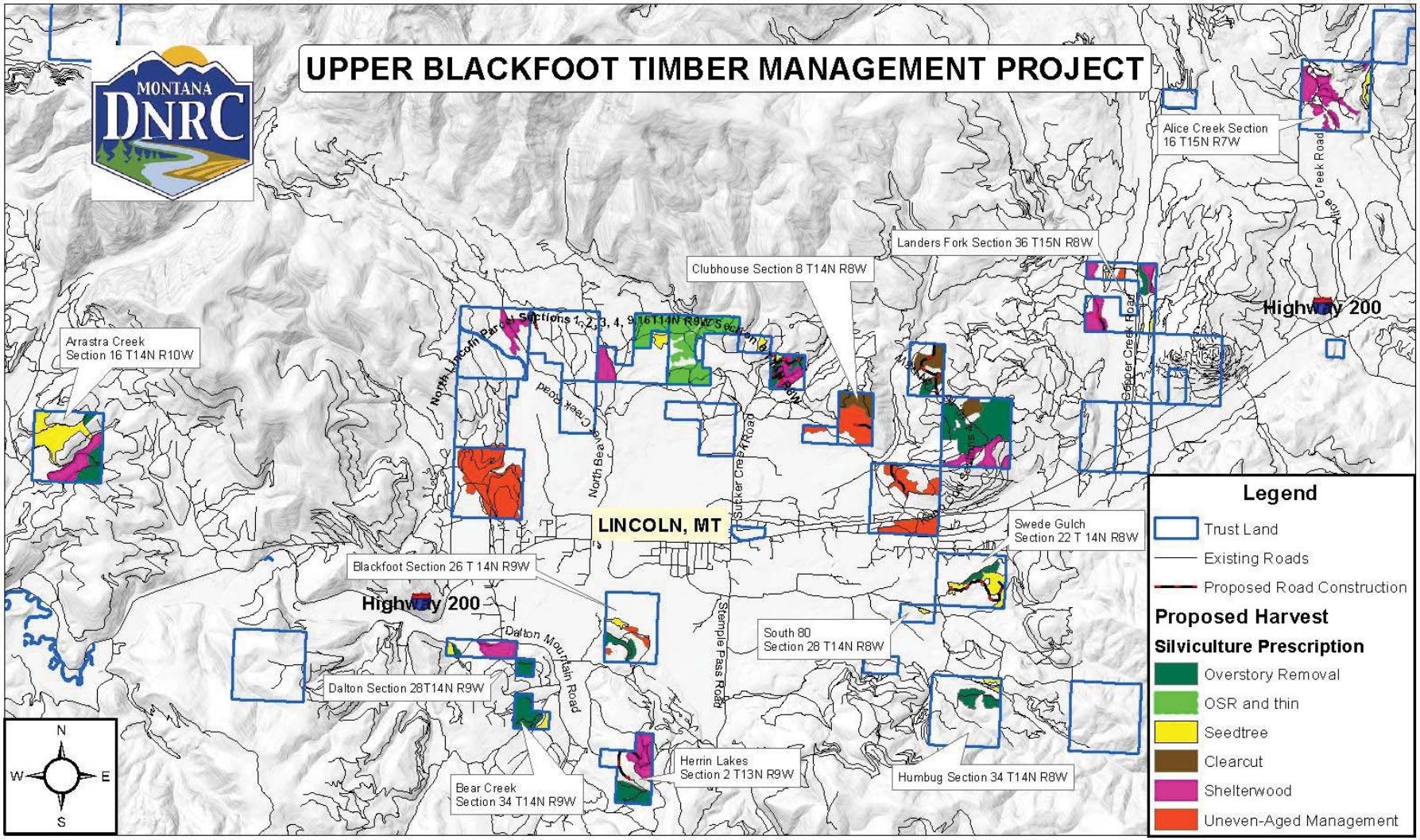
[ ]	EIS	[ ]	More Detailed EA	[X]	No Further Analysis

EA Checklist Approved By:	**Name:** Craig V. Nelson **Title:** Supervisory Forester
Signature: /s/ Craig V. Nelson	**Date**: January 13, 2014

ATTACHMENT A
MAPS

Attachment A-1: Upper Blackfoot Timber Management Plan Vicinity Map





N. Simpson 08/15/2013

Attachment A-2

ATTACHMENT B
SOILS/WATERSHED/NOXIOUS WEEDS

August 16, 2013

TO: Sam Whitney, Neil Simpson, Craig Nelson, Jon Hayes, Garrett Schairer

FROM: Jeff Collins, Hydrologist

RE: Watershed/Soils/Noxious Weeds
Report for the Upper Blackfoot Timber Management Project

Introduction and Issue Statements
The following report describes the existing conditions of soils, water resources and noxious weed management for the proposed Upper Blackfoot Timber Management Project. This report includes the environmental assessments of the expected direct, indirect and cumulative effects of the project for these resources.

Issues and Concerns
The following issue statements were developed from internal scoping and compliance with laws and rules regarding the effects of the proposed timber harvest and road systems to water resources, soils and noxious weeds. No public comments were received except for a concern for noxious weed spread.

* Soil Resources/Geology – There is a concern that road construction and timber management activities on unstable geologic material may cause slope instability. There is a concern that forest management activities may result in increased erosion and reduced soil productivity where excessive disturbance from compaction, displacement, or loss of nutrients occurs, depending on the extent and degree of harvest related soil effects.

*Water Quality - There is a concern that the proposed action may cause impacts to water quality from sedimentation that may occur and is associated with timber management activities, road construction and road use.

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

* Noxious weeds- There is a concern that the proposed forest management activities may introduce or spread noxious weeds and that disturbed roads should be reseeded.

Recommended Mitigation Measures for Soil, Water Resources and Noxious Weed Management:
The analysis and levels of effects to Soil resources, Water resources, and Noxious weeds are based on implementation of the following mitigation measures.

* DNRC would implement all applicable Best Management Practices (BMP's), Montana Administrative Rules for Forest Management, and reasonable mitigation and erosion control practices during timber harvest, road maintenance, and road construction and road use activities. The commitments of the DNRC Habitat Conservation Plan (HCP) would be implemented on the applicable parcels.

* DNRC would locate, clearly mark and maintain suitable water resource protection boundaries including Streamside Management Zones (SMZ's), Riparian Management Zones (RMZ's), Channel Migration Zones (CMZ's) and Wetland Management Zones (WMZ's) adjacent to streams and wetlands consistent with State Forest Land Management rules, and the DNRC Habitat Conservation Plan (HCP) where applicable.

* Adjacent to Class 1 fish bearing streams, locate a 50 ft. no cut harvest boundary and a 100 ft. Riparian Management Zone (RMZ/CMZ) where 50% of representative standing trees would be retained in the 50-100 ft. strip that would be designated parallel to the stream.

* Harvest operations and new roads would be located to avoid areas of slumps and slide prone areas.

* Limit harvest equipment and hauling operations to periods when soils are relatively dry, (less than 20%), frozen or snow covered to minimize soil compaction and rutting, and maintain drainage features. Check

soil moisture conditions prior to equipment start-up. Avoid dispersed skidding unless on snow or frozen ground. Portions of the access roads have clayey segments that tend to remain wet later into the spring and requires strict adherence to dry or frozen season of use to limit impacts in harvest units or damage to roads. Some moister conditions are accepted on harvest units where tractors remain on designated trails and timber will be felled and bunched or winched to trails.

* On tractor harvest units the logger and sale administrator will agree to a general skidding plan prior to equipment operations to limit trails to 15% or less of the harvest unit. Prefer use of existing skid trails, unless too steep. Limit ground skidding equipment to slopes less than 45% on the short steep slopes. Feller-bunchers may work on slopes up to 45% as long as displacement and turning is minimized to prevent excessive disturbance.

* On moderate to densely stocked stands, whole tree skidding can reduce slash hazard, but also remove a portion of nutrients from growing sites. Target is to retain 25% fine slash and 5-15 tons/acre woody debris on salvage areas with material well distributed on site while meeting the requirements of the slash law. In areas of whole tree skidding, a portion of fines and coarse woody debris would be return skidded on areas that less than 25% of fine fuels retained. On thinning sites with lower basal area, retain large woody debris as feasible since it may not be possible to retain 5 tons/acre and the emphasis will be on providing additional CWD in the future. Slash would be placed on main skid trails to protect soils and reduce erosion potential and potential unauthorized ATV use as needed.

* Existing road segments would be improved and maintained in association with the harvest activities. Road improvements would include surface blading, installation of drainage features to prevent surface erosion and sediment delivery to the stream, ditching to improve road surface stability, gravel surfacing of selected segments as needed and designated on site to comply with BMP'S, and to protect water quality.

* Road use will be limited to dry or frozen ground conditions to reduce rutting and erosion. New road construction, including drainage features should be completed in the fall prior to freeze-up. Check snow/frozen ground conditions prior to operations. Minimal effects are expected with snow road construction.

*The improvement of existing stream crossings or removal of culverts would meet the applicable BMP’s and requirements of the FWP 124 permit issued for specific sites for erosion control and stream protection.

* Temporary low standard roads would be reclaimed. Road reclamation would consist of recontouring to near natural slopes, grass seeding, and covering in slash.

*A crossing/ culvert would be removed on a tributary to Bear Creek. The existing culvert would be removed, streambanks would be reshaped to stable cross sections, and road surface drainage would be installed. The road would be closed to traffic and grass seeded.

* All road maintenance and harvest equipment will be cleaned of plant parts, mud and weed seed to prevent the introduction of noxious weeds. Equipment will be subject to inspection by forest officer prior to moving on site.

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

* Weed treatment measures will include roadside and spot herbicide treatment of noxious weeds. Where herbicide treatments are required by the forest officer, herbicide must be applied under the supervision of a licensed applicator following label directions in accordance with Department of Agriculture regulations, applicable laws and rules and regulations of the County Weed Board.

* DNRC will monitor the project roads and areas to evaluate weed control measures implemented and determine if any new noxious weeds establish that were not previously identified.

Soils Analysis Methods and Area
The soils analysis included an evaluation of NRCS Soil Survey data, air photos, past harvest design and on-site field reviews by DNRC hydrologist/soil scientist. For the purposes of this analysis, minor soils of 5% or less of the area were grouped based on slope, soil properties and interpretations. Field reviews were conducted to verify the soil properties and current conditions to assess past and predicted effects based on DNRC soil monitoring results on previous harvest operations. Each planned harvest area was reviewed to identify limitations and mitigations where appropriate. Soils maps, map unit descriptions and management interpretations of the project sites are included in the sale file and referenced in previous analysis within the project areas. The soil analysis considered soil interpretations and the estimated physical effects to soils based on the area and degree of harvest disturbance associated with skidding and roads. The analysis for soil nutrients considers the area of disturbed surface and the fine litter and coarse woody debris available to supply organic materials to the soil.

The analysis area for geology and soil resources includes the proposed harvest units and locations of new and temporary road construction on state owned parcels within the following sections:

Section 16 T.15N, R.7W, Section 16 T.14N, R10W. Section 2 T.13N, R 9W. Section 36 T.15N, R.8W.
Sections 4, 6, 8, 10, 16, 22, 28, and 34, T.14N, R.8W.
Sections 1, 2, 3, 4, 9, 16, 26, 28, and 34 T. 14N, R 9W. Refer to Attachment A Project Area Map.

Risk evaluation of impacts to soil and water resources will use the following narrative descriptions: a low risk of an impact means that the impact is unlikely to occur. A moderate risk of an impact means that the impact may or may not (50/50) occur. A high risk of an impact means that the impact is likely to occur.

A very low impact means that the impact is unlikely to be detectable or measurable, and the impact is not likely to be detrimental to the resource. A low impact means that the impact is likely to be detectable or measurable, but the impact is not likely to be detrimental to the resource. A moderate impact means that the impact is likely to be detectable or measurable, and the impact is likely to be moderately detrimental to the resource. A high impact means that the impact is likely to be detectable or measurable, and the impact is likely to be highly detrimental to the resource.

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 resources in the analysis areas are determined by assessing the collective anticipated direct and indirect impacts, other related existing actions, and future actions affecting soil and water resources.

Existing Conditions-Geology and Soils
Soils form a complex mosaic throughout the project area. The proposed harvest areas are located on the footslopes and mid-slopes principally in the Blackfoot Valley near Lincoln, and scattered parcels in the Arrastra Creek, Alice Creek and Lander's Fork drainages. The area is characterized by rolling hills with deep soils forming in alluvium, glacial deposits and tertiary age fine silt and clay rich parent materials on footslopes. Bedrock outcrops are few in these footslope areas. The mountain midslopes and sideslopes have soils forming in moderate to deep glacial tills and colluvial soils from mixed bedrocks, with gravelly subsoils on the ridgelines and convex slopes.

The only area of marginal slope stability was noted on the steep stream breakland landforms adjacent to Alice Creek, and no operations are planned on these areas. No other especially unusual/unique geologic or unstable landform features were identified on the project parcels. There is low risk of impacts to slope stability from road construction or harvest and this concern will be dismissed from further analysis.

Glacial pothole wetlands and ponds occur throughout the Lincoln valley and within the project parcels. Somewhat poorly drained soils occur along stream bottoms and include some localized wetlands adjacent to the streams that support a complex of conifers, riparian shrubs, aspen, cottonwood, deep sod grasslands with sedges. Large wetlands occur in lower Beaver Creek and in the Sucker Creek and Park Creek drainages north of Lincoln. Broad alluvial fans occur on the footslopes of Beaver Creek, Park

Creek, Stonewall Creek, Keep Cool and Alice Creek. The spring runoff elevates the water table in the gravelly deposits and fills some seasonal wetlands that dry out during the summer as runoff subsides.

A complete list of project site soils is available in the project file. The following generalized descriptions and interpretations represent the soils in the project area and are divided for management interpretations into primary slope ranges of 0-10%, 10-45%% slopes and slopes over 45% for summary discussion. The 0-10% slopes are well suited to ground based operations. Areas of coarse textured soil (gravels, loamy materials) are well drained and have a long season of use. Erosion potential is low and can be controlled with standard drainage practices. Soil displacement potential is low to moderate and a concern in areas of shallow surface soils. Soil compaction and rutting is a concern when soils are wet, generally for a short period in the spring.

Areas of fine silt and clay loam textured soil (glacial tills and tertiary valley fill deposits) are suitable to ground based operations, but soils are subject to rutting and compaction if operated on when wet. These soils remain wet later in the spring and a suitable period of dry period of use may not occur until mid June. Erosion potential is moderate and can be mitigated by installing standard drainage practices on harvest areas and roads. Season of use is limited to relatively dry summer/fall months or frozen ground on included areas of clay-rich soils.

Within the proposed harvest area, the mountain footslopes and sideslopes are mainly deep gravelly loams and gravelly silt loams on moderate to steep slopes of 10-45% that occur on up to 70% of the area. The dominant Winkler soils are well-drained, moderate productivity soils and support mainly Douglas-fir, lodgepole pine and Ponderosa pine. North and east aspects are typically more moist areas that support western larch. Winkler soils tend to be droughty with a long season of use, which is in part why there is little surface runoff. Material quality is good for road construction, but high cobble content can lead to rough roads. These soils are subject to rutting and compaction if operated on in the spring when wet. This limitation can be overcome by limiting operations to dry summer periods or winter conditions. Erosion risk is moderate on slopes up to 45%. No high erosion potential soils were identified in the proposed harvest units. Vegetative competition is moderate and excessive soil disturbance can lead to conifer overstocking.

Minor soils include Bignell and Lubrecht soils with higher clay contents and silty surface soils that occur on footslopes and concave terrain along the Sucker Creek road, in Willow Creek and Alice Creek. Bignell soils have a gravelly silt loam surface over deep gravelly clay loam subsoils. Lubrecht soils have higher clay contents and < 10% gravel and both soils are subject to rutting and compaction if operated on in the spring when wet. Traffic should be avoided when wet to minimize soil impacts and maintain drainage features. Erosion risk is moderate on these gentle slopes. Vegetative completion is moderate and may limit larch establishment unless scarified or prescribed burned. These materials are poor to good for road construction depending on the location, and the amount of subsurface clay materials that can change within a short distance.

The mountain sideslopes over 45% have similar soils as the previous units, with typically thinner surface soils and occasional bedrock outcrops. Less than 3% of the proposed harvest areas are on slopes over 45%. These soils are easily disturbed by ground based equipment operations and are subject to high risk of erosion and displacement. Cable skidding reduces disturbance and overcomes this limitation.

Other included and minor soils are mapping units with slopes of 30- 60%, that affects less than 3% of the project area (refer to project file). These soils are mainly complexes of deep gravelly loams and silt loams, with some areas of clay rich subsoils. These groups of soils are moderate productivity and support Douglas-fir, lodgepole pine and ponderosa pine and western larch. Erosion risk is moderate and the terrain is well suited to ground based operations on slopes up to 45%. Steeper slopes over 45% have high displacement and erosion risks that can be overcome by cable logging or winch line skidding.

Previous Harvest Effects on Soil Resources

Previous harvest has occurred historically at varied levels in all sections, (from post cutting to even age harvests) dating back to settlement and early mining activities. Historic harvest effects have largely recovered except for localized disturbances and legacy road segments. Recent harvests were principally lodgepole salvage in the Humbug drainage, Beaver Creek drainage, Liverpool drainage and Arrastra Creek parcel. Recent harvest effects were within the range of analyzed effects and mitigation measures

were effective in controlling the level of soil impacts consistent with BMP's. A few major skid trails and landing sites are still apparent and harvest effects are estimated to be less than 10% of the proposed harvest units. Field assessment found that the previous soil effects from timber management activities over 20 years ago have ameliorated in the stands proposed for thinning and the parcels are well regenerated to conifers. There are apparent growth reductions still on some old landing sites that would likely be used again.

Table S1 Soil Interpretations of Upper Blackfoot Project Timber Sale Project Area
The following represent the major soil types of the project area. Minor and included soil descriptions are referenced to the County Soil Surveys & considered in analysis

MAP SYM	% of UNITS	MAP UNIT NAME	Erosion risk Kf	Displacement Risk	Compaction Risk	Notes
701B	1.6	Fluvaquents-Endoaquolls complex, 0 to 4 percent slopes	Wet	Avoid, Subject to rutting.	Avoid, Subject to rutting.	Sensitive Sites Locate Protective Management Zones SMZ/WMZ, around wetland perimeter, Site specific reviews required
301B	0.4	Typic Ustifluvents, 0 to 4 % slopes	Wet			
700D	0.2	Bridger silt loam, moderately wet, 4 to 25 % slopes	0.28			
15E	18.8	Worock-Mikesell stony loams, 8 to 35 % slopes	0.37	Moderate	High when wet	Mikesell (low spots) has higher clay content, more productive
19E/ 196E	14.9	Worock-Libeg-Loberg stony loams, 8 to 35 % slopes	0.37	Moderate	Low-Mod	
19F	3.5	Worock stony loam, 35 to 60 % slopes	0.37	Mod to high on slopes >45%	Low	Soils with fractured rock at shallow depth, Limit ground skid to slopes less than 45%
196F	2.4	Worock-Loberg complex, 35 to 60 % slopes	0.37	Mod to high on slopes >45%	Low	Soils with fractured rock at shallow depth, Limit ground skid to slopes less than 45%
515E	2.3	Mikesell stony loam, 8 to 35 % slopes	0.37	Moderate	High when wet	Mikesell (low spots) has higher clay content, more productive
784D	11.8	Yourame stony loam, 8 to 35 % slopes	0.37	Moderate	High when wet	Yourame has higher clay content subsoil
415D	7.2	Crow loam, 4 to 25 % slopes	0.32	Moderate	High when wet	Crow has higher clay content subsoil
584D	7.2	Trapps stony loam, 8 to 25 % slopes	0.37	Moderate	High when wet	Trapps has higher clay content subsoil
484F/ 298F	4.8	Trapps channery loam, 25 to 60 % slopes	0.28	Mod to high on slopes >45%	Low	Soils with fractured rock at shallow depth, Limit ground skid to slopes less than 45%
91B	7.0	Cadotte gravelly loam, 0 to 4 % slopes	0.32	Low	Low	Shallow surface soils
499D	4.0	Farnuf-Hilger stony loams, cool, 4 to 25 % slopes	0.28	Low	Low	
390F / 590F	5.7	Helmville channery loam, 25 to 60 % slopes	0.37	Mod to high on slopes >45%	Low	Soils with fractured rock at shallow depth, Limit ground skid to slopes less than 45%
6A	2.7	Totelake gravelly loam, 0 to 3 % slopes	0.28	Mod	Low	Shallow soils over gravelly outwash, Avoid excessive disturbance
298D	1.9	Trapps channery loam, 4 to 25 % slopes	0.37	Moderate	High when wet	Trapps has higher clay content subsoil
485E	1.8	Relyea-Helmville complex, moist, 15 to 35 % slopes	0.37	Mod to high on slopes >45%		Soils with fractured rock at shallow depth, Limit ground skid to slopes less than 45%
184E	1.2	Helmville cobbly loam, moist, 15 to 35 % slopes	0.28	Moderate	High when wet	

Other Minor soils of small acreage = 1% of Harvest Units	Silvercity gravelly loam on 1 to 4 % slp- Bridger loam on 4 to 25 % slp-Stryker silt loam, cool, 0 to 2 % slp-Stryker silt loam-Silverking silt loam	Unique soils will be considered on unit basis for operations and apply BMP mitigations

Erosion Factor **K** indicates the susceptibility of a soil to sheet and rill erosion and considers rock fragments. K of .02 is low and .69 is highest

There are moderate levels of existing downed course woody debris across the proposed harvest areas that is within the range of woody debris levels established by Graham et al. (1994) for largely undisturbed areas. The tree mortality from insects has resulted in many trees shedding their needles, which helps return organic matter and nutrients to the soil. Retaining vegetative litter and woody debris helps to control erosion on disturbed sites and provide media for healthy soil fungi and conservation of soil nutrients important to tree growth. It is desirable to maintain old and new coarse woody debris (>3" dia.) at ~10-15 tons/acre on the harvest units.

Predicted Effects on Soil Resources

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

The No-action alternative would be similar to existing conditions and have little effect on soil resources. There would be no additive effect of ground disturbance from timber harvest operations or road construction and soil properties would continue to recover to natural conditions. The estimates of existing impacts are approximately 10% as past trails and landings, depending on site locations. Existing access roads with inadequate drainage would continue to erode without maintenance.

Direct and Indirect, Effects of the Action Alternative on Soils

The primary risks to long term soil productivity and hydrologic function are excessive impacts to soil properties caused by rutting, compaction and displacement of surface soils by equipment operation and road construction. The most sensitive soils in the area are wet sites and small areas of steep slopes over 45% which will be avoided or protected with mitigation measures (refer to Mitigation Section attached).

For the proposed harvest, BMP's and mitigations would be implemented to minimize the area and degree of detrimental soil impacts (displacement, erosion, and compaction). Mitigations include general skid trail planning, limit ground based equipment to moderate slopes less than 45%, and avoiding wet areas by marking protection boundaries. Contract administration would monitor on-going operation to control soil disturbance to avoid excessive impacts and meet silvicultural goals to reduce competition. The proposed harvest and commercial thinning would mainly use historic, existing trails and landings which will reduce the area of potential soil impacts. The improved tree spacing is expected to improve growth of retained trees, due to reduced competition for soil nutrients and moisture.

Based on DNRC soil monitoring on comparable sites, implementation of BMP's and the recommended mitigation measures, has been shown to effectively limit soil impacts to less than 20% of the harvest units. Harvest operations present low to moderate risk of detrimental impacts to soil resources if impacts are restricted to ~20% of the proposed harvest areas. We expect that by protecting at least ~80% of a harvest area in non-detrimental soil impacts, soil properties important to soil productivity will be maintained. The estimates of existing impacts are approximately 10% and additional impacts from the proposed operations are expected to add no more than 5% = 15% projected. Within the 3,625 acres proposed for harvest, up to 544 ac. would be impacted as a combination of past skid trails and landings combined with new disturbances, based on up to 15% combined detrimental impacts per acre. The estimates of harvest impacts on soils are based on field review and DNRC Soil Monitoring and comparison to similar treatments. Up to 5.6 miles of new roads (17 acres in area) would be constructed and .1 miles of streamside road would be reclaimed in Bear Gulch.

Ground based skidding would be limited to winter or adequately dry conditions. Harvest around the perimeter of wetlands would maintain protective wetland management zones to limit ground disturbance. The selective harvest/thinning of overstocked trees would improve tree spacing, reduce competition and improve growth of retained trees. Mitigations include winter season of use limits, and retaining a portion of woody debris and fine litter for nutrients and moisture retention to support mycorrhizae for best tree growth. The mycorrhizae fungal network is connected to plant roots and helps improve nutrient and moisture flow to plants.

The proposed harvest and road operations present low to moderate risk of excessive impacts to soils based on, implementation of BMP's and the recommended mitigation measures. Sale administrators will monitor soil conditions and the on-going harvest and road construction activities to meet contract requirements, BMP'S for soil and water protection and silvicultural objectives. For all of these reasons the proposed harvest operations and mitigation measures are expected to maintain soil properties important to plant growth and hydrologic function and present low risk of excessive direct and indirect impacts to soils.

Cumulative effects of the No-Action Alternative to Soils
Cumulative effects to soils can occur from repeated ground skidding entries into the harvest area and additional road construction, depending on area and degree of detrimental impacts. Previous harvest effects have largely recovered with 10% or lesser impacts based on site. No operations would occur and no change in cumulative effects would occur compared to existing conditions.

Cumulative effects of the Action Alternative to Soils
There is low risk of cumulative effects to soils with the proposed harvest based on use of existing roads, skid trail planning using existing trails where feasible and implementation of mitigation measures to limit the area impacted. We expect that effects would be less than 15% of the harvest area based on; modifications to harvest since BMP inception in 1989, implementation of mitigation measures that include season of use limits, skid trail planning to use existing trails where feasible and site specific measures near wetlands. Road drainage would be improved on existing haul roads across state and shared right of ways throughout the area. Proposed new roads would impact up to 5.6 miles and 0.1 miles would be reclaimed for a net increase of 5.5 miles (22 acres) or less than 0.5% of the project parcels

Considering nutrient cycling, the level of tree mortality of pine has already caused many needles and fine litter to fall to the forest floor. Most needles and fine foliage that have not already fallen would be expected to break off during logging operations. On all proposed harvest areas a portion of old and new course woody debris (CWD >3" dia.) at ~5-15 tons/acre and a target of 30% fine litter (similar to historic ranges) would be retained or return skidded on harvest units. Coarse wood would be well distributed throughout the units and trampled. The combination of fine litter and coarse woody debris would maintain surface organic matter that provides media for healthy soil fungi and conserves soil nutrients and moisture important to tree growth. Improved tree spacing will reduce competition for nutrients and soil moisture, enhance growth of retained trees, and promote regeneration of conifers as noted in the vegetation section.

Water Resources, Analysis Methods & Area
The primary issues relating to water resources within the analysis area are potential impacts to water quality from sediment sources and potential excessive increases in water yield that may affect channel stability. Sediment sources are roads and forest sites that can deliver to stream channels as well as sources within the stream channels. Timber harvest reduces forest cover and can lead to increased water yields. Excessive increases in water yield can reduce stream channel stability. In order to address these issues the following are analyzed for each alternative:

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

A watershed analysis and field survey was completed by a DNRC hydrologist for the proposed sale area to determine direct, indirect and cumulative effects to water quality. The water quality evaluation included a review of existing inventories for water resources (NRIS 2012), the 2005 Upper Blackfoot Restoration Plan (BFC 2005) and reference to previous DNRC projects. Aerial photos of the project area were compared and combined with GIS analysis to estimate the area of past timber harvest and vegetative recovery. Field reviews were completed for the proposed harvest units, access roads and associated streams, then the observations, information and data were integrated into the watershed analysis and design of project mitigations.

Sediment delivery
The analysis for direct, indirect and cumulative effects to sediment delivery is limited to the area of harvest units and the roads used for hauling and will focus on the streams described as affected watersheds. The sediment delivery analysis includes in-channel and upland sources of sediment that

could result from this project. In-channel areas include the stream channels adjacent to and directly downstream of harvest areas and will be analyzed qualitatively. Upland sources include harvest units, roads and stream crossings that may contribute sediment delivery as a result of this project.

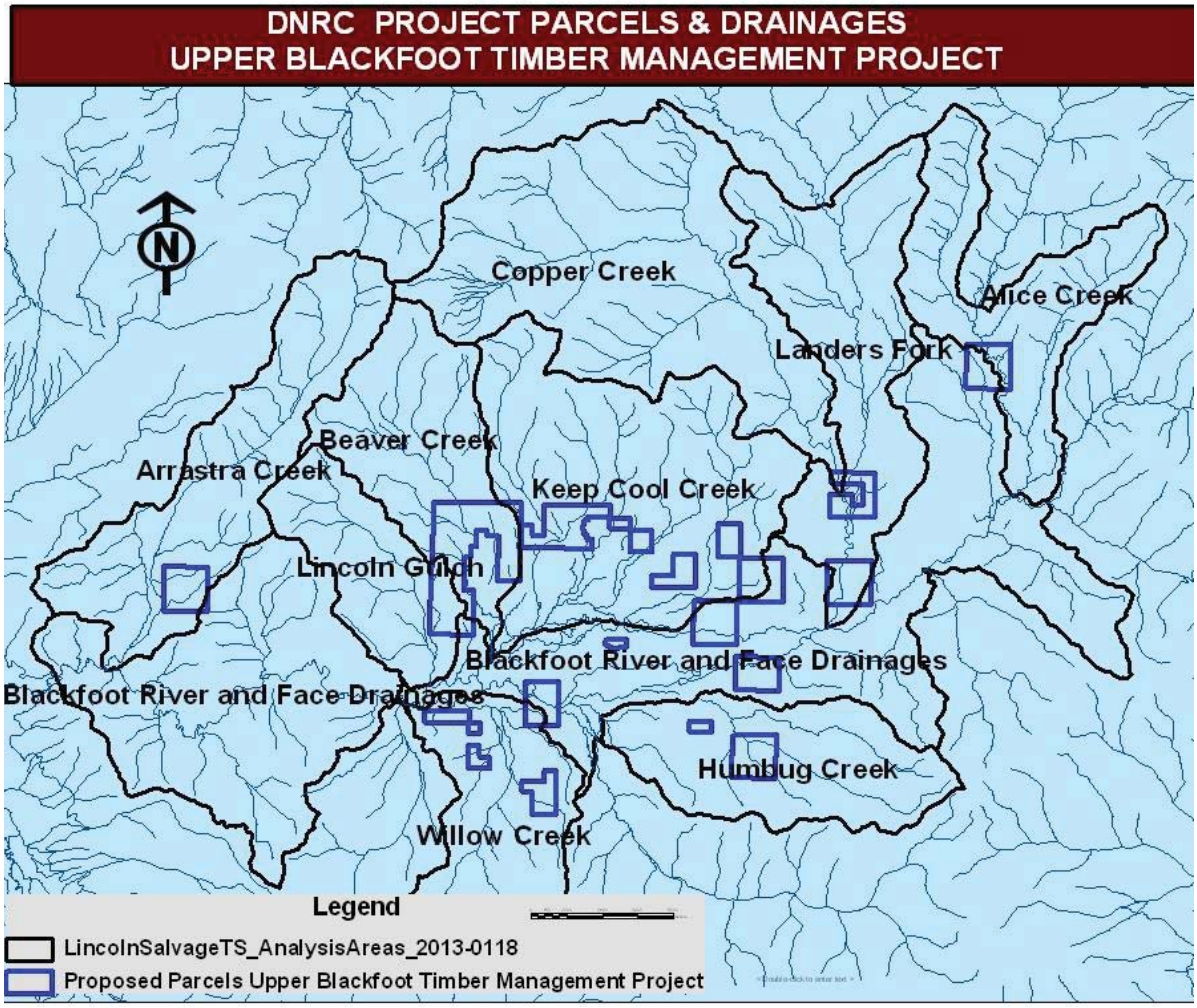
Water Yield
The analysis for direct, indirect and cumulative effects to water yield considers the area of harvest units and roads within the project drainages described as the affected watersheds. A DNRC water resource specialist completed a coarse filter qualitative assessment of watershed conditions and cumulative effects as outlined in the Forest Management Rules (ARM 36.11.423) and the commitments described in the HCP concerning watershed management. Based on past logging in the area, an assessment of sediment sources and stream channel conditions was also completed and a fine filter water yield analysis was completed. The potential for increases in surface runoff water yield and affects to stream channels will be discussed considering the distribution and timing of runoff.

Water Resources, Analysis Areas
Initially 12 separate watershed analysis areas were designated to evaluate the existing and proposed impacts to water resources associated with the proposed actions. Refer to the hydrology map for analysis areas that include the proposed harvest units and road haul routes. The initial analysis areas are watershed boundaries (6^{th} order HUC's) that include Arrastra Creek, Lincoln Gulch, Beaver Creek, Keep Cool Creek, Copper Creek, Lower Lander's Fork, Lower Alice Creek, Humbug Creek, Blackfoot River/Moose Creek & face drainage #1 below Lincoln, Blackfoot River/Lincoln & Face Drainages #2, Blackfoot River/Hardscrabble Creek, and Willow Creek.

The analysis areas for watershed cumulative effects include the watersheds that wholly surround the DNRC project sections and the access roads to those sections. Past, current, and future planned activities within each analysis area have been taken into account for the cumulative effects analysis.

21 Acre Harvest Area within Arrastra Section 16, T14N, R10W is Dismissed from Further Analysis-
The proposed forest management actions within the watershed of the Blackfoot River/ Little Moose Creek & face drainages #1 below Lincoln (HUC170102030310) will be dismissed from further water resource analysis due to low risks of direct, in-direct or cumulative impacts to water quality or quantity based on the following. The small 21 acre portion of harvest unit presents low potential for increased water yield or any impacts of off-site runoff or sediment delivery; the harvest unit is over 300 ft. to surface waters; and there are no surface waters or topographic features that would concentrate water in this small harvest area. Water resources analysis will be carried through on the remaining 11 analysis areas listed above.

Regulations, Laws, Rules and Agreements
Montana Surface Water Quality Regulations
All the watershed areas listed in this report are classified as B-1 in the Montana Surface Water Quality Standards. The water quality standards for protecting beneficial uses in B-1 classified watersheds are described in ARM 17.30.623. The B-1 classification is for multiple use waters suitable for; domestic use after conventional treatment, growth and propagation of cold-water fisheries, associated aquatic life and wildlife, agricultural, and industrial uses. Other criteria for B-1 waters include; no increases are allowed above naturally occurring concentrations of sediment, which will prove detrimental to fish or wildlife and a maximum 1 degree Fahrenheit increase above naturally occurring water temperature is allowed within the range of 32 to 66 degrees Fahrenheit. Naturally occurring includes conditions or materials present from runoff or percolation on developed land, where all reasonable land, soil, and water conservation practices have been applied. Reasonable conservation practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. The State has adopted Forestry Best Management Practices BMP's through its Non-point Source Management Plan as the principle means of controlling non-point source pollution from silvicultural activities. Stream temperatures are discussed in the fisheries section. DNRC provides further protection of water quality and sensitive fish through implementation of the Streamside Management Zone (SMZ) Laws and Forest Management Rules.



Water Quality Limited Waterbodies and Beneficial Uses
Regulatory Framework

Within the 11 project drainages analyzed, water quality is listed as impaired for 2 drainages in Montana's 2012 DEQ TMDL database. The Blackfoot River from the headwaters to Landers Fork (MT76F001_010) is listed as impaired or not supporting drinking water and aquatic life, but fully supports agriculture and recreation. Probable causes of impairment are metals. Probable sources are mining in the headwaters. A Total Max Daily Load (TMDL) analysis and restoration plan has been completed as part of the Upper Blackfoot watershed (DEQ 2006).

The Blackfoot River from Landers Fork to Nevada Creek (MT76F001_020) is listed as impaired in Montana's 2012 DEQ TMDL database for partially supporting aquatic life, but fully supporting drinking water, agriculture and recreation. Probable causes of impairment are sedimentation/siltation and metals. Probable sources are mining in the headwaters, agriculture and silviculture harvesting. A Total Max Daily Load (TMDL) analysis and restoration plan has been completed as part of the Upper Blackfoot watershed (DEQ 2006). TMDL listed mitigations include improving fish passage, improved grazing management, and reducing sedimentation through implementation of Best Management Practices (BMPs) on land management projects.

Beneficial Uses-The downslope beneficial uses in the project area include: domestic surface water rights, recreation, cold-water fisheries, agriculture, irrigation, wildlife and livestock watering.

Water Rights- There are water rights for drinking water, livestock watering, agriculture and mining in the analysis area. There are irrigation ditches within each of the analysis areas, except for Copper Creek. The lower stream reaches of Humbug Creek, Park Creek, Sucker Creek, Liverpool Creek and Arrastra

Creek has reduced flows from irrigation diversions and natural flow loss to cobbly substrates that can affect summer fishery connectivity.

Montana Streamside Management Zone (SMZ) Law
All rules and regulations pertaining to the SMZ Law will be followed. An SMZ width of 100 feet is required on Class I and II streams when the slope is greater than 35%. An SMZ width of 50 feet is required when the slope is less than 35%. As part of ARM 36.11.427(3) (a) (i) and (IV) and ARM 36.11.436.

DNRC Forest Management Rules and Habitat Conservation Plan (HCP)
All applicable State Forest Land Management rules and regulations regarding watershed and fisheries management will be followed. This includes, but is not limited to rules listed for water quality (ARM 36.11.422), cumulative effects (36.11.423) Riparian Management Zones RMZ (ARM 36.11.425), Fisheries (ARM 36.11.427) and Conservation Strategies outlined in the DNRC Habitat Conservation Plan (HCP 2011). As part of ARM 36.11.427(3)(a)(i) and (iv) and ARM 36.11.436, DNRC is committed to designing forest management activities to protect and maintain bull trout, westslope cutthroat trout and all other sensitive fish and aquatic species as noted in the fisheries assessment. DNRC would protect Class 1 fisheries streams by designating. 50 foot no-harvest buffers and 100ft RMZ as noted in mitigations.

Existing Conditions - Water Quality/Sediment Delivery & Quantity
Past management activities in the proposed project area include timber harvest, grazing, road construction, fire suppression and recreation. Sedimentation sources identified in the area are, road-fill segments adjacent to stream channels, stream crossings with inadequate road surface drainage prior to the crossing sites, historic riparian harvest and dispersed grazing that includes a high level of elk use. Sediment inventories were completed for existing roads and crossing sites on haul routes within the project area. Streams within the project parcels were reviewed for channel stability and sediment sources.

Beaver Creek
Beaver Creek, including the DNRC section has good to excellent stream and riparian conditions. The main stem of Beaver Creek flows along the eastern edge of the DNRC sections 4 and 9. All channels were field surveyed and most have stable cross sections with cobble streambeds, and well anchored large woody debris. The riparian stands along Beaver Creek include a well stocked mixed conifer stand of 100 to 106 feet in height. There are two irrigation ditch diversions within the DNRC section on Beaver Creek that flow to the southeast. The upper diversion was previously a problem where the flow of Beaver Creek was concentrated and undercutting banks and causing channel instability. The diversion site and a segment of Beaver Creek was reconstructed and stabilized in 2005 and bank stability is on an improving trend. There is an old abandoned ditch/channel that parallels Beaver Creek on the western flank. This channel has seasonal flow from groundwater, but the diversion has been removed and the bank restored to prevent flow from Beaver Creek. The forest access road through the Lincoln Gulch Section 6 and Beaver Creek Section 4 and 9 has been recently reconstructed to meet BMP's and no sediment delivery sources were noted from roads or harvest units to surface waters.

Lincoln Gulch
The Lincoln Gulch State Section 16 is located in the lower 2 miles of the drainage and straddles the watershed boundary of Lincoln Gulch drainage (HUC 170102030308) and a lesser portion in the Beaver Creek drainage. DNRC forest and rangelands represent a relatively small portion (5.9%) of the 7544 acre Lincoln Gulch watershed. Lincoln Gulch is a Class 1 perennial 3rd order stream that originates near Black Mountain and flows southeast to the Blackfoot River. Historic mining occurred in the headwaters and changed channel stability that has largely equilibrated. The main stem of Lincoln Gulch flows outside the western DNRC property boundary. An unnamed tributary that is ditched flows along the flat alluvial terrace inside the DNRC western boundary. This stream has segments with perennial flow that becomes intermittent prior to reaching Lincoln Gulch. The DNRC section 16 has a dry 19 inch average annual precipitation, and surface runoff is rare, as this land is on the forest ecotone transition to sage/grassland. Runoff and stream flows are generally moderate but may have flashy flow response during summer thunderstorms. There are several seasonal wetlands within sections 16. The proposed sale area is accessed by the Lincoln Gulch County road and local forest roads. No sediment sources were identified and the haul route meets BMPs.

Arrastra Creek
The DNRC Arrastra project section includes the existing roads and harvest units which are located in the lower portion (2-3miles) of the Arrastra Creek drainage. Only a very short segment of Arrastra Creek flows along the southwestern DNRC property boundary and is not near any proposed harvest units. Ownership in this drainage is a mixture as noted in table W1 and DNRC forestlands represents a relatively small portion (4.1%) of this 15,070 acre watershed. Arrastra Creek is approximately 12.6 miles long and originates in mountain headwaters and flows southeast through a steep canyon onto rolling foothills and then onto the Blackfoot River. The DNRC section 16 has a relatively dry 21 inch average annual precipitation occurring mainly as snow, and surface runoff is rare. Steep gradient headwaters streams and shallow soils are present in the Arrastra Creek drainage. These factors can lead to flashy flow response from precipitation events, such as summer thunderstorms, that may exceed infiltration rates.

Most of the stream system has class 1 perennial flow except for a portion of the lower drainage between 2.2 to about 3.0 stream miles that seasonally dries up, typically in August. It is this seasonally dry stream reach where the access roads to the DNRC section cross fords on a Rosgen C3/C4 channel type (Rosgen 1996), gravel/cobble bottom segment of Arrastra Creek. Within the DNRC project section, topographic maps of the area indicates stream segments mapped across the section, but actually there are no streams on the upper slopes based on ground verification. There is a large wetland locally known as Frenchie's pond in SW corner of the DNRC section that is connected to Arrastra Creek at about 2.2 stream mile and flow is perennial below this point.

The proposed haul route is the main Arrastra Creek road and two secondary forest roads that access the section with separate cobble bottom ford crossings of Arrastra Creek. The secondary roads are gated/closed at the main road to; control road use, reduce maintenance and potential road surface erosion. The upper ford site shows signs of channel down cutting on adjacent stream channel segments. The lower ford site is a gravel cobble streambed that is overly wide and shallow at the crossing. No rutting of the dry streambed is indicated from use, and the streambed is similar to previous conditions of use in 1988 and in 2011. Erosion was not apparent on the approaches to the road crossings, due to the course cobble nature of the material and established vegetation on the road, but minor sedimentation may occur on this third party road location.

Copper Creek & Lower Landers Fork
Lower Landers Fork has a TMDL rating of 1 showing all beneficial uses are supported. The Copper Creek watershed and Landers Fork have experienced a heavy loss of over 70% vegetation in the 1988 Canyon Creek Fire. Landers Fork and Copper Creek have cobble substrates. Streambank stability ranges from stable to meandering with high sediment supply and vertically shifting banks caused by changes in flow and sediment regimes. Streams are overly wide, but this is considered within natural range of conditions associated with large wildfires, like the extensive Canyon Creek Fire. Recent road maintenance has been completed to improve road drainage and comply with BMP's and no direct sediment sources were noted on the haul route.

Humbug Creek area
The DNRC ownership is located on the lower footslopes to mid elevation mountainside above the South Fork Humbug Creek. Precipitation is low, with an average 19-21 inches/year mainly as snow, with surface runoff rare and subsoil moisture low in high coarse fragment soils. DNRC section 34 ownership includes the South Fork Humbug Creek that flows along a NE boundary line and a small unnamed perennial tributary.

The S Fork Humbug Creek Sections 34 T14N, R8W and Section 22 T14N, R8 W share the same access roads across range sites. Several stream crossings are undersized on Humbug Creek and tributaries had poor surface drainage prior to crossing locations. DNRC recently completed road improvements and maintenance to repair the haul route to comply BMP's on over 10 miles of road across private and State ownerships.

Blackfoot River-Lincoln area
The DNRC ownership in section 26 T14N, R7 W and section 22 T14N, R8 W are located along the Blackfoot River. This reach of the Blackfoot River is listed as impaired due to sediment and metals, as noted above. Precipitation is low with mixed forest and grassland sage habitats and an average 19-21

inches/year mainly as snow. Surface runoff rare and subsoil moisture low in high coarse fragment soils. Segments of the river bank are undercut and shifting within the floodplain, that is relatively broad including wetlands and areas of seasonal high water table. No harvest is proposed near the floodplain. Road maintenance is needed along access roads, but no sediment sources were noted on the access roads

Willow Creek and Bear Gulch
There are 4 state lands parcels within the Willow Creek drainage. The DNRC ownership is located on the lower elevation footslopes of Bear Gulch. Precipitation is low, with an average 19-20 inches/year mainly as snow, with surface runoff rare and subsoil moisture low. Grassland and sagebrush occur on the edge of the DNRC ownership reflecting the dry nature of the area. Bear Gulch is approximately 2.5 miles long and provides fish habitat in the lower reaches. The stream flows across several ownerships and has varied levels of grazing use with minor effects on the DNRC ownership. The SW ¼ of section 34, T14N, R9W includes 120 acres of DNRC ownership and approximately ¼ mile segment of Bear Gulch, a tributary to Willow Creek. The stream segment and associated wetlands are in fair to good condition across DNRC ownership. There are no stream crossings or proposed crossings on this parcel. The access road across private ownership in section 34 has inadequate road surface drainage and there is a damaged culvert on the state parcel. Sedimentation occurs at the culvert and from bank alteration by grazing disturbance. Within the state parcel of section 2, T 13N, R9W there is an unused road that is a source of sediment and has grazing disturbance.

Lower Alice Creek
Within the project areas there is slope instability on the steep stream breakland landforms adjacent to Alice Creek and a large source of natural sediment. No operations are planned on areas of instability. The existing access road is located over 200 feet from Alice Creek and no sediment sources from the roads or proposed harvest areas were noted.

Keep Cool Creek
Keep Cool Creek is about 4.5 miles in length, and is a Class 1 tributary to the Blackfoot River. The Keep Cool drainage includes the tributary streams of Liverpool, Stonewall Creek, Park Creek and Sucker Creek. The main stem of Keep Cool Creek flows only about 300 feet through the NW corner of State Section 16 and is not affected by the proposed project. There is an intermittent tributary to Keep Cool Creek in State Section 10 and this stream is stable. Precipitation is moderate with ranges from 17-29 inches / year mainly as snow. Precipitation rates are generally less than soil infiltration rates and surface runoff on forested sites is rare.

The haul routes to the Keep Cool project sites have locations with inadequate drainage and sediment sources that require some improved crossings, road repairs and maintenance to fully meet BMP's. An existing ford on Park Creek and several crossing sites had poor surface drainage prior to crossing locations and the Park Creek irrigation periodically overflows onto the Park Creek road and is a sediment sources during spring runoff. DNRC is currently completing road repairs and maintenance along the Park Creek road to improve road surface drainage to comply with BMP's. The Park Creek ford is being replaced with a bridge through cooperative efforts with Montana Trout Unlimited and Montana FWP that will reduce sediment at that site.

Grazing Effects on sedimentation
DNRC has completed interim grazing inspections every 5 years since 2004 on grazing parcels adjacent to riparian areas. An overall condition of grazing effects on riparian areas can be summarized from field inspections. The following summary is a review of 56 separate grazing inspections leases on parcels within the project area. Riparian browse utilization was recorded as none or unused on 29 sites; there was slight use on 19 sites and moderate use on 6 sites. During field reconnaissance, 3 stream reaches had high use and stream bank trampling in section 34, T 14N, R9W on Bear Gulch and Section 2 T 13N, R9W on an unnamed tributary to Willow Creek.

Existing Water Yield
Concerning water yield, tree canopy reduction by timber harvest activities, tree mortality or wildfire can affect the timing of runoff, increase peak flows and increase the total annual water yield of a particular drainage. Moderate to high increases in water yield can increase stream channel scour and in-stream

sediments that impact water quality, so we assess stream channel conditions as part of this project analysis.

Currently, lodgepole pine, ponderosa pine within the analysis areas are dead, dying and at risk of mountain pine beetle mortality. Within the project area, tree mortality from pine beetle is greatest in lodgepole pine and to a lesser extent in larger ponderosa pine. Spruce bud worm attacks to Douglas-fir has defoliated tree tops and caused mortality, mainly on southerly exposures. Tree mortality and reduced tree canopy from insects will have an effect of low to moderate increases in available water and evapo-transpiration that is expected to be within the range of natural conditions. Historically, tree cover comprised about 75-80% of forest stands in combination with natural openings and areas in various successional stages after fires, as noted in the vegetation section description. The drier Lincoln valley and footslope terrain has low precipitation of 16- 20 inches with a mosaic of sage/grassland and open forest stands.

Due to a concern for the level of past harvest and fisheries, an estimate of water yield was completed. A harvest history was developed for the project areas from aerial photos to estimate the annual water yield increases using Equivalent Clearcut Area (ECA) analysis (Haupt 1985). ECA is a procedure used to index the relationship between vegetative condition and water yields from forested watersheds. ECA is a function of; the total area that is roaded and harvested, the % crown removal in harvest units, and the amount of vegetative growth recovery that has occurred in the harvest areas. This procedure equates the area of the percent of canopy removed by fire, harvest or roads to an equivalent clearcut area to calculate water yield increases from management activities and the existing water yields are noted in table WS-1. After reviewing the beneficial uses, existing channel conditions and existing watershed condition per ARM 36.11.423, a threshold of concern for water yield increase (WYI) in the seven of the watershed analysis areas was set at a 12% reduction compared to a fully forested condition due to the resilient stream conditions. All of the 8 watersheds were less than 10% (noted in table WS-1) and have low changes in stream flow and considered stable. An allowable water yield threshold of concern was set at 10% for four watershed analysis areas including; Blackfoot River - Lincoln 170102030308, Blackfoot River-Hardscrabble Creek 170102030206, Lower Landers Fork 170102030104 based on their TMD impaired designation and Copper Creek 170102030103, based on extent of fire and coarse filter analysis.

Copper Creek and Landers Fork experienced extensive loss of vegetation cover from the Canyon Creek fire in 1988 that resulted in increased water yields and increased channel scour and sediment loads (DEQ 2012 Records). Water yield increase is estimated to be 21.9% for Copper Creek and 15.8% for Lower Landers Fork.
Within the Landers Fork and Copper drainages affected by the Canyon Creek fire, the potential increase in water yield from conifer mortality is expected to be offset by continued conifer regrowth is slow and revegetation over the last 25 years. There is a climate trend towards earlier snowmelt and declines in late summer stream flow based on recent 30 years comparisons of precipitation (Luce 2009).

Table WS-1 Estimated Annual Water Yield Increases for project drainages using Equivalent Clearcut Area (ECA) analysis (Haupt 1985).							Percent Ownership within Analysis Areas				
Analysis Areas & Hydrologic Unit Codes	Acres	Sq. Mi.	Area AVG. PPT. Inches	Existing Water Yield Increase Acre ft.	Existing Water Yield Increase	% Allowable WYI	State	FS	BLM	TNC	Private & Corp Timber Lands
Beaver Creek 170102030303	11618	18.1	29.5	180	1.7%	12%	8.4	76.4		6.7	8.5
Lincoln Creek 170102030305	7545	11.8	23.3	229	5.0%	12%	6	74.5	0.6	2.4	16.5
Arrastra Creek 170102030309	15084	23.5	29	488	3.7%	12%	4.1	52	22.3	12.1	9.5
Copper Creek 170102030103	25984	40.6	37	7561	21.90%	10%	0.2	96.8			3

Lower Landers Fork 170102030104	15662	24.5	22.9	1545	15.8%	10%	7.8	35.2			57
Humbug Creek 170102030301	15451	24.1	20	287	5.0%	12%	12.3	19.9	0.4	3.4	63
Willow Creek 170102030306	12088	18.8	21	350	6.0%	12%	6.3	48.4		20.1	25.2
Blackfoot River - Lincoln 170102030308	11399	17.8	22.2	287	5.0%	10%	12.6	46.7			40.7
Blackfoot River-Hardscrabble Creek 170102030206	12474	19.5	22.6	396	6.3%	10%	7.5	26.4		5.1	61
Lower Alice Creek 170102030204	11697	18.3	22.5	527	6.2%	12%	5.4	32.6		31.1	30.9
Keep Cool Creek 170102030304	22816	35.6	22.1	771	4.7%	12%	10.5	50.3		2.8	36.4

Direct and Indirect Effects of the No- Action Alternative on Water Quality and Quantity

No direct or indirect effects to water quality or quantity would be expected to result other than those described under existing conditions. The majority of roads on haul route meet BMP's. Sedimentation on segments of existing roads with inadequate surface drainage would continue to impact water quality unless mitigations or remedial actions are taken. Continued insect mortality or wildfire may increase runoff and water yield relative to increasing canopy loss. There is a climate trend towards earlier snowmelt and declines in late summer stream flow based on recent 30 years comparisons of precipitation. Grazing management within the project drainages would continue and should gradually improve over time as inspections and management modifications are made.

Direct and Indirect Effects of the Action Alternative on Water Quality and Quantity

Land management activities such as timber harvest and road construction could impact water quality primarily by accelerating sediment delivery to local stream channels and draw bottoms. The primary risk to water quality is sediment delivery at stream crossings. Potential change in water yield is addressed under cumulative effects.

The proposed project would harvest up to 3,625 acres within the 9,260 acres of State land on the project parcels outlined on watershed map WS-1. Silvicultural treatments are a combination of salvage harvest, commercial and pre-commercial thinning.

Riparian Management Zones would be designated for stream protection where harvest units are adjacent to class 1 streams. No harvest would occur within 50 feet of Class 1 fishery streams. Throughout the project area, the stand potential tree heights vary from 80 to 100 feet adjacent to Class 1 streams. The RMZ distance is based on stand potential tree height. As a conservative approach and for ease of layout all RMZ protective widths were set at 100 feet where proposed harvest units are adjacent to Class 1 streams. No harvest is proposed within RMZ's adjacent to Lander's Fork or Copper Creek or within the TMDL listed drainages of the Blackfoot River.

Selection harvest would occur within the RMZ of 50-100 foot in the following stream segments listed in Table WS-2. Selection harvest would retain 50% or more of representative trees in the RMZ. All harvest operations are designed to minimize surface disturbance and potential for erosion and sediment delivery by implementing adequate stream and wetland buffers and would provide adequate protection of water quality. The riparian management zones proposed for harvest have moderate slopes and well established vegetative buffers, and there is low risk of sedimentation to surface waters from the proposed harvest operations, based on BMP and RMZ monitoring. Implementations of the requirements of the RMZ's, SMZ law and BMP's have proved effective in controlling erosion and protecting riparian zones (DNRC 2012). Sediment trapping research (Lakel et. al. 2010) on the effectiveness of stream buffers, found that > 97% of watershed erosion was trapped by vegetation prior to entering streams for SMZ's of 25ft or more.

Table WS-2 Proposed Riparian Management Zone Harvest				
Section Legal	**Section Name**	**Stream Name**	**Lineal feet RMZ Harvest**	**Acres RMZ Harvest**
S34 T14N R9W	Bear Gulch	Unnamed trib to Bear Gulch	(1,365' X 2 sides) = 2,730'	3.1 acres
S 4 14N R9W	Beaver Creek	Beaver Creek	3,500'	4.0 acres
S 16 14N R9W	Lincoln Gulch	Beaver Creek	1,000'	1.1 acres
S 6 T14N R8W	Sucker Creek	Sucker Creek	Up to 500ft. in the 90-100 ft outside RMZ edge	0.1 acre

DNRC focused road design and location efforts to minimize the extent of new road construction, stream crossings and construction costs and includes temporary use roads where feasible. The proposed haul routes use largely existing roads. Road maintenance and site specific road recommendations would be implemented on up to 75 miles of existing roads to maintain, restore and improve road surface drainage to control erosion and comply with Best Management Practices and mitigation measures. Up to 5.6 miles of new road would be constructed to relocate and improve access to state parcels. There would be no increase in open road density. Road reclamation would occur on .1 miles of road and one eroded culvert would be removed in the Bear Creek drainage to reduce sedimentation and restore channel form and floodplain. One new stream crossing would be constructed on a tributary channel to Landers Fork.

There would be a temporary increase in sediment when the culvert is removed and the channel profiles are reestablished, but sediment is expected to be low, short term and will quickly subside, based on DNRC monitoring following culvert removals (DNRC 2012). All requirements of the 124 permit and erosion control measures would be implemented, at the proposed stabilization site to minimize erosion. Temporary use roads would be located for minimal construction. Following use, temporary roads will be closed, stabilized with long-term drainage features installed, and reseeded with site adapted grass to control erosion and compete with noxious weeds.

All requirements of the SMZ laws, Forest Management ARMS, BMP's, 124 and associated stream permits and DNRC Habitat Conservation Plan (HCP) would be implemented. Grazing management within the project drainages would continue and should gradually improve over time as inspections and management modifications are made, especially to the three impacted sites identified. Harvest design is consistent with TMDL mitigations for the Upper Blackfoot River. Based on implementation of Best Management Practices, site specific mitigations, and all rules and agreements, the proposed timber harvest and road construction is expected to result in moderate short term risk of low to moderate direct or in-direct water quality impacts due to erosion and sediment delivery.

Cumulative Watershed Effects of No-Action Alternative:

Cumulative watershed effects can be characterized as impacts on water quality and quantity that result from the interaction of past, current or foreseeable future disturbances, both human-caused and natural such as wildfires and mortality. Timber harvest activities can affect the timing of runoff, increase peak flows and increase the total annual water yield of a particular drainage. Low to moderate cumulative effects of timber harvest, agricultural use, grazing, roads and irrigation diversions have occurred in the project area drainages since the late 1800's. Based on aerial photos and site reviews, the more extensive timber harvests and road construction on adjacent ownership area occurred between 1960 to 2000.Past management activities in the proposed project areas include timber harvest, grazing, road construction, mining, irrigation diversions, agriculture, fire suppression and recreation. Recent timber harvest projects in the general area include: Beaverlodge Timber Sale, Lincoln South Timber Sale, Liverstone Park Timber Sale and minor salvage permits. On each of the previous sales, road conditions and stream crossings that did not meet BMP's were improved to meet BMPS. A DNRC programmatic, BMP audit was completed on a salvage permit in 2012 to monitor administration and mitigations, and operations were found to be in compliance with all BMP's and SMZ rules. On the Landers Fork section a SMZ violation occurred where there was minor traffic within the outside edge of an overflow channel. There was very minor ground disturbance, no sediment source to the stream, and no corrective action was needed. Under the no-action alternative, cumulative effects would remain the same as described in existing conditions.

Cumulative Watershed Effects of the Action Alternative:

There would be low risk of adverse cumulative impacts from the proposed action, to water quality and beneficial uses based on implementation of BMPs, Rules, HCP requirements and mitigation measures during timber harvest and road construction operations. Within the cumulative effects analysis area, DNRC has proposed to harvest dead, high risk and overstocked trees from up to 3,625 acres in the project areas.

The proposed harvest includes salvage of trees that are dead, dying and at high risk of insect mortality and comprises 30-60% of stand volume in proposed DNRC harvest areas. Sites that are thinned would also reduce competition and promote faster growth and improved water efficiency by retained trees. There is low potential for surface runoff or measurable water yield increases from the proposed harvest and thinning, compared to no-action based on the water yield estimates in table WS-2. Over 80% of harvest sites are located on relatively low rainfall sites with less than 22" annual precipitation where evaportranspiration and soil infiltration rates exceed precipitation levels and surface runoff is unlikely, even during storm events.

Research has shown that water yield is not likely detectable (MacDonald & Stednick. 2003, Romme et.al.2006) for these low precipitation levels of less than 20' annually, even with aggressive harvests, and the proposal is low to moderate selective harvest over a broad area, using existing roads. There would continue to be moderate to impacts of existing water yield increases in Copper Creek and Lander's fork drainages where fire has affected large portions of the watersheds combined with historic land management and mining activities. The minor 20 acres of salvage harvest in the Copper Creek drainage and 152 acres in Landers Fork would affect less than 0.2% of the drainage is not expected to measurably impact water quality or water yields compared to no-action.

For all these reasons there is low risk of additive cumulative watershed effects associated with proposed actions to increased water yield or potential change in stream channel forms or flow regimes as compared to the no-action alternative and natural ranges associated with disturbances such as tree mortality and fire.

Table WS-2 Estimated Annual Water Yield Increases for Analysis Areas from Action Alternative.

HU_12_NAME	Harvest Area PPT	% Allowable WYI	Existing Water Yield Increase	Treated Acres from Actions	New Road from Actions	ECA Increase from Actions	Post Water Yield Increase Acre ft.	Post Percent Water Yield Increase	Net/Post-Project % Water Yield Increase
Beaver Creek 170102030303	29.5	12%	1.7%	132	0.45 mi	68.7	193	1.8%	0.12%
Lincoln Creek 170102030305	23.3	12%	5.0%	285		119.7	244	5.4%	0.36%
Arrastra Creek 170102030309	29	12%	3.7%	350		194	525	4.0%	0.28%
Copper Creek 170102030103	37	10%	21.90%	20		10.8	7563	21.9%	0.01%
Lower Landers Fork 170102030104	22.9	10%	15.8%	152	.3 mi	96	1563	15.9%	0.19%

Humbug Creek 11390 170102030301	20	12%	5.0%	85		64	297	5.2%	0.1
Willow Creek 170102030306	21	12%	6.0%	487		277	392	6.8%	0.80%
Blackfoot River-Lincoln 170102030308	22.2	10%	5.0%	85		64	297	5.2%	0.16%
Blackfoot River-Hardscrabble Creek 170102030206	22.6	10%	6.3%	160		34	405	6.4%	0.14%
Lower Alice Creek 170102030204	22.5	12%	6.2%	36		15.5	530	6.2%	0.04%
Keep Cool Creek 170102030304	22.1	12%	4.7%	1269	3.2 mi	705	898	5.5%	0.78%

One culvert crossing of an unnamed tributary to Bear Creek would be removed and up to .1 miles of road adjacent to the stream would be reclaimed and stabilized to reduce sedimentation at the crossing sites. There would be a short term pulse in sediment at the site of the culvert removals that would subside quickly and there would be a long term reduction in sediments at these crossings.

In summary, the proposed road relocation, crossing removals, road reclamation, road drainage improvements, and road maintenance would reduce current sediments and maintain or improve water quality. The proposed ground based timber harvest is expected to result in low risk of erosion and sediment delivery to streams. All streams would be protected by implementation of the SMZ law and RMZ requirements consistent with rules and HCP requirements. The harvest of mainly dead, dying and beetle infested pine and thinning of mixed tree species to improve spacing and growth would have moderate risk of low impacts to water quality, the amount or timing of runoff (water yield), or stream stability from the proposed project area when compared to the effects anticipated under no action.

Section 7 Vegetation- Noxious Weeds- Existing Conditions

Noxious weeds infestations are mainly a combination of spotted knapweed, houndstongue and spots of thistle which occur along portions of the existing access road system, open forest and rangeland sites. Noxious weeds occurring in the project parcels are mostly knapweed (Centaurea maculosa), houndstongue (Cynoglossum officinale L) and spot infestations of thistle (Cirsium arvense) within project sections and on adjacent lands. Knapweed (Centaurea maculosa) was found along roadsides as well as in some forested portions of the project area. Houndstongue was found mostly along roadsides along the access haul routes. Yellow toadflax (Linaria vulgaris) also occurs in the Lincoln area and is mainly a concern in the Lander's Fork area, where toadflax occurs along the open roads and stream bottom. Historic cattle grazing, timber harvest activities, and recreational uses, are most likely the reasons for the existing rate of spread of noxious weeds and the potential future spread and introduction of noxious weeds. Reseeding of some roadcuts followed by roadside and spot herbicide treatments have been made on noxious weeds on portions of all of the project sections that has reduced the infestation and spread of noxious weeds. DNRC has completed considerable herbicide treatments and revegetation on forest management projects for the last 10 years, coupled with weed treatments by Newmont Mining near Landers Fork and volunteers such as Lincoln area "Snow Warriors" and some work by grazing lessees. Yet weeds continue to spread by wind, animals and vehicles. Weed management treatments on adjacent

ownerships in the area varies from no-action to combinations of revegetation, herbicide treatments and bio-control measures.

Noxious Weeds- Direct and Indirect Effects of the No- Action Alternative

With no action, noxious weeds will continue to spread along roads and may increase on the drier site habitats. Following disturbance events such as timber harvest activities, fires, or grazing, the establishment and spread of noxious weeds can be more prevalent than in undisturbed areas. DNRC would treat selected sites on DNRC roads based on priorities and funding availability. If new weed invader species are found they would have highest priority for management. The grazing licensees would be required to continue weed control efforts consistent with their use.

Noxious Weeds- Direct and Indirect Effects of the Action Alternative

The action alternative will involve ground-disturbing activities that have the potential to introduce or spread noxious weeds in susceptible habitat types. For the action alternative, an Integrated Weed Management (IWM) approach was considered for treatment of existing and prevention of potential noxious weeds. For this project: prevention, revegetation and weed control measures for spot outbreaks are considered the most effective weed management treatments. Prevention measures would require clean off-road equipment. Roadsides would be sprayed prior to operations and weed control and revegetation would slow noxious weed spread and reduce weed density and occurrence compared to no-action. There would be a similar or potential slight increase in weed infestation with harvest units due to soil disturbance and reduction of tree canopy. The silvicultural prescriptions are designed to control disturbance and scarification to goals need for sustained forest growth. Control efforts will promote rapid revegetation and emphasize treatment of any new noxious weeds found.

Herbicide application would be completed on segments of DNRC roads along the haul route, to reduce weed spread along roads and promote desired vegetation for weed competition and to reduce sedimentation. Herbicide would be applied according to labeled directions, laws and rules, and would be applied with adequate buffers to prevent herbicide runoff in surface. Implementation of IWM measures listed in the mitigations would reduce existing weeds, limit the possible spread of weeds, and improve current conditions, to promote existing native vegetation. More weed control would occur compared to the no-action alternative and grass and competitive vegetation would increase along roads.

Noxious Weeds- Cumulative Impacts of No-Action

Impacts of noxious weeds within the project areas are moderate. Weeds have spread through the drainage across ownerships over time and are prone to more dispersal along open roads. Weeds also have spread by multiple uses from wind, traffic, forest management, grazing animals and wildlife. Current weed infestations are mainly limited to roadsides within the project parcel and open forest sites. No control occurs along the main county access road, and this increases the potential for windblown seed. Timber harvest and roads throughout these drainages has increased grass growth and the risk for noxious weeds to spread though ground disturbance. As tree density and vegetation increase, weeds are reduced through vegetative competition.

Noxious Weeds- Cumulative Impacts of the Action Alternative

Impacts of noxious weeds within the project areas are moderate. Weeds have spread through the project areas across ownerships over time, mainly along roadsides and open forest sites with multiple uses and by seed dispersal from wind, traffic and wildlife. Timber harvest throughout these drainages has increased grass growth and the risk for noxious weeds to spread though ground disturbance. Within the project area, overall cumulative effects of increased noxious weeds are expected to be low to moderate, based on herbicide treatments of existing weeds along roads and implementing prevention measures to reduce new weeds, by cleaning equipment and planting grass on roads to compete against weeds and the continued weed control of grazing users.

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Attachment C
Fisheries

UPPER BLACKFOOT TIMBER SALVAGE AND MANAGEMENT PROJECT – FISHERIES RESOURCES ANALYSIS

Jim Bower, DNRC Forest Management Bureau
April 15, 2013

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1 INTRODUCTION

The purpose of this assessment is the analysis of foreseeable environmental effects to fisheries and related habitat resources associated with the proposed Upper Blackfoot Timber Management Project (UBTMP) area.

1.1 PROJECT AREA

The UBTMP project area includes all parcels identified in Chapter 1 of the UBTMP Environmental Assessment document. Other project area lands include private lands that intersect forest road haul routes.

1.2 INITIAL FISHERIES ANALYSIS AREAS

Eleven separate initial analysis areas were identified to evaluate the existing and potential impacts to fisheries and fisheries resources associated with the proposed actions. The selected analysis areas include: Arrastra Creek, Beaver Creek, Lincoln Gulch, Blackfoot River and Face Drainages #1, Blackfoot River and Face Drainages #2, Willow Creek, Humbug Creek, Keep Cool Creek, Copper Creek, Landers Fork, and Alice Creek (see Map 1).

The eleven analysis areas were chosen because they include (1) the watershed of current or historic fish-bearing streams and (2) the proposed timber harvest units and/or forest road haul routes that could have potential measurable or detectable impacts to those fish-bearing streams.

Arrastra Creek, the Blackfoot River, and Poorman Creek within the analysis areas are identified on the 2012 Montana 303(d) list as having impairments to aquatic life. Surface waters in all analysis areas are classified as B-1 in the Montana Surface Water Quality Standards (ARM 17.30.610). For more details on these regulations, water quality standards, and beneficial uses please see the Water Resources analysis.

1.3 SPECIES

Current and historic fisheries distribution within the analysis areas are identified in Table 1. The United States 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. DNRC has also identified bull trout and westslope cutthroat trout as sensitive species.

MAP 1 – Fisheries resource analysis areas.

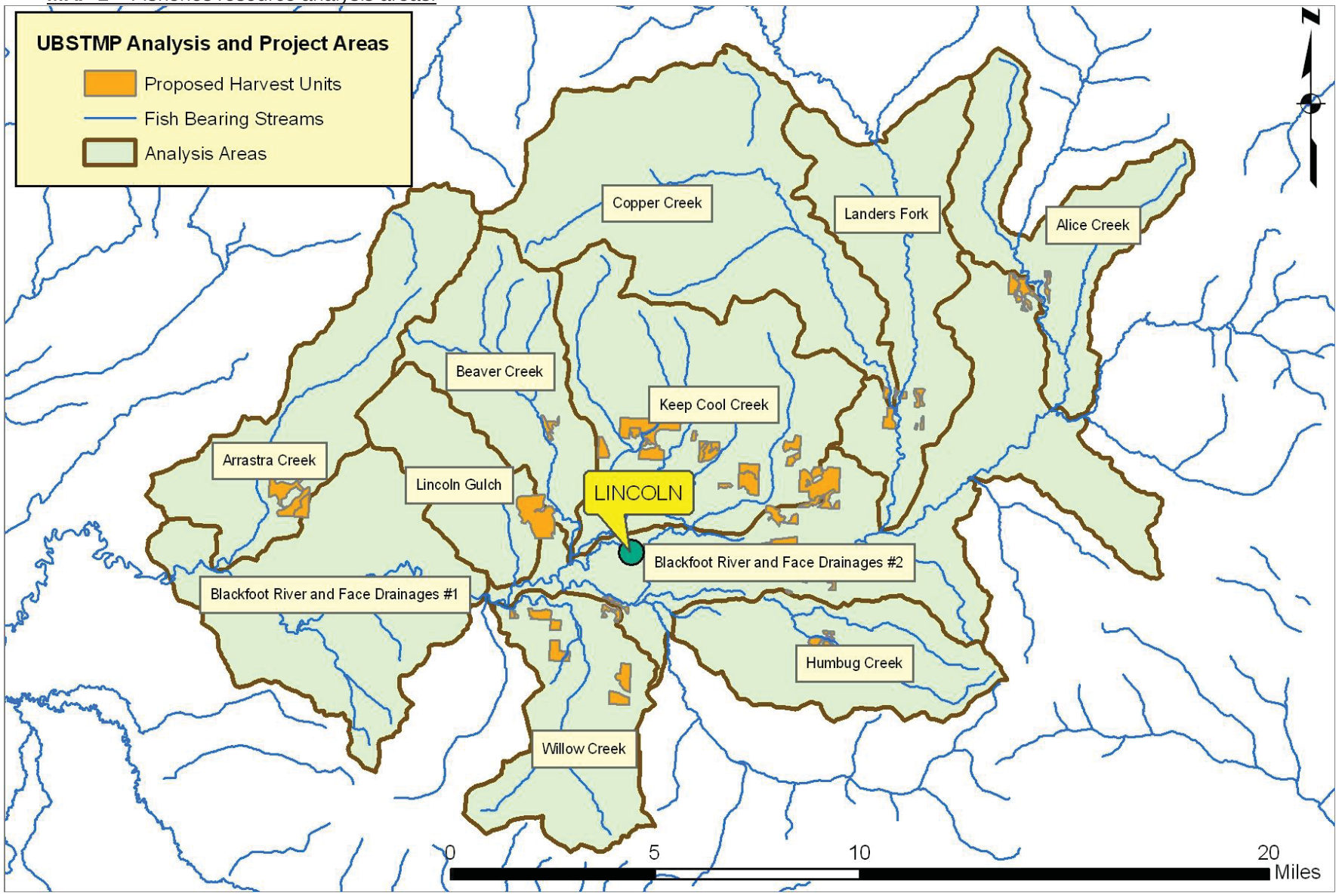

TABLE 1 – Current and historic fish species distribution across analysis areas.

			ANALYSIS AREAS										
			Arrastra Creek	Beaver Creek	Lincoln Gulch	Blackfoot River and Face Drainages #1	Blackfoot River and Face Drainages #2	Willow Creek	Humbug Creek	Keep Cool Creek	Copper Creek	Landers Fork	Alice Creek
SPECIES	native species	bull trout	X	X[1]		X	X			X	X	X	X
		westslope cutthroat trout	X	X	X	X	X	X	X	X	X	X	X
		mountain whitefish				X	X					X	
		longnose sucker	X	X		X	X	X	X				X
		longnose dace							X				
		northern pike minnow				X	X						
		redside shiner				X		X					
		largescale sucker											X
		slimy sculpin								X			
		fathead minnow					X[2]		X[2]				
	nonnative species	rainbow trout				X							
		brown trout		X		X	X	X		X		X	X
		eastern brook trout	X	X		X	X	X	X	X		X	X

[1] Recent surveys have not found species present in analysis area; analysis area is estimated to be within species historic distribution.
[2] Species is native to the Missouri River drainage in Montana; analysis area may or may not be within species historic distribution

1.4 FISHERIES ISSUES RAISED DURING SCOPING

Issues, with respect to this environmental analysis, are not specifically defined by either the Montana Environmental Policy Act or the Council on Environmental Quality. For the purposes of this environmental analysis, issues will be considered actual or perceived effects, risks, or hazards as a result of the proposed actions. Issues raised internally include: the proposed actions may adversely affect fisheries habitat features, including channel forms, stream temperature, and connectivity. No issue statements related to fisheries resources were received from the public during project scoping.

1.5 ANALYSIS METHODS

The *EXISTING CONDITIONS* of fisheries resources will be described for each analysis area. 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.

Analysis methods are a function of the types and quality of data available for analysis, which varies among the different analysis areas. The analyses may either be quantitative or qualitative. The best available data for both populations and habitats will be presented for the analysis area. In order to adequately address the issues raised in Section 1.4 (Fisheries Issues Raised during Scoping) the existing conditions and foreseeable environmental effects to fisheries in the analysis area will be explored using the following outline of variables. Sedimentation will be addressed through an analysis of effects to channel forms.

- Fisheries Populations – Presence/Absence
- Fisheries Habitat – Channel Forms
    - Fisheries Habitat – Sediment
    - Fisheries Habitat – Flow Regimes
    - Fisheries Habitat – Woody Debris
- Habitat – Stream Temperature
    - Fisheries Habitat – Stream Shading
- Habitat – Connectivity
- Cumulative Effects

All project area lands were evaluated in the field by a DNRC fisheries resources specialist either during 2012 or recently as part of other past timber sale proposals. In addition to assessing existing and potential direct and indirect effects, these site-specific surveys also serve as a resource subsample to extrapolate foreseeable effects across analysis areas.

[Data used to derive the information in Tables 2 and 3 include: site-specific field survey data, December 2012 National Hydrography Dataset, March 2013 DNRC Pre-enterprise Geodatabase, 2013 ESRI 1-meter photo imagery, and 2013 Montana Fish, Wildlife and Parks MFISH.]

In terms of the risk that an impact may occur, a low risk of an impact means that the impact is unlikely to occur. A moderate risk of an impact means that the impact may or may not (50/50) occur. A high risk of an impact means that the impact is likely to occur.

A very low impact means that the impact is unlikely to be detectable or measurable, and the impact is not likely to be detrimental to the resource. A low impact means that the impact is likely to be detectable or measurable, but the impact is not likely to be detrimental to the resource. A moderate impact means that the impact is likely to be detectable or measurable, and the impact is likely to be moderately detrimental to the resource. A high impact means that the impact is likely to be detectable or measurable, and the impact is likely to be highly detrimental to the resource.

Cumulative impacts are those collective impacts on the human environment [in this case, fisheries resources] 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 analysis areas are determined by assessing the collective

anticipated direct and indirect impacts, other related existing actions, and future actions affecting the fisheries resources.

2 ALTERNATIVES

2.1 PROPOSED ACTION ALTERNATIVE AND RELATED MITIGATIONS

Up to 3,625 acres of timber harvest is proposed through 65 different harvest units. New, permanent road construction would total 5.6 miles. One existing road-stream crossing on a Class 1 stream would be permanently removed to improve water quality, and approximately 0.1 miles of existing roads would be reclaimed to further improve downstream fish habitats and water quality.

Fisheries-related resource mitigations that would be implemented with the proposed Action Alternative include: (1) applying all applicable Forestry BMPs and Forest Management ARMs for fisheries, soils, and wetland riparian management zones (RMZ) (ARMs 36.11.425 and 36.11.426), (2) implementation of all applicable conservation strategies in the Forested State Trust Lands Habitat Conservation Plan, and (3) monitoring all road-stream crossings for sedimentation.

2.2 ANALYSIS AREAS DISMISSED FROM FURTHER ANALYSIS

After considering project-specific issue statements (Section 1.4) and the extent of the proposed actions (Section 2.1), the Blackfoot River and Face Drainages #1 analysis area is dismissed from further analysis. The Blackfoot River and Face Drainages #1 analysis area is dismissed from the further analysis of fisheries resources due to: (1) less than 0.1% of the acreage within the analysis area would be affected by timber harvest, (2) timber harvest would not occur within 300 feet of any stream channel, (3) no road construction would occur in the analysis area, and (4) only 130 feet of existing forest road haul route in the analysis area would be utilized as part of the proposed actions. As no foreseeable direct or indirect impacts to fisheries resources would be expected to occur in the analysis area, no additional cumulative effects to fisheries resources would be expected in the analysis areas as a result of implementing the Action Alternative.

2.3 ISSUES DISMISSED FROM FURTHER DETAILED ANALYSIS

After considering the extent of the proposed actions (Section 2.1), the fish habitat variables of species presence/absence and connectivity are dismissed from further detailed analysis, since no direct or indirect effects to the variables would occur. However, both variables remain important components of overall fisheries resources and will be discussed as part of cumulative effects.

3 EXISTING CONDITIONS

3.1 ALL ANALYSIS AREAS

The proposed activities that may affect fisheries resources in all of the analysis areas include: riparian and upland timber harvest; forest road construction and maintenance; and 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, woody debris, stream temperature and stream shading.

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, a matrix of 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 analysis areas.

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. Table 2 shows the number of all road-stream crossings and the cumulative length of all roads within 300 feet of all streams in the different analysis areas. The number of road-stream crossings ranges from 19 in the Landers Fork analysis area to 81 in the Keep Cool Creek analysis area (average = 55). Considering the density of road-stream crossings, 0.8 (Landers Fork) to 3.6 (Lincoln Gulch and Willow Creek) crossings occur per square mile in the analysis areas (average = 2.5). The length of all roads within 300 feet of all streams ranges from 10.0 miles in the Landers Fork analysis area to 34.2 miles in the Keep Cool Creek analysis area (average = 22.1 miles). The density of adjacent roads ranges from 0.4 miles per square mile in the Landers Fork analysis area to 1.4 miles per square mile in the Willow Creek analysis area (average = 0.9 miles per square mile). 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 roads sources is low in Landers Fork and Copper Creek and moderate across all other analysis areas.

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 nature disturbances and land management activities. The Water Resources analysis indicates that the existing condition in all analysis areas is expected to be within the historic range of variability, except in Landers Fork and Copper Creek. The Landers Fork and Copper Creek analysis areas have undergone recent, expansive, high-severity fires, and the effects to flow regime by these natural disturbances are likely exacerbated by historic land management activities. More specifically, the effects to flow regime by both the fire events and land management activities are likely contributing to existing, elevated levels of channel forming processes. As a result the expected existing direct and indirect impact to the historic ranges of flow regime (by land management activities) is moderate in Landers Fork and Copper Creek.

TABLE 2 – Existing conditions assessment criteria across analysis areas.

		ANALYSIS AREAS									
		Arrastra Creek	Beaver Creek	Lincoln Gulch	Blackfoot River and Face Drainages #2	Willow Creek	Humbug Creek	Keep Cool Creek	Copper Creek	Landers Fork	Alice Creek
GENERAL	Area (acres).	**15,071**	**11,607**	**7,545**	**27,903**	**12,088**	**11,390**	**22,816**	**25,984**	**15,650**	**11,689**
	Total length of perennial and intermittent streams (miles).	**50.2**	**37.9**	**23.5**	**112.3**	**38.9**	**36.7**	**76.9**	**73.1**	**37.1**	**38.5**
	Total length of fish-bearing streams (miles).	**12.3**	**18.3**	**2.3**	**60.1**	**16.2**	**15.9**	**33.9**	**23.3**	**14.2**	**19.9**
	Total riparian area within 100 feet of perennial streams (acres).	**373**	**481**	**202**	**1,307**	**393**	**433**	**939**	**936**	**526**	**514**
EXISTING CONDITIONS ASSESSMENT CRITERIA	Number of road crossings on perennial and intermittent streams.	**80**	**55**	**42**	**74**	**68**	**42**	**81**	**40**	**19**	**52**
	Total length of roads within 300 feet of perennial and intermittent streams (miles).	**28.8**	**15.0**	**14.2**	**32.1**	**25.5**	**18.5**	**34.2**	**19.0**	**10.0**	**23.3**
	Flow regime departure from historic range of conditions (see Watershed Resources Analysis).	**none**	**none**	**none**	**none**	**none**	**none**	**none**	**likely elevated**	**likely elevated**	**none**
	Total riparian area within 100 feet of perennial streams with existing road or forest management effects (acres).	**82**	**114**	**144**	**1,132**	**318**	**205**	**506**	**452**	**357**	**343**

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 100 feet of perennial streams is the primary influence on these two fisheries resource variables. Table 2 shows the estimated acreage within 100 feet of perennial streams that has been affected by all roads and past land management activities. (These acre values do not include area affected by natural disturbances.) Existing affected riparian zone areas range from 82 acres in Arrastra Creek to 1,132 acres in the Blackfoot River and Face Drainages (average = 365 acres); and, the percentage of total riparian zone affected ranges from 22 percent in Arrastra Creek to 87 percent the Blackfoot River and Face Drainages (average = 57 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 Arrastra and Beaver creeks and moderate across all other analysis areas.

While low to moderate direct and indirect existing impacts are likely occurring to channel forms and stream temperature and the native fisheries associated with these resources, it is uncertain if these stressors are affecting the fish species distribution or presence. Further assessment of the data in Table 2 indicates there are no significant existing trends among all analysis areas between the miles of fish-bearing streams per 1,000 acres or the percent of perennial and intermittent stream that are fish-bearing and the density of road-stream crossings per square mile or adjacent road miles per square mile. Similarly, no there are no significant existing trends among all analysis areas between the miles of fish-bearing streams per 1,000 acres or the percent of perennial and intermittent stream that are fish-bearing and the percentage of affected riparian zone areas. This coarse assessment does not compare the analysis areas to nearby reference conditions, which is outside the scope of this environmental assessment.

Other existing impacts to fisheries resources in all of the analysis areas include: high impacts to native fish species through displacement, disease, and hybridization by nonnative species; road-stream crossings that likely affect habitat connectivity; grazing impacts that may exacerbate in-stream sedimentation, adverse effects to riparian vegetation, and nutrient inputs; recreational fishing pressures; stream dewatering for agricultural or other purposes; and off-road vehicle impacts. (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 cumulative impact to fisheries resources across all analysis areas, except Lincoln Gulch and Copper Creek. An existing moderate cumulative effect to fisheries resources is expected in Lincoln Gulch and Copper Creek, which is due to lower adverse effects from nonnative fish species compared to the other analysis areas.

4 ENVIRONMENTAL EFFECTS

4.1 NO-ACTION ALTERNATIVE

4.1.1 ALL ANALYSIS AREAS

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

Future related actions considered part of cumulative impacts include other forest management practices; continued high impacts to native fish species by nonnative species; a stable to declining number of road-stream crossings that affect habitat connectivity; continued grazing impacts; stable to increasing recreational fishing pressures; ongoing stream dewatering for agricultural or other purposes; and ongoing off-road vehicle impacts. 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.

4.2 ACTION ALTERNATIVE

4.2.1 ALL ANALYSIS AREAS

The proposed actions and affected fisheries resources in all analysis areas are broadly described in Sections 2.1 and 3.1. Project-specific BMPs and road maintenance would be applied to all segments of the haul routes through the analysis areas (see Water Resources analysis).

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. Table 3 displays both the number of road-stream crossings and total length of roads within 300 feet of all streams that would be used for the proposed actions.

The number of road-stream crossings that would be used ranges from 1 in the Copper Creek analysis area to 18 in the Willow Creek analysis area (average = 8). Comparing the percentage of road-stream crossings used to the existing density of road-stream crossings per square mile, all analysis areas except Willow Creek, Humbug Creek and Keep Cool Creek would have a relatively low amount of dispersed road-stream crossings used by the project. The Willow Creek, Humbug Creek and Keep Cool Creek analysis areas have existing road-stream crossing densities greater than 2.3 sites per square mile and would utilize more than 21 percent of all road-stream crossings across the analysis areas. The miles of roads that would be used within 300 feet of all streams ranges from 0.1 miles in the Landers Fork analysis area to 5.3 miles in the Willow Creek analysis area (average = 2.0 miles). The percentage of roads that would be used in all analysis areas within 300 feet of all streams is below 12 percent, except in Willow Creek and Humbug Creek, where the proportion of these roads used would 19 percent or greater. 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 likely in all analysis areas except in Willow Creek and Humbug Creek. A risk of moderate impacts to sediment is expected in the Willow Creek and Humbug Creek analysis areas.

Additionally, a low risk of low impacts to fisheries resources in Landers Fork would occur from 0.1 miles of road construction within 300 feet of a perennial channel. A positive impact would occur in the Willow Creek analysis area where 0.1 miles of road would be removed within the same zone.

Upland harvest on sites with high risk of erosion may mobilize material that could be delivered to adjacent stream channels; however, the Water Resources analysis indicates that this action is low risk for low impacts. This effects assessment takes into consider the implementation of the SMZ Law and Rules and supplemental ARMs for Forest Management on high risk of erosion sites.

As described in the Water Resources analysis, the levels of proposed timber harvest are not expected to lead to measureable increases in water yield or consequent changes in flow regime.

TABLE 3 – Environmental effects assessment criteria across analysis areas.

		ANALYSIS AREAS									
		Arrastra Creek	Beaver Creek	Lincoln Gulch	Blackfoot River and Face Drainages #2	Willow Creek	Humbug Creek	Keep Cool Creek	Copper Creek	Landers Fork	Alice Creek
ENVIRONMENTAL EFFECTS ASSESSMENT CRITERIA	Number of road crossings on perennial and intermittent streams on proposed haul routes.	**4**	**5**	**4**	**9**	**18**	**12**	**17**	**1**	**5**	**3**
	Net change in number of road crossings on perennial and intermittent streams.	**0**	**0**	**0**	**0**	**-1**	**0**	**0**	**0**	**1**	**0**
	Total length of roads on proposed haul routes within 300 feet of perennial and intermittent streams (miles).	**1.8**	**0.5**	**0.2**	**3.8**	**5.3**	**3.6**	**3.5**	**0.5**	**0.1**	**0.7**
	Net change in total length of roads within 300 feet of perennial and intermittent streams (miles).	**0.0**	**0.0**	**0.0**	**0.0**	**-0.1**	**0.0**	**0.0**	**0.0**	**0.1**	**0.0**
	Net anticipated change in flow regime (see Watershed Resources Analysis).	**none**	**none**	**none**	**none**	**none**	**none**	**none**	**none**	**none**	**none**
	Total riparian area within 100 feet of perennial streams affected by the proposed actions (acres).	**0**	**4**	**2**	**0**	**6**	**1**	**3**	**1**	**4**	**0**

Riparian harvest of 50 percent of merchantable trees between 50 and 100 feet away from fish-bearing and non-fish-bearing perennial streams would occur in all analysis areas except Arrastra Creek, Alice Creek and Blackfoot River and Face Drainages #2. [No riparian harvest would occur within 0 to 50 feet of any fish-bearing and non-fish-bearing perennial 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 each of the remaining analysis areas ranges from 1 percent to 4 percent (average = 1 percent). Due to the very limited magnitude and extent of this management action, a moderate risk of low impacts to woody debris and stream shading is expected in these analysis areas.

Due to the potential effects to riparian shading, a consequent moderate risk of low impacts to stream temperature is also expected in all analysis areas, except Arrastra Creek, Alice Creek and Blackfoot River and Face Drainages #2.

Overall, low to moderate direct and indirect impacts may occur to channel forms, and low direct and indirect impacts may occur to stream temperature. These potential direct and indirect impacts could affect native fisheries associated with these resources. These potential effects would also be in addition to those direct and indirect effects already occurring. The Existing Conditions provides a coarse trend assessment of historic and ongoing effects by roads and riparian management to fisheries distribution or presence. The magnitude and extent of the proposed actions are not expected to have any detectable or measurable effects to the trends in fish species distribution or presence among the analysis areas compared to the existing conditions. This assessment does not compare the analysis areas to nearby reference conditions, which is outside the scope of this environmental assessment.

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. Additionally, low to moderate direct and indirect existing impacts may occur to channel forms, and low direct and indirect existing impacts may occur to stream temperature as a result of implementing the proposed actions. Considering all of these impacts collectively, moderate to high cumulative impacts to fisheries resources are expected across all analysis areas, except Lincoln Gulch and Copper Creek. A moderate cumulative effect to fisheries resources is expected in Lincoln Gulch and Copper Creek. The foreseeable cumulative effects to fisheries resources are fundamentally unchanged from the existing conditions, and they would remain elevated and slightly variable primarily due to the presence and consequent adverse impacts from nonnative fish species.

ATTACHMENT D
WILDLIFE

Upper Blackfoot Timber Sale Wildlife Analysis

Garrett Schairer, Wildlife Biologist

April 18, 2013

Chapter 1

Issues and Concerns

The following wildlife-related issues were raised during project scoping and project development. Each is analyzed in more detail below.

-There is concern that proposed activities could alter forested connectivity and/or wildlife corridors, which could affect wildlife movements across the landscape.

-There is concern that the proposed activities could alter cover, increase access, and reduce secure areas, which could affect grizzly bears by displacing them from important habitats and/or increasing risk to bears of human-caused mortality.

-There is concern that the proposed activities could negatively affect Canada lynx by altering lynx summer foraging habitat, winter foraging habitat, and other suitable habitat, rendering it unsuitable for supporting lynx.

-There is concern that the proposed activities could negatively affect bald eagles by reducing nesting and perching structures and/or disturbing nesting bald eagles

-There is concern that the proposed activities could reduce the amount and/or quality of fisher habitats, which could alter fisher use of the area.

-There is concern that the proposed activities may alter flammulated owl habitat by reducing canopy closure and increasing tree spacing, and could remove snags needed by flammulated owls for nesting.

-The proposed activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.

-There is concern that the proposed activities could reduce suitable nesting and foraging habitat for pileated woodpeckers, which could alter pileated woodpecker use of the area.

-There is concern that the proposed activities could reduce the amount and/or quality of wolverine habitats, which could alter wolverine use of the area.

-There is concern that the proposed activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range

-There is concern that the proposed activities could remove big game security cover, which could affect hunter opportunity and local quality of recreational hunting.

-There is concern that the proposed activities could alter northern goshawk habitats and/or displace nesting goshawks from active nests, resulting in increased mortality to goshawk chicks.

Issues Eliminated from Further Study

The following species were considered but eliminated from detailed study due to lack of habitat present: black-backed woodpecker, Coeur d'Alene salamander, Columbian sharp-tailed grouse, common loon, harlequin duck, mountain plover, northern bog lemming, peregrine falcon, and Townsend's big-eared bat. Thus there would be a low risk of adverse direct, indirect, or cumulative effects as a result of either alternative.

Chapter 2

Suggested Wildlife Mitigations

- A DNRC biologist will be consulted if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435) are needed.

- Motorized public access will be restricted at all times on restricted roads that are opened for harvesting activities; motorized public access would revert to existing levels following harvesting. Efforts to discourage additional motorized access (legal and illegal) by reclaiming temporary roads and obstructing skid trails would benefit several wildlife species.
- Snags, snag recruits, and coarse woody debris will be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch and ponderosa pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.
- Contractors and purchasers conducting contract operations will be prohibited from carrying firearms while on duty.
- Food, garbage, and other attractants will be stored in a bear-resistant manner.
- Harvesting would be prohibited between April 1 and June 15 to minimize the potential for disturbance to grizzly bears, bald eagles, red-tailed hawks, and a host of other avian species.
- Provide visual screening for grizzly bears by designing new clearcut and seed tree units such that no point in the unit is more than 600 feet from vegetation or topographic break.
- Break up sight distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx by retaining of patches of advanced regeneration of shade-tolerant trees, such as subalpine-fir and Engelmann spruce.
- Minimize potential for disturbance to nesting bald eagles by restricting harvesting and related activities in nest and primary use areas between February 1 and August 15.
- Minimize potential for disturbance to nesting northern goshawks by restricting harvesting and related activities within 0.5 miles of last known nest along Bear Creek between April 1 and July 15.
- Provide connectivity for fisher, Canada lynx, grizzly bears, and a host of other species by maintaining corridors of unharvested and/or lighter harvested areas along riparian areas, ridge tops, and saddles.

Chapter 3: Affected Environment

Description of Relevant Affected Resources

Wildlife

Forested Habitat Connectivity and Wildlife Movements

Connectivity of forest cover between adjacent patches is important for promoting movements of species that are hesitant to cross non-forested areas and other openings. Effective corridors tend to be those that are relatively wide, unfragmented, diverse, and associated with riparian areas (Fischer and Fischenich 2000). Width of the travel corridor tends to determine the efficacy of the corridor for individual species. In general, a wider corridor would be more effective and provide for more species than a narrower one. Riparian areas and ridges often play an important role in providing connective corridors. As such, corridors can become compromised through human management and environmental changes (e.g., fires or floods).

The 9,260 acre project area currently contains approximately 3,941 acres (43%) of mature stands (100-plus years in age) of Douglas-fir, lodgepole pine, and ponderosa pine stands that have a reasonably closed canopy. Currently, the project area contains a mixture of forested, semi-forested, young forest, recently harvested, and non-forested areas; some use of the project area by those species requiring connected-forested conditions may occur in those forested and semi-forested stands. Cumulative effects were analyzed on the combined area used for grizzly bears, which includes the Arrastra Mountain grizzly bear subunit (69,258 acres), Alice Creek grizzly bear subunit (70,175 acres), Red Mountain grizzly bear subunit (76,676 acres), and the 119,543-acre area south of these 3 grizzly bear subunits and bounded by Arrastra Creek, Trapper Mountain, Ogden Mountain, Dalton Mountain, the Continental Divide through Granite Divide and Flesher Pass to Highway 279 and back to Highway 200. DNRC manages approximately 4% of the cumulative effects analysis area; USFS manages roughly 74% of cumulative effects analysis area. On DNRC-managed lands within the cumulative effects analysis area, roughly 5,909 acres of mature stands with a reasonably closed canopy exist. On other ownerships, there are

roughly 198,066 acres (59%) of forested stands with ≥40% canopy closure across the cumulative effects analysis area; a portion of those stands are likely mature stands with a reasonably closed canopy. Furthermore, roughly 119,269 acres (41%) of sparsely stocked, young forest, shrubs, herbaceous, and non-forested types exist on other ownerships in the cumulative effects analysis area, which are not presently providing habitats for species requiring connected stands of mature forests. Connectivity of forested habitats in the cumulative effects analysis area has been compromised by past timber harvesting, agricultural clearing, the Highway 200 corridor, the Town of Lincoln, the natural intermingling of non-forested habitats in the vicinity, and the land ownership patterns in the area. Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis area has altered forested canopy and landscape connectivity. Continued tree mortality would likely continue altering forested habitats in the cumulative effects analysis area. Ongoing salvage harvesting within the cumulative effects analysis area would continue to alter forested habitats and landscape connectivity. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including Helmville Face prescribed burn, Poorman prescribed burn, Alice Creek prescribed burn, Stonewall Project, and Dalton Mountain Project, could potentially reduce forest canopy and/or alter landscape connectivity, adding to the effects from past vegetation management activities in the cumulative effects analysis area.

THREATENED AND ENDANGERED SPECIES

Grizzly Bears

Grizzly bears are native generalist omnivores that use a diversity of habitats found in western Montana. Preferred habitats are meadows, riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. The search for food drives grizzly bear movements, with bears moving from low elevations in spring to higher elevations through the summer and early fall, as fruits ripen throughout the year. 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 increasing human access into secure areas by creating roads (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 bringing humans and bears closer together and/or making bears more detectable, which can increase the risk of bears being illegally shot. Displacing bears from preferred areas may increase their energetic costs, which may, in turn, lower their ability to survive and/or reproduce successfully.

The project area is partially in the Alice Creek, Red Mountain, and Arrastra Mountain grizzly bear subunits of the Lander Fork Grizzly Bear Management Unit of the Northern Continental Divide Ecosystem grizzly bear recovery area, which has a sizeable grizzly bear population. The other portion of the project area is in the `occupied habitat' area as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (Wittinger 2002). Grizzly bears generally use different habitats relative to season. The project area primarily provides low-mid elevation forested areas, riparian areas, meadows, and big game winter range. Grizzly bears have been documented in the project area in the past, using vernal and permanent pools in the area (MT DNRC 2007), and have had to be relocated or removed from the population in the vicinity because they were preying upon sheep in the late spring (MT DNRC 2005). Grizzly bears may be present in the project area throughout the non-denning period. Cumulative effects were analyzed on 4 different cumulative effects analysis areas: the Arrastra Mountain grizzly bear subunit (69,258 acres); Alice Creek grizzly bear subunit (70,175 acres); Red Mountain grizzly bear subunit (76,676 acres); and the portion of the "occupied habitat" area south of these 3 grizzly bear subunits and bounded by Arrastra Creek, Trapper Mountain, Ogden Mountain, Dalton Mountain, the Continental Divide through Granite Divide and Flesher Pass to Highway 279 and back to the recovery zone at Highway 200 (119,543 acres). DNRC manages approximately 3-5% of each of the cumulative effects analysis areas; USFS manages between 57-94% of cumulative effects analysis areas, with the higher percentages in the recovery zone.

Managing human access is a major factor in management for grizzly bear habitat. There are numerous open roads in the project area. Within the 3 grizzly bear management subunits, open road densities (simple linear calculation) are fairly low (Alice Creek 0.47 mi./sq. mi.; Arrastra Mountain 0.52 mi./sq. mi.,

Red Mountain 0.52 mi./sq. mi.; USFS 2013); open road densities within the "occupied habitat" area are higher (0.93 mi./sq. mi.; simple linear calculation) than the recovery zone, but not excessively high. Hiding cover exists on roughly 3,066 acres (35%) in the project area. Across the cumulative effects analysis areas, hiding cover exists on 4,860 acres (35%) of DNRC-managed lands; grizzly bear hiding cover is likely present on a portion of the 198,066 acres (59%) of forested stands with ≥40% canopy closure across the cumulative effects analysis areas. Within the cumulative effects analysis areas, hiding cover is largely absent from the 64,678 acres of shrubs, herbaceous, and non-forested habitats and is likely somewhat limited on the other 54,591 acres of sparsely stocked and young forest habitats in the cumulative effects analysis areas. Three parcels from the project area (1 in Alice Creek subunit, and 2 in the 'occupied habitat' area) contain areas that are distant enough (≥ 0.3 miles) from open roads to contribute to blocks of grizzly bear security habitat (blocks ≥ 0.3 miles from roads receiving motorized use and ≥2,500 acres in size); within the cumulative effects analysis areas, 9 blocks of grizzly bear security habitat exist totaling 131,883 acres. Security habitats are fairly common within each of the cumulative effects analysis area (31% Red Mountain subunit; 33% 'occupied' habitat area; 43% Alice Creek subunit; and 56% Arrastra Creek subunit). Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis areas has altered grizzly bear habitats; recent wildfires have also altered grizzly bear habitats and security habitat in the cumulative effects analysis areas. Continued tree mortality would likely continue altering grizzly bear habitats. Ongoing salvage harvesting within the cumulative effects analysis area would continue altering grizzly bear habitats while potentially disturbing or displacing grizzly bears. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including Poorman prescribed burn, Alice Creek prescribed burn, Helmville Face prescribed burn, Stonewall Project, and Dalton Mountain Project, could potentially alter grizzly bear hiding cover, security habitats, or other important grizzly bear habitats, adding to the effects from past vegetation management activities in the cumulative effects analysis areas ; potential grizzly bear disturbance or displacement could also be possible.

Canada Lynx

Canada lynx are associated with subalpine forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). The proposed project area ranges from approximately 4,480 to 5,720 feet in elevation and is dominated by Douglas-fir, ponderosa pine, and lodgepole pine stands along with numerous non-forested areas. Lynx habitat in western Montana consists primarily of stands that provide habitat for snowshoe hares, either dense, young coniferous stands or dense, mature forested stands. Lynx in western Montana preferred mature, multi-storied stands with dense horizontal cover year-round; during the summer lynx also selected earlier successional stands with a high horizontal cover (Squires et al. 2010). For denning sites, the primary component appears to be abundant large woody debris, particularly in the form of downed logs, root wads, slash piles, and live trees (Squires et al. 2008). These conditions are found in a variety of climax vegetation habitat types, particularly within the subalpine fir series (Pfister et al. 1977). Historically, high intensity, stand-replacing fires of long fire intervals (150 to 300 years) occurred in continuous dense forests of lodgepole pine, subalpine fir, and Engelmann spruce. These fires created extensive even-aged patches of regenerating forest intermixed with old stands that maintained a mosaic of snowshoe hare and lynx habitat.

Approximately 1,930 acres of lynx habitats occur in the 9,260-acre (21% of the project area) project area, which is comprised of foraging habitats (725 acres; 8% of the project area), other suitable lynx habitats (largely forested lands that provide cover to facilitate movement; 759 acres; 8% of the project area), and temporary non-suitable lynx habitats (409 acres; 4% of the project area). Ongoing tree mortality would continue altering lynx habitats and landscape connectivity in the project area. Winter foraging habitats would be expected to decline with the ongoing tree mortality; these habitats would likely be converted to temporary non-lynx habitats. Over time summer foraging habitats could develop within some stands in the project area. Similarly, ongoing tree mortality could reduce landscape connectivity. Cumulative effects were analyzed on the combined area used for grizzly bears, which includes the Arrastra Mountain grizzly bear subunit (69,258 acres), Alice Creek grizzly bear subunit (70,175 acres), Red Mountain grizzly bear subunit (76,676 acres), and the 119,543-acre area south of these 3 grizzly bear subunits and bounded by Arrastra Creek, Trapper Mountain, Ogden Mountain, Dalton Mountain, the Continental Divide through Granite Divide and Flesher Pass to Highway 279 and back to Highway 200. DNRC manages

approximately 4% of the cumulative effects analysis area; USFS manages roughly 74% of cumulative effects analysis area. On DNRC-managed lands within the cumulative effects analysis area, roughly 3,317 acres (24% of DNRC-managed lands in the cumulative effects analysis area) of potential lynx habitats exist, which are dominated by mature/winter foraging habitats (1,279 acres; 9% of DNRC-managed lands), and `other suitable' lynx habitats (1,045 acres; 8% of DNRC-managed lands), with slightly fewer acres of temporary non-suitable lynx (797 acres; 6% of DNRC-managed lands) habitats. On other ownerships, there are roughly 198,066 acres (62% of non-DNRC-managed lands in the cumulative effects analysis area) of forested stands with ≥40% canopy closure across the cumulative effects analysis area, which are largely dominated by lodgepole pine and Douglas-fir, but contains subalpine fir, whitebark pine, and ponderosa pine. A portion of those forested stands would likely be suitable lynx habitats and probably include some winter foraging habitats in addition to `other suitable' habitats. Additionally some younger, summer foraging habitats likely exists on a portion of the 54,591 acres (17% of non-DNRC-managed lands in the cumulative effects analysis area) of sparsely stocked and young forest on other ownerships; no lynx habitats likely exist on the 64,678 acres (20% of non-DNRC-managed lands in the cumulative effects analysis area) of shrubs, herbaceous, and non-forested types on other ownerships in the cumulative effects analysis area. Similar to the project area, ongoing tree mortality would likely convert some of the winter foraging habitats to temporary non-lynx habitats. Future summer foraging habitats would likely develop within those habitats. Some modifications to landscape connectivity would be likely with the ongoing tree mortality. Lynx have been documented in the Dalton Mountain and Alice Creek areas within the cumulative effects analysis area (USFS 2013). Connectivity of forested habitats in the cumulative effects analysis area has been compromised by past timber harvesting, agricultural clearing, the Highway 200 corridor, the Town of Lincoln, the natural intermingling of non-forested habitats in the vicinity, and the land ownership patterns in the area. Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis area has altered Canada lynx habitats and/or landscape connectivity. Continued tree mortality would likely continue altering lynx habitats in the cumulative effects analysis area; widespread tree mortality could leave large areas of the cumulative effects analysis area in the temporary non-lynx habitat category. Ongoing salvage harvesting within the cumulative effects analysis area would continue altering Canada lynx habitats and/or landscape connectivity. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including Poorman prescribed burn, Alice Creek prescribed burn, Helmville Face prescribed burn, Stonewall Project, and Dalton Mountain Project, could potentially alter lynx habitats and/or landscape connectivity, adding to the effects from past vegetation management activities in the cumulative effects analysis area.

SENSITIVE SPECIES

Bald Eagle

Bald eagles are diurnal raptors associated with significant bodies of water, such as rivers, lakes, and coastal zones. The bald eagle diet consists primarily of fish and waterfowl, but includes carrion, mammals, and items taken from other birds of prey. In Montana, bald eagles begin the breeding process with courtship behavior and nest building in early February; the young fledge by approximately mid-August, ending the breeding process. Preferred nest-stand characteristics include large emergent trees that are within sight distances of lakes and rivers and screened from disturbance by vegetation.

In the vicinity of the project area, there are 2 known bald eagle territories: Lincoln and Stonewall Creek. The Lincoln territory was rather productive through 2001, and since that time this territory has only been sporadically monitored. The Stonewall Creek territory was discovered in 2011 and as such has a limited history. Direct, indirect, and cumulative effects were analyzed on the combined home ranges associated with these bald eagle territories. The aquatic habitats associated with these bald eagle territories include Smith Lake, Herrin Lakes, Blackfoot River, several streams (Stonewall, Beaver, Keep Cool, Spring, and Willow), as well as numerous smaller streams and wetlands. Aquatic and terrestrial prey species are fairly common in the home range. The terrestrial habitat incorporated by the territories is a coniferous/deciduous mixture along the lakeshores and riparian areas, with coniferous forests and grasslands/non-forested areas in the upland areas. Within the home ranges, black cottonwood is the deciduous tree of primary importance to bald eagles, while large emergent conifers also provide important nesting, roosting, and perching habitats.

Human disturbance, including timber harvesting, agricultural activities, the Highway 200 corridor, the town of Lincoln, and various forms of recreation are potential sources of disturbance to the nesting territory. Numerous large emergent trees are available across portions of the home range, but logging and other human developments in the last 100 years has likely reduced some of these attributes while others have experienced mortality and are declining in quality. Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis area has altered bald eagle habitats. Continued tree mortality would likely continue altering stand densities and potential visual screening around existing nests. Ongoing salvage harvesting within the cumulative effects analysis area would continue altering bald eagle habitats, including emergent trees and snags, while potentially increasing disturbance and/or human access within the cumulative effects analysis area. Proposed vegetation management projects on USFS lands in the cumulative effects analysis area, including the Stonewall Project, could potentially alter bald eagle habitats, adding to the effects from past vegetation management activities in the cumulative effects analysis; potential disturbance to bald eagles would also be possible with any activities near bald eagles nests.

Fisher

Fishers are a mid-sized forest carnivore whose prey includes small mammals such as voles, squirrels, snowshoe hares, and porcupines, as well as birds (Powell and Zielinski 1994). They also take advantage of carrion and seasonally available fruits and berries (Foresman 2012). Fishers use a variety of successional stages, but are disproportionately found in stands with dense canopies (Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994) and avoid openings or young forested stands (Buskirk and Powell 1994). However, some use of openings may occur for short hunting forays or if sufficient overhead cover (shrubs, saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites and tend to use areas within 150 feet of water (Jones 1991). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining travel corridors.

There are approximately 62 acres (<1% of the project area) of potential riparian fisher habitats and 341 acres (4% of the project area) of upland habitats in the project area. Ongoing tree mortality would likely continue to reduce canopy closure; an increase in snags and coarse woody debris would be anticipated with the ongoing tree mortality. Cumulative effects were analyzed on the combined area used for grizzly bears, which includes the Arrastra Mountain grizzly bear subunit (69,258 acres), Alice Creek grizzly bear subunit (70,175 acres), Red Mountain grizzly bear subunit (76,676 acres), and the 119,543-acre area south of these 3 grizzly bear subunits and bounded by Arrastra Creek, Trapper Mountain, Ogden Mountain, Dalton Mountain, the Continental Divide through Granite Divide and Flesher Pass to Highway 279 and back to Highway 200. DNRC manages approximately 4% of the cumulative effects analysis area; USFS manages roughly 74% of cumulative effects analysis area. On DNRC-managed lands within the cumulative effects analysis area, roughly 594 acres of upland fisher habitats and 101 acres of riparian fisher habitats exist (4% and 1%, respectively) on DNRC-managed lands, including the habitats found in the project area. Thus, roughly 84% of the potential riparian fisher habitats in the cumulative effects analysis area are providing structural habitat attributes that would facilitate use by fisher. On other ownerships in the cumulative effects analysis area, there are roughly 12,509 acres of riparian and 184,089 acres of upland forested stands (4% and 57% of non-DNRC-managed lands in the cumulative effects analysis area), a portion of which likely supports sufficient canopy closure of preferred covertypes that may be suitable fisher habitats. Much of the 119,269 acres (37% of non-DNRC-managed lands in the cumulative effects analysis area) of shrubs, herbaceous, poorly stocked forested stands, and non-forested stands in the cumulative effects analysis area would not be expected to be suitable fisher habitats for some time, if ever. Continued tree mortality would likely continue altering fisher habitats and landscape connectivity in the cumulative effects analysis area, while increasing snags and coarse woody debris. Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis area has altered fisher habitats. Ongoing salvage harvesting within the cumulative effects analysis area would continue altering fisher habitats and potentially landscape connectivity. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including Poorman prescribed burn, Alice Creek prescribed burn, Helmville Face prescribed burn, Stonewall Project, and Dalton Mountain Project, could result in

reductions in forest canopy and coarse woody debris, adding to the effects on fisher from past vegetation management activities in the cumulative effects analysis area.

Flammulated Owl

Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and are secondary cavity nesters. In general, preferred habitats have open to moderate canopy closure (30-50 percent) with at least 2 canopy layers, and are often near small clearings. They usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12-25" dbh ponderosa pine, Douglas-fir, or aspen. Without disturbance, Douglas-fir encroach upon ponderosa pine stands resulting in increased stand density and decreased habitat quality for flammulated owls. Periodic, low-intensity underburns can increase habitat suitability and sustainability by reducing the density of understory seedlings and saplings, stimulating shrub growth, and by protecting large dominant trees from ladder fuels and competition with other mature trees.

There are approximately 3,767 acres (41% of the project area) of potential flammulated owl habitats in ponderosa pine and dry Douglas-fir stands across the project area. Ongoing tree mortality in the project area would likely create more open stands while also creating suitable nesting snags. The cumulative effects analysis area encompasses the project area and lands within a one mile radius and comprises 58,153 acres. Within the cumulative-effects analysis area, approximately 4,382 acres (41% of DNRC-managed lands in the cumulative effects analysis area) of potential flammulated owl habitats exist on DNRC-managed lands. Additionally, some suitable habitats likely exist on a portion of the 12,159 acres (26% of non-DNRC-managed lands) of open and closed forested habitats on other ownerships in the cumulative effects analysis area. A portion of the cumulative effects analysis area has been harvested in the recent past, potentially improving flammulated owl habitat by creating foraging areas and reversing a portion of the Douglas-fir encroachment and opening up stands of ponderosa pine; however retention of large ponderosa pine and/or larger snags was not necessarily achieved in some of those areas, thereby minimizing the benefits to flammulated owls. Continued tree mortality would likely continue altering flammulated owl habitats in the cumulative effects analysis area. Ongoing salvage harvesting within the cumulative effects analysis area would continue removing suitable snags and reducing stand densities. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including the Stonewall and Dalton Mountain projects, could potentially alter snag availability and stand densities.

Gray Wolf

Wolves are a wide-ranging, mobile species that occupy a wide variety of habitats that possess adequate prey and minimal human disturbance, especially at den and/or rendezvous sites. Wolves are opportunistic carnivores that frequently take vulnerable prey (including young individuals, older individuals, and individuals in poor condition). In general, wolf densities are positively correlated to prey densities (Fuller et al. 1992, Oakleaf et al. 2006). In Montana, wolves prey primarily on white-tailed deer and elk (Kunkel et al. 1999, Arjo et al. 2002). Thus, reductions in big game populations and/or winter range productivity could indirectly be detrimental to wolf populations.

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

Several landscape features commonly associated with denning and rendezvous sites occur in the project area, such as areas with gentle terrain near a water source (valley bottoms), openings, and proximity to big game wintering areas. Ongoing tree mortality would continue to alter stand density, which could cause shifts in big game and wolf use of the area. Thermal cover and snow intercept capacities continue to be reduced with ongoing tree mortality. The project area is near a couple of existing pack areas; additionally several packs have occupied the general vicinity in the past, but some of these packs have been removed due to conflicts with humans. Thus, use of the project area by wolves is possible for

breeding, hunting, or other life requirements. No known den or rendezvous sites occur in the project area. Big game species are abundant in the project area much of the year; winter range exists in the project area for deer, elk, and moose. Approximately 3,339 acres of the 9,260-acre (36%) project area appear to be providing snow intercept and thermal cover attributes.

Cumulative effects were analyzed on the combined area used for grizzly bears, which includes the Arrastra Mountain grizzly bear subunit (69,258 acres), Alice Creek grizzly bear subunit (70,175 acres), Red Mountain grizzly bear subunit (76,676 acres), and the 119,543-acre area south of these 3 grizzly bear subunits and bounded by Arrastra Creek, Trapper Mountain, Ogden Mountain, Dalton Mountain, the Continental Divide through Granite Divide and Flesher Pass to Highway 279 and back to Highway 200. DNRC manages approximately 4% of the cumulative effects analysis area; USFS manages roughly 74% of cumulative effects analysis area. Within the cumulative-effects analysis area, big game species are fairly abundant; winter range for deer, elk, and moose are common in the cumulative effects analysis area, particularly in the central portion of the cumulative effects analysis area centered on the Blackfoot River where the DNRC-managed lands are located. Additionally, numerous landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water and in gentle terrain, occur in the cumulative-effects analysis area. Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis area has altered wolf and big game habitats. Continued tree mortality would likely continue altering wolf and big game habitats in the cumulative effects analysis area. No appreciable changes to big game distribution or habitat use would be anticipated with the ongoing tree mortality. Ongoing salvage harvesting within the cumulative effects analysis area would continue altering wolf and big game. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including Poorman prescribed burn, Alice Creek prescribed burn, Helmville Face prescribed burn, Stonewall Project, and Dalton Mountain Project, could potentially alter wolf and big game habitats, adding to the effects from past vegetation management activities in the cumulative effects analysis area.

Pileated Woodpecker

Pileated woodpeckers are one of the largest woodpeckers in North America and excavate the largest cavities of any woodpecker. Preferred nest trees are large diameter western larch, ponderosa pine, cottonwood, and quaking aspen trees and snags, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat carpenter ants, which inhabit large downed logs, stumps, and snags. Aney and McClelland (1985) described pileated nesting habitat as "...stands of 50 to 100 contiguous acres, generally below 5,000 feet in elevation with basal areas of 100 to 125 square feet per acre and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and downed wood for feeding, closely tie these woodpeckers to mature forests with late-successional characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in stands (McClelland 1979).

In the 9,260-acre project area, potential pileated woodpecker nesting habitat exists on approximately 2,292 acres (25% of the project area). These nesting habitats are dominated by Douglas-fir and ponderosa pine. Additionally, roughly 2,037 acres (23% of the project area) of sawtimber stands dominated by Douglas-fir, ponderosa pine, and lodgepole pine exist in the project area, which may serve as potential foraging habitats. Ongoing tree mortality in the project area would likely decrease canopy closure and stand density which would reduce habitat quality for pileated woodpeckers, but could create additional snag resources that could be used by pileated woodpeckers. The cumulative effects analysis area encompasses the project area and lands within a one mile radius and comprises 58,153 acres. Within the cumulative-effects analysis area, approximately 2,631 acres (25% of DNRC-managed lands in the cumulative effects analysis area) of potential pileated woodpecker habitats exist on DNRC-managed lands; potential foraging habitats may exist on the 2,253 acres (21% of DNRC-managed lands in the cumulative effects analysis area) of sawtimber stands dominated by Douglas-fir, ponderosa pine, and lodgepole pine on DNRC-managed lands in the cumulative effects analysis area. Additionally, some suitable habitats likely exist on a portion of the 27,861 acres (59% of non-DNRC-managed lands in the cumulative effects analysis area) of reasonably closed forested habitats on other ownerships in the cumulative effects analysis area, and some of the 7,102 acres (15% of non-DNRC-managed lands in the cumulative effects analysis area) of moderately stocked forested stands on those other ownerships could

also be suitable foraging habitats. Ongoing tree mortality and associated changes in species composition would continue reducing habitat quality for pileated woodpeckers in the cumulative effects analysis area, particularly in any stands that are being salvage harvested in the vicinity. Much of the 12,443 acres (26% of non-DNRC-managed lands in the cumulative effects analysis area) of shrubs, herbaceous areas, poorly stocked forested stands, and recently harvested stands on other ownerships in the cumulative effects analysis area is likely too open to be useful to pileated woodpeckers. Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis area has altered pileated woodpecker habitats. Continued tree mortality would likely continue altering forested cover and pileated woodpecker habitats in the cumulative effects analysis area. Ongoing salvage harvesting within the cumulative effects analysis area would continue removing suitable snags and reducing stand densities. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including the Stonewall and Dalton Mountain projects, could potentially alter snag availability, forested cover, and stand densities in the cumulative effects analysis area.

Wolverine

Wolverine is a highly mobile and solitary carnivore that inhabits remote areas and occurs at relatively low densities (Banci 1994). Generally wolverines are found at high elevations centered near the treeline; habitats consist of coniferous forests below treeline, rocky alpine habitats above treeline, and cirque basins and avalanche chutes. These areas are characterized by having cool to cold temperatures year round and rather deep and persistent snow well into the spring (Copeland et al. 2010). Wolverines are well-adapted for life in snowy-environments and success of wolverine may relate to the availability of large areas of remote, rugged uplands that are difficult to access by humans (Hatler 1989). Wolverines consume a variety of foods depending upon availability, including scavenging carrion (caribou, deer, elk, and moose), small animals (snowshoe hare, squirrels, marmots, and small mammals), birds, fruits, berries, and insects (Banci 1994). The availability and distribution of food is likely the primary factor in the large home range sizes of wolverines (Banci 1994). Wolverines are dependent on persistent spring snow for successful reproduction (Copeland et al. 2010) where female wolverine den in a series of long complex snow tunnels that may or may not be associated with large boulders, fallen trees, or other complex structures beneath the persistent snow (Magoun and Copeland 1998). In general, year-round habitat use takes place almost entirely in the area defined by deep persistent snow (Copeland et al. 2010). Lower elevation forested habitats appear to only be used for dispersal movements and not for foraging or reproduction. There is some evidence that although wolverines will use more open areas above treeline, grass-shrub habitats were largely avoided, perhaps due to warmer temperatures, lack of snow, and a general lack of prey availability (Copeland et al. 2007). Wolverines have few natural predators, but some evidence exists that wolverines are occasionally attacked and/or killed by wolves, bears, mountain lions, and wolverines; human-caused mortality may be one of the primary mortality factors (Banci 1994). Forest-management considerations for wolverines involve providing for connectivity across the landscape to maintain the functional nature of the meta-population, which requires migration and gene flow between these semi-isolated subpopulations.

In the northern Rockies, wolverines tend to select for habitats above 7,218 feet; elevations in the project area range between 4,480 and 5,720 feet. Additionally, wolverines generally do not utilize winter ranges (Copeland et al. 2007), possibly to avoid other, larger predators that frequent ungulate winter ranges. Winter ranges for deer, elk, and moose are located in the project area. No areas of deep persistent spring snow occur in the project area, but the project area is within a couple of miles of a fairly large patch of persistent spring snow, which may be suitable for use by wolverine (Copeland et al. 2010). Additionally, the project area is between this patch of persistent spring snow and a couple of other patches of persistent spring snow to the south of the project area, thus the project area could be important for connectivity, particularly if the large complex of persistent snow that extends through the Scapegoat, Bob Marshall, and Great Bear Wilderness Areas prior to connecting to Glacier National Park is providing individuals and/or gene flow to these more southerly areas of potentially suitable habitats. Overall some use of the project area by wolverine could occur.

Cumulative effects were analyzed on the combined area used for grizzly bears, which includes the Arrastra Mountain grizzly bear subunit (69,258 acres), Alice Creek grizzly bear subunit (70,175 acres), Red Mountain grizzly bear subunit (76,676 acres), and the 119,543-acre area south of these 3 grizzly bear subunits and bounded by Arrastra Creek, Trapper Mountain, Ogden Mountain, Dalton Mountain, the

Continental Divide through Granite Divide and Flesher Pass to Highway 279 and back to Highway 200. DNRC manages approximately 4% of the cumulative effects analysis area; USFS manages roughly 74% of cumulative effects analysis area. Within the cumulative-effects analysis area, large areas of persistent spring snow exist to the north of the project area; no persistent spring snow exists in the project area or any of the cumulative effects analysis area or the 119,543-acre area described above. In the cumulative effects analysis area, the variety of stands likely provides a suite of potential food sources; winter range is common in the cumulative effects analysis area as well. Connectivity of forested habitats in the cumulative effects analysis area has been compromised by past timber harvesting, agricultural clearing, the Highway 200 corridor, the Town of Lincoln, the natural intermingling of non-forested habitats in the vicinity, and the land ownership patterns in the area. Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis area has altered landscape connectivity. Continued tree mortality could continue altering wolverine habitats in the cumulative effects analysis area. Ongoing salvage harvesting within the cumulative effects analysis area would continue altering landscape connectivity. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including Poorman prescribed burn, Alice Creek prescribed burn, Helmville Face prescribed burn, Stonewall Project, and Dalton Mountain Project, could potentially alter wolverine habitats and/or altering landscape connectivity, adding to the effects from past vegetation management activities in the cumulative effects analysis area.

BIG GAME

Big Game Winter Range

Winter ranges enable big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be relatively small areas that support large numbers of big game, which are widely distributed during the remainder of the year. These winter ranges have adequate midstory and overstory to reduce wind velocity and intercept snow. Thus, these winter ranges have moderated temperatures and lower snow depths, which enable big game movement and access to forage with less energy expenditure than in areas with deeper snow and colder temperatures. Snow depths differentially affect big game; white-tailed deer are most affected, followed by mule deer, elk, and then moose. Thus, removing cover that is important for wintering big game through forest management activities can increase their energy expenditures and stress in winter, but may increase forage production for use on summer range. Reductions in cover could ultimately result in a reduction in winter range carrying capacity and subsequent increases in winter mortality within local big game herds.

Montana Department of Fish, Wildlife, and Parks identified white-tailed deer (6,188 acres; 71%), mule deer (4,014 acres; 46%), and elk (6,990 acres; 80%) winter range in the project area. These winter ranges are part of larger winter ranges in the area. Mature Douglas-fir and ponderosa pine with lesser amounts of lodgepole pine and mixed conifer stands in the project area are providing attributes facilitating use by wintering big game. Approximately 3,339 acres of the 9,260-acre (36%) project area appear to be providing snow intercept and thermal cover attributes. Ongoing tree mortality would continue to alter stand density, which could cause shifts in big game use of the area while also reducing the amount of mature forested habitats available. Similarly, thermal cover and snow intercept capacities would continue to be reduced with ongoing tree mortality. Evidence of winter and non-winter use by deer and elk was noted during field visits.

A variety of stands across the 70,959-acre winter range, used for the cumulative effects analysis area, are presently providing thermal cover and snow intercept for big game. In the recent past, harvesting within this area has reduced thermal cover and snow intercept; ongoing harvesting across the winter range could continue altering these attributes while potentially disturbing wintering big game. Ongoing tree mortality is removing canopy closure in several of the stands providing thermal cover and snow intercept attributes for big game in the winter range, thus any ongoing harvesting would likely have minimal effect on thermal cover and snow intercept as these attributes are being lost with the natural tree mortality. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including Poorman prescribed burn, Alice Creek prescribed burn, Helmville Face prescribed burn, Stonewall Project, and Dalton Mountain Project, could potentially alter lynx habitats and/or landscape connectivity, adding to the effects from past vegetation management activities in the cumulative effects analysis. Portions of the cumulative effects analysis area are in non-forested,

herbaceous, or shrub types, which would not be expected to provide thermal cover or snow intercept in the future. Human disturbance within the winter range is associated with residential development, the town of Lincoln, agricultural areas, recreational snowmobile use, commercial timber management, and the several roadways.

Big Game Security

Timber harvesting can increase vulnerability of big game animals by changing the size, structure, juxtaposition, and accessibility of areas that provide security during hunting season (Hillis et al. 1991). As visibility and accessibility increase within forested landscapes, moose, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters, or they may become displaced or reduced in numbers due to lowered effective carrying capacity of the local habitat. Reduced cover attributable to logging and roads can also influence the effective use of habitat for big game species. For the purpose of this analysis, cover was considered generically as big game cover for the four species of concern. Because elk are highly social wide-ranging species, providing for their cover needs helps ensure that habitat needs for other ungulates, such as deer and moose are met as well. Because of their smaller size and behavioral differences, mule deer and white-tailed deer are able to use smaller cover patches more effectively for escape and security. Moose are a solitary, wide-ranging species capable of effectively using relatively small cover patches, and the hunting season for moose is heavily regulated, greatly reducing risk of overharvest by humans. Therefore, for this analysis we assumed that if available security cover would provide for the needs of elk, it would also generally be adequate to meet the needs of moose, mule deer, and white-tailed deer.

Big game security areas are nonlinear blocks of hiding cover that are more than 0.5 mile from open roads and are a minimum of 250 acres in size. Hiding cover is somewhat abundant in the project area. Much of the project area is within 0.5 miles from open roads. Approximately 258 acres of the project area (3%) have sufficient cover and are distant enough from open roads and contribute to larger patches of potential big game security habitats in the cumulative effects analysis area, which in turn contributes to a larger block of security habitats that extends beyond the cumulative effects analysis area. Cumulative effects were analyzed on the combined area used for grizzly bears, which includes the Arrastra Mountain grizzly bear subunit (69,258 acres), Alice Creek grizzly bear subunit (70,175 acres), Red Mountain grizzly bear subunit (76,676 acres), and the 119,543-acre area south of these 3 grizzly bear subunits and bounded by Arrastra Creek, Trapper Mountain, Ogden Mountain, Dalton Mountain, the Continental Divide through Granite Divide and Flesher Pass to Highway 279 and back to Highway 200. DNRC manages approximately 4% of the cumulative effects analysis area; USFS manages roughly 74% of cumulative effects analysis area. In the cumulative effects analysis area, motorized access for recreational hunting varies widely, from areas with extensive access on numerous open roads to wilderness areas that lack roads; roughly 814 miles of open road (1.55 mi. / sq. mi, simple linear calculation) exist in the cumulative effects analysis area. Additionally, numerous restricted roads (approximately 447 miles; 0.85 mi. sq. mi, simple linear calculation; total road density 2.40 mi. / sq. mi.) exist in the cumulative effects analysis area that could be used for non-motorized use. Hiding cover in the cumulative effects analysis area is fairly common, and the combination of topography, distance from open roads, and the presence of hiding cover likely provides adequate cover for elk during the hunting season. Roughly 108,901 acres (32% of the cumulative effects analysis area) are far enough from open roads, contain suitable hiding cover, and are large enough to meet the definition of big game security habitats in the cumulative effects analysis area. Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis area has reduced hiding cover and big game security habitats while increasing human access. Continued tree mortality could continue altering big game security habitats in the cumulative effects analysis area. Ongoing salvage harvesting within the cumulative effects analysis area would continue altering hiding cover and big game security habitats while potentially increasing human access. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including Poorman prescribed burn, Alice Creek prescribed burn, Helmville Face prescribed burn, Stonewall Project, and Dalton Mountain Project, could potentially alter hiding cover, big game security habitats, and/or human access, adding to the effects from past vegetation management activities in the cumulative effects analysis area.

OTHER ISSUES

Northern Goshawk

The northern goshawk (hereafter goshawk) is a forest habitat generalist with specific nesting habitat requirements (Reynolds et al. 1992, Squires and Reynolds 1997, McGrath et al. 2003). The goshawk forages on a wide range of species, with the most predominant prey being snowshoe hare, Columbian ground squirrels, red squirrels, dusky and ruffed grouse, northern flickers, American robins, gray jays, and Clark's nutcrackers (Reynolds et al. 1992, Cutler et al. 1996, Boal and Mannan 1996, Watson et al. 1998, Squires 2000, Clough 2000). Thus, given the diverse array of prey species, goshawks forage from a diverse array of habitats. However, Beier and Drennan (1997) found goshawks to forage in areas based primarily on habitat characteristics rather than prey abundance. Beier and Drennan (1997) found goshawks to forage selectively in forests with a high density of large trees, greater canopy closure, high basal area, and relatively open understories. Reynolds et al. (1992) identified 3 increasingly large spatial scales, at which northern goshawks appear to utilize their nesting home range, including: 1) nest area; 2) post-fledging family area; and 3) foraging area. Goshawks will nest in ponderosa pine, Douglas-fir, and aspen stands on north-facing slopes that are typically in the stem exclusion (pole) or understory reinitiation (mature) stages of stand development, with higher canopy closure ($\geq$ 50%) and basal area than available in the surrounding landscape (Reynolds et al. 1992, Squires and Reynolds 1997, Clough 2000, Finn et al. 2002, McGrath et al. 2003). Goshawk post-fledging family areas are generally 300-600 acres and provide sufficient prey to allow young hawks to develop hunting skills while affording the young cover from predators. Foraging areas must provide adults an area to capture sufficient prey to support themselves and their young. In general, goshawk home ranges vary in size from 1,200 to 12,000 acres depending on forest type, prey availability, and intraspecific competition (Squires and Reynolds 1997).

Previously, a pair of goshawks successfully reared young in a nest in the southern half of section 34, T14N R9W along Bear Creek (MT DNRC 2009). Re-use of old nests by goshawks occurs relatively infrequently, but fidelity to the nest area is fairly high (Woodbridge and Deitrich 1994, Patla 1997). Thus use of this portion of the project area could be anticipated. In the project area, roughly 150 acres (24%) of potential nesting habitat (cover $\geq$60%, pole or mature forest) exist within 8,680 feet off the previous nest. Ongoing tree mortality could improve foraging habitats, but in the long-term, may reduce nesting and foraging habitats in the project area. Cumulative effects were analyzed on a 5,434-acre (8,680 foot radius) circle centered on the previous nest. This scale includes enough area to support a pair of goshawks while approximating the home range size for northern goshawks (Reynolds et al. 1992). The cumulative effects analysis area is largely privately managed (4,791 acres), but also includes roughly 625 acres of DNRC-managed lands and 18 acres of US Forest Service-managed lands. Within the cumulative effects analysis area, approximately 422 acres (8%) would be available for potential nesting habitat (crown cover $\geq$60%, pole or mature forest). In the cumulative effects analysis area, ongoing tree mortality has and would be expected to continue altering stand densities; much of the habitats in the cumulative effects analysis area is changing as large numbers of lodgepole and ponderosa pine trees die and the forest canopy opens up. In the short term, this would likely improve goshawk foraging habitats, but could eventually reduce the quality of existing nesting and foraging habitats. Habitats for some prey species could improve with the decreases in canopy closure in the project area and across much of the analysis area due to the ongoing tree mortality, but habitats for those prey species that rely on dense stands would gradually be reduced. Past timber management on DNRC-managed lands, USFS-managed lands, as well as on privately owned lands in the cumulative effects analysis area has altered northern goshawk habitats; ongoing salvage harvesting within the cumulative effects analysis area would continue altering goshawk habitats. Proposed or ongoing vegetation management projects on USFS lands in the cumulative effects analysis area, including the Dalton Mountain Project, could potentially affect goshawk habitats, adding to the effects from past vegetation management activities in the cumulative effects analysis area.

Chapter 4: Environmental Consequences

Wildlife

Forested Habitat Connectivity and Wildlife Movements

Direct and Indirect Effects of the No-Action Alternative to Forested Habitat Connectivity and Wildlife Movement

Ongoing mortality would continue to negatively affect existing forested stands and connectivity; no further changes to existing stands would be anticipated. No changes in human developments or motorized access would occur. Thus, negligible direct or indirect effects to forested habitat connectivity and wildlife movements would be expected since: 1) no further changes in forested cover or landscape connectivity would occur; 2) no changes in human developments, particularly human developments that would concentrate human activity or human-related attractants would occur; 3) no changes to motorized human access would occur; and 4) no further changes to visual screening would occur.

Cumulative Effects of the No-Action Alternative to Forested Habitat Connectivity and Wildlife Movement

Widespread tree mortality could lead to areas of younger-aged stands that may not be suitable for wildlife species requiring mature forested habitats and/or inter-connected areas of forested habitats. Past harvesting has reduced the amount of mature, forested habitats in portions of the cumulative effects analysis area; proposed USFS harvesting could also reduce mature forested conditions and/or alter landscape connectivity, however portions of these reductions would be offset by the ongoing tree mortality in the cumulative effects analysis area. No changes in human developments, or motorized access would occur. No appreciable changes in wildlife use would be expected, and species relying on mature forested habitats and/or inter-connected areas of forested habitats would be the most likely to decline in usage levels. Thus, negligible adverse cumulative effects to forested habitat connectivity and wildlife movements would be expected since: 1) no further changes in forested cover or landscape connectivity would occur; 2) no changes in human developments, particularly human developments that would concentrate human activity or human-related attractants would occur; 3) no changes to motorized human access would occur; and 4) no further changes to visual screening would occur.

Direct and Indirect Effects of the Action Alternative to Forested Habitat Connectivity and Wildlife Movement

Approximately 2,019 acres (51% of habitats in the project area) of mature Douglas-fir and ponderosa pine stands with a reasonably closed canopy would be harvested. The majority of those acres would receive a shelterwood, overstory removal, or un-even-aged management type treatment, which could reduce habitat for those species relying on mature, closed-canopied forested habitats; however ongoing mortality would continue to negatively affect existing forested stands and connectivity in the project area. Although these treatments would create fairly open stands that would not likely be used by wildlife species that use mature stands to move through the landscape, connectivity, particularly along ridges, draws, and other topographic features, would be retained. Additionally, the only permanent human development constructed would be roughly 5.6 miles of new restricted road, but this would not be expected to concentrate human activity beyond the proposed activities. Furthermore contract stipulations would minimize the presence of human-related attractants during the duration of the proposed activities. No changes in motorized human access would occur in the project area. Some changes in visual screening would occur within individual units, but the combination of irregular-shaped units, topography, and unharvested patches throughout the project area would minimize the effect of the reductions in visual screening. Thus, a minor risk of adverse direct and indirect effects to forested habitat connectivity and wildlife movements would be expected since: 1) proposed activities could reduce forested cover and alter landscape connectivity in a portion of the project area where ongoing tree mortality is already altering these attributes, but some connectivity would be retained; 2) minor changes in human developments would occur, but no changes in human developments that would concentrate human activity or human-related attractants would occur; 3) no changes to motorized human access would occur; and 4) visual screening in portions of the project area would be reduced, but ongoing tree mortality is continuing to alter visual screening in the project area.

Cumulative Effects of the Action Alternative to Forested Habitat Connectivity and Wildlife Movement

Proposed harvesting would reduce forested habitats, but ongoing tree mortality is already reducing mature forested habitats and altering landscape connectivity across much of the cumulative effects

analysis area. Reductions in forested habitats associated with this alternative would be additive to past harvesting and any ongoing harvesting; proposed USFS harvesting could also reduce mature forested conditions and/or alter landscape connectivity. Much of the cumulative effects analysis area is experiencing widespread tree mortality, and some of the anticipated reductions in forested habitats and landscape connectivity associated with harvesting would partially offset some of the ongoing reductions due to widespread tree mortality. No appreciable changes in the presence of human developments would occur, particularly no changes in the presence of human-related attractants or concentrations of human activities beyond the short duration of proposed activities. No changes to motorized access to the cumulative effects analysis area would occur. Reductions in visual screening in a small portion of the cumulative effects analysis area would occur, which would be additive to past reductions as well as any proposed USFS harvesting; ongoing tree mortality is likely reducing visual screening in the cumulative effects analysis area. Thus, a minor risk of adverse cumulative effects to forested habitat connectivity and wildlife movements would be expected since: 1) proposed activities could reduce forested cover in a small portion of the cumulative effects analysis area, but connectivity would be retained; 2) negligible changes in human developments would occur, but no changes in human developments that would concentrate human activity or human-related attractants would occur; 3) no changes to motorized human access would occur; and 4) visual screening in a small portion of the cumulative effects analysis area would be reduced within a landscape that is experiencing reductions in visual screening due to widespread tree mortality.

Threatened and Endangered Species

Grizzly Bear

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

Negligible direct and indirect effects to grizzly bears would be anticipated since: 1) no disturbance or displacement would be expected, 2) ongoing mortality would continue to alter hiding cover in the project area, 3) no changes to security habitat would be anticipated; and 4) no changes in long-term open-road densities would be anticipated.

Cumulative Effects of the No-Action Alternative to Grizzly Bears

Ongoing mortality and any associated harvesting that may occur in the cumulative effects analysis areas would continue reducing grizzly bear hiding cover and security habitat, but potentially improving seasonal food sources. Use of the cumulative effects analysis areas by grizzly bears would not be expected to appreciably change from present levels. Thus, negligible adverse cumulative effects to grizzly bears would be anticipated since: 1) no appreciable changes in human disturbance levels would be expected; 2) no changes to open road density would occur; 3) reductions in hiding cover would continue to occur with ongoing mortality and associated salvage harvesting; and 4) no further changes to security habitat would be expected.

Direct and Indirect Effects of the Action Alternative to Grizzly Bears

Proposed activities could affect grizzly bears directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources. Activities in grizzly bear habitats reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance or to move from the area. These disturbances would only be present during harvesting operations; therefore, the season of disturbance is important in addressing effects to grizzly bears. Proposed activities would not be permitted between April 1 and June 15 since the area is in spring grizzly bear habitat. Otherwise harvesting could occur when soil conditions are dry, frozen, or snow covered. Thus activities could either occur during the denning or non-denning period for grizzly bears. If activities were to occur during the denning period, no direct effects to grizzly bears would be anticipated. Some disturbance of grizzly bears could be possible with any activities that may occur during the non-denning period, but activities would avoid the spring period when grizzly bears are most likely to be using the area. Overall, the proposed activities would avoid the important spring period leading to a negligible potential for disturbance and displacement of grizzly bears.

Hiding cover would be partially reduced on roughly 1,667 acres (54%) in the short-term. Some hiding cover in the form of brush, shrubs, and sub-merchantable trees would persist in several of the units, albeit

at a reduced level from the existing condition; hiding cover would increase through time as young trees and shrubs regenerate over the next 5 to 10 years. To reduce the avoidance of harvest units and provide some security for bears, clearcut and seedtree harvest units would be laid out to ensure that no point of the unit exceeds 600 feet to cover. Additionally, cover and habitat connectivity associated with riparian areas would not be appreciable altered as no riparian timber harvesting would occur. Within the recovery zone, any activities conducted during the non-denning period would initiate a 4-year active period for that section, which would be followed by an 8-year period of rest without commercial activity, which would minimize additional disturbance to grizzly bears. The majority of proposed units are not within grizzly bear security habitat; portions of 8 units (totaling 390 acres) are within blocks of habitat that are large enough and far enough from open roads to meet the definition of grizzly bear security habitat. No new open roads and roughly 5.6 miles of restricted roads would be constructed with this alternative. No changes in open road density or motorized public access would be anticipated. No appreciable changes in non-motorized human access would occur in the project area. Thus, a minor risk of adverse direct or indirect effects to grizzly bears would be anticipated since: 1) a low potential for disturbance and displacement would be anticipated; 2) hiding cover would be removed from a portion of the project area, but would remain in portions of the project area, and would be expected to recover in the short-term; 3) no changes in security habitat would be expected; and 4) no changes to long-term open road density would be anticipated.

Cumulative Effects of the Action Alternative to Grizzly Bears

Project activities that would be conducted during the non-denning period could temporarily increase human disturbance to grizzly bears within a portion of the cumulative effects analysis areas; activities conducted during the denning period would not be expected to disturb grizzly bears. Any potential human disturbance would be of short duration (2-4 years) and would largely occur outside of the more sensitive time periods for grizzly bears in the area. Continued use of the cumulative effects analysis areas by grizzly bears would be anticipated at levels similar to present levels. Modifications to existing hiding cover would be additive to the reductions from past timber harvesting, ongoing harvesting, as well as more permanent land-cover changes in the cumulative effects analysis area; however, portions of the cumulative effects analysis area are currently providing hiding cover. Quality of grizzly bear security habitat would be slightly reduced in the short-term, but would persist through time. No changes in the amount of security habitat would occur in any of the cumulative effects analysis areas; security habitat would continue to exist on 31-56% of the individual cumulative effects analysis areas. No changes in long-term open-road densities would be anticipated. Proposed USFS harvesting could alter hiding cover and security habitats while potentially disturbing grizzly bears. Thus, a minor risk of adverse cumulative effects to grizzly bears would be anticipated since: 1) minor increases in human disturbance levels in the short-term would be expected within a portion of the cumulative effects analysis areas; 2) hiding cover would be modified in the short-term on a portion of the cumulative effects analysis areas, but would be expected to recover fairly rapidly; 3) no changes in long-term open road density would occur, and 4) no changes to security habitat would be expected.

Canada Lynx

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

In the short-term, no changes in lynx habitat elements would be expected in the project area outside of the ongoing tree mortality in the project area. Landscape connectivity would not be appreciably altered. Thus, a negligible risk of adverse direct and indirect effects to Canada lynx would be expected since: 1) no appreciable changes to existing winter foraging habitats would be anticipated; 2) summer foraging habitats would likely develop through time; 3) the amount of temporary non-suitable habitats could increase due to the ongoing tree mortality, but no further changes would occur as a result of this alternative; and 4) landscape connectivity would not be appreciably altered.

Cumulative Effects of the No-Action Alternative to Canada Lynx

No appreciable change in lynx habitats in the cumulative effects analysis area would occur beyond the ongoing tree mortality. No further changes to landscape connectivity would be anticipated. Thus, a negligible risk of adverse cumulative effects to lynx would be expected since: 1) no additional reductions in winter foraging habitats would occur; 2) summer foraging habitats could continue developing in the

near-term across the cumulative-effects analysis area; 3) no further changes in the amount of the cumulative-effects analysis area that is in the temporary non-suitable habitat class would occur beyond those associated with naturally occurring events; and 4) no further changes in landscape connectivity would occur.

Direct and Indirect Effects of the Action Alternative to Canada Lynx

Approximately 823 acres of lynx habitats (43% of lynx habitats in the project area) would be altered with the proposed harvesting, including 414 acres of other suitable habitats, 265 acres of foraging (largely winter foraging) habitats, and 144 acres of temporary non-suitable lynx habitats. The majority of these habitats would be expected to be moved into the temporary non-suitable lynx habitat class, increasing the amount of lynx habitats in the project area in this category from 21% to 55%. Following proposed treatments, the project area would include 474 acres of foraging habitats (25% of lynx habitats in the project area), 345 acres of other suitable (18% of lynx habitats in the project area), and 1,073 acres (57% of lynx habitats in the project area) of temporary non-suitable habitats. The habitats that would be affected would be rather discontinuous, with concentrations in the Alice Creek area (171 acres of affected lynx habitats), Arrastra Creek area (288 acres affected), and Dalton Mountain/Bear Creek/Herrin Lakes areas (206 acres affected). The retention of patches of advanced regeneration of shade-tolerant trees, such as sub-alpine fir, would break-up sight distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx. In all proposed units, coarse woody debris would be retained (emphasizing retention of some logs 15 inches dbh and larger) to provide some horizontal cover and security structure for lynx. Proposed pre-commercial thinning would not occur in lynx habitats. Some connectivity would be maintained with corridors being retained, particularly along riparian areas, draws, ridges, and other topographic features, but overall forested connectivity could be further reduced in a landscape that is fairly poorly connected. Ongoing tree mortality is likely already removing some of the existing connectivity that would be reduced with the proposed harvesting, thus some or all of the reductions associated with this alternative would be compensatory to existing reductions. Collectively, a moderate risk of adverse direct and indirect effects to Canada lynx would be expected since: 1) foraging habitats would be reduced in the project area; 2) summer foraging habitats would continue to be a minor component of the project area, but could develop through time; 3) a sizeable increase in the amount of the project area in the temporary non-suitable lynx habitat category would occur; and 4) connectivity could be slightly decreased, but habitat connectivity between patches would be retained.

Cumulative Effects of the Action Alternative to Canada Lynx

Proposed harvesting would convert foraging and other suitable habitats in the project area to temporary non-suitable lynx habitats, which could slightly decrease the quality of the lynx habitats in the cumulative effects analysis area. No appreciable changes in summer foraging habitats would occur, but through time, this habitat attribute could increase in abundance as stands regenerate. Widespread tree mortality could render large portions of the cumulative effects analysis area in the temporary non-lynx habitats category across ownerships, which would reduce the likelihood of use by lynx. Within the cumulative effects analysis area, roughly 56% of the total potential lynx habitats on DNRC-managed lands would remain in the various suitable habitat classes and 44% would to be in the temporary non-suitable habitat category. Reductions in landscape connectivity associated with proposed harvesting would be additive to reductions in landscape connectivity from the ongoing tree mortality, as well as the ongoing harvesting; any harvesting that may occur with the proposed project on USFS lands could also alter landscape connectivity. Thus, a moderate risk of adverse cumulative effects to Canada lynx would be expected since: 1) adequate winter foraging habitats would persist in the cumulative effects analysis area; 2) summer foraging habitats could develop through time; 3) sizeable increases in the amount of the cumulative effects analysis area in the temporary non-suitable habitat category would occur, but the majority of the lynx habitats would be in a usable state for lynx; and 4) reductions in landscape connectivity could occur, but some connectivity would be retained.

Sensitive Species

Bald Eagle

Direct and Indirect Effects of the No-Action Alternative to Bald Eagles

No direct or indirect effects to bald eagles would be anticipated since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees suitable for perching or nesting would be expected.

Cumulative Effects of the No-Action Alternative to Bald Eagles

No changes to bald eagle habitat attributes would occur on DNRC-managed lands. Past harvesting has reduced the availability of large, emergent trees; proposed harvesting on USFS lands could remove additional large emergent trees in the home range. No further cumulative effects to bald eagles would be anticipated since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees would be expected.

Direct and Indirect Effects of the Action Alternative to Bald Eagles

No harvesting activities would occur in the nest areas; hauling on the Beaver Creek road would be within the nest area associated with the Stonewall Creek territory. Similarly, hauling on the Stonewall Creek road would occur in the primary use area associated with the Stonewall Creek territory. Portions of 2 proposed units (in section 26) would occur in the primary use area associated with the Lincoln territory. Proposed hauling on Beaver Creek road and harvesting in the nest and primary use areas (in section 26) associated with these territories would be restricted during the nesting period (February 1 – August 15). Several additional units in the Dalton Mountain, Bear Gulch, Blackfoot, Lincoln Gulch, Beaver Creek, and Stonewall areas would be within the home ranges or would use roads within the home ranges associated with these territories. Seasonal harvesting restrictions (April 1 – June 15) in these units would further limit the potential for disturbance to nesting bald eagles. Thus, the proposed activities could occur during the early nesting season (February 1 – March 31), late nesting season (June 16-August 15), or the non-nesting period (August 16-February 1) within the home range. Minor disturbance to bald eagles could occur should any activities be conducted during the nesting period in the home ranges. Conversely, no disturbance to bald eagles from activities conducted during the non-nesting period or outside of the home ranges would be anticipated. Negligible reductions in the availability of large snags or emergent trees that could be used as nest or perch trees could occur in the home range. No changes to human access to the home range would occur, thus limiting potential for introducing additional human disturbance to this territory. Thus, a negligible risk of direct and indirect effects to bald eagles would be anticipated since: 1) disturbance could be slightly elevated within the home range during operations, should they occur during the nesting period; 2) no change in human access within the project area would occur; and 3) minor reductions in the availability of large, emergent trees could occur.

Cumulative Effects of the Action Alternative to Bald Eagles

Nesting bald eagles would continue to experience varying levels of disturbance. Any potential disturbance and/or noise from the proposed harvesting would be additive to any of these other forms of disturbance, however no changes in bald eagle behavior would be anticipated. A slight decrease in the availability of large emergent trees or snags would occur; proposed harvesting on USFS lands could also affect the availability of large, emergent trees. Thus, a negligible risk of cumulative effects to bald eagles would be anticipated since: 1) disturbance would be slightly elevated within the territory during harvesting operations; 2) no changes in human access within the territory would occur; and 3) a slight decrease in the availability of large, emergent trees could occur.

Fisher

Direct and Indirect Effects of the No-Action Alternative to Fisher

Minor adverse direct and indirect effects to fisher would be expected since: 1) no further changes to fisher habitats in the project area would occur beyond the ongoing natural events; 2) no further changes in landscape connectivity would occur beyond the ongoing natural events; 3) no further changes in snags and coarse woody debris would be anticipated beyond the ongoing natural events; and 4) no changes to human access or the potential for trapping mortality would be anticipated.

Cumulative Effects of the No-Action Alternative to Fisher

No further cumulative effects to fishers would be anticipated since: 1) no further changes to existing habitats on DNRC-managed lands would occur; 2) any landscape connectivity afforded by the stands on DNRC-managed lands would not change appreciably; 3) no further changes to snags, snag recruits, or coarse woody debris levels would be expected; and 4) no changes to human access or the potential for trapping mortality would be anticipated.

Direct and Indirect Effects of the Action Alternative to Fisher

Trace amounts of fisher habitats (0.5 acres) and another 1.5 acres of preferred fisher covertypes would be altered with this alternative; much of these riparian habitats would likely continue to be marginally suitable for fisher following proposed treatments. Approximately 215 of the 341 acres (63%) of upland fisher habitats in the project area would receive treatments; at least half of those acres would be too open to be considered fisher habitat following proposed treatments. No changes in open roads would be anticipated, which would not likely alter trapping pressure and the potential for fisher mortality. Ongoing tree mortality would continue to alter landscape connectivity; negligible additional reductions would occur with the proposed harvesting. Additionally, harvesting activities would avoid riparian areas commonly used by fisher. Thus, a minor risk of adverse direct and indirect effects to fisher would be anticipated since: 1) harvesting would largely avoid riparian areas, particularly habitats associated with Class 1 and 2 streams; 2) harvesting would modify or remove fisher upland fisher habitats depending the density of trees retained within the proposed units; 3) landscape connectivity would be reduced, but those areas associated with riparian areas would largely remain unaffected; 4) harvesting would reduce snags and snag-recruitment trees while increasing coarse woody debris levels; however, some of these resources would be retained; and 5) no appreciable changes in motorized human-access levels would be anticipated.

Cumulative Effects of the Action Alternative to Fisher

Since trace amounts of riparian habitats and preferred covertypes would be modified, no appreciable change in the amount of the preferred riparian fisher cover types meeting structural requirements for fishers on DNRC-managed lands at the cumulative-effects analysis area level would occur; roughly 84% of the potential riparian fisher habitats in the cumulative effects analysis area are providing structural habitat attributes that would facilitate use by fisher. Reductions in suitable upland fisher habitats in the project area would lead to reductions in the amount of suitable upland fisher habitats in the cumulative effects analysis area. These reductions would be additive to the losses associated with past timber harvesting in the cumulative-effects analysis area as well as any ongoing harvesting; proposed USFS harvesting could also reduce upland and riparian fisher habitats in the cumulative effects analysis area. Declines in landscape connectivity associated with ongoing tree mortality in the cumulative effects analysis area would continue; negligible additional reductions in landscape connectivity associated with proposed harvesting would be anticipated. Furthermore, proposed activities would avoid preferred riparian habitats, which would be useful for connectivity across the cumulative effects analysis area. No appreciable changes in human disturbance and potential trapping mortality would be anticipated. Thus, a minor risk of adverse cumulative effects to fisher would be anticipated since: 1) harvesting would modify upland fisher habitats and a trace amount of riparian habitats, but both upland and riparian habitats would persist; 2) declines in landscape connectivity would be anticipated, but connectivity in riparian areas would not be altered; 3) harvesting in a relatively small portion of the cumulative-effects analysis area would partially reduce snags and snag recruits, while slightly increasing the coarse woody debris levels, largely in the smaller-sized pieces; and 4) no changes to motorized human access would occur.

Flammulated Owl

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

Existing flammulated owl habitats in the project area would persist. Thus, no direct and indirect effects to flammulated owls would be anticipated since: 1) no disturbance to flammulated owls would occur; and 2) no further changes to foraging or nesting habitats would occur.

Cumulative Effects of the No-Action Alternative to Flammulated Owls

No further changes to flammulated owl habitats would occur. Thus, no adverse cumulative effects to flammulated owls would be anticipated since: 1) no disturbance to flammulated owls would be anticipated; and 2) no further changes to potential nesting habitats would be anticipated.

Direct and Indirect Effects of the Action Alternative to Flammulated Owls

Flammulated owls are tolerant of human disturbance (McCallum 1994), however the elevated disturbance levels associated with proposed activities could negatively affect flammulated owls should activities occur during the nesting season; seasonal harvesting restrictions would minimize disturbance during the early nesting period, but activities would be permitted during the later nesting period or the non-nesting period. Proposed timber harvest on 2,049 acres (54% of habitats in the project area) of potential flammulated owl habitats would open the canopy while favoring ponderosa pine, western larch, and Douglas-fir. Elements of the forest structure important for nesting flammulated owls, including snags, coarse woody debris, numerous leave trees, and snag recruits would be retained in the proposed units. Additionally, the proposed pre-commercial thinning could improve foraging habitats. The more open stand conditions, the retention of fire adapted tree species, and the maintenance of snags would move the proposed project area toward historical conditions, which is preferred flammulated owl habitat. Thus, minor positive direct and indirect effects would be expected to flammulated owls since: 1) proposed harvesting could disturb flammulated owls; and 2) elements of forest structure used for foraging and nesting by flammulated owl would be retained.

Cumulative Effects of the Action Alternative to Flammulated Owls

Proposed harvesting would increase the amount of the cumulative-effects analysis area that has been recently harvested, which would add to the amount of potential habitat available, but possibly at the expense of losing snags and large trees important for nesting. This would be additive to any ongoing salvage harvesting in the cumulative effects analysis area, including any proposed harvesting that may occur on USFS lands. Overall a slight improvement in habitat quality in the cumulative-effects analysis area could be realized with this alternative. The portions of the cumulative-effects analysis area not currently providing flammulated owl habitats would not be expected to change any time in the future. Thus, negligible beneficial cumulative effects to flammulated owls would be expected since: 1) harvesting could disturb flammulated owls on a portion of the cumulative effects analysis area; and 2) harvesting could improve the quality and sustainability of flammulated owl nesting and foraging habitats on a portion of the cumulative effects analysis area.

Gray Wolf

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

Negligible direct and indirect effects would be expected to gray wolves since: 1) no changes in human disturbance levels would occur; and 2) no appreciable changes to prey availability would occur.

Cumulative Effects of the No-Action Alternative to Gray Wolves

Levels of human disturbance would be expected to remain similar to present levels. Past harvesting and any ongoing harvesting may cause shifts in big game use and, subsequently, gray wolf use, of the cumulative-effects analysis area; proposed salvage harvesting on USFS lands could also cause shifts in big game and wolf use of the vicinity. However, no appreciable changes would be anticipated that would alter levels of gray wolf use of the cumulative-effects analysis area. Thus, negligible cumulative effects to gray wolves would be expected since: 1) no changes in human disturbance levels would occur, particularly near known wolf den and/or rendezvous sites; and 2) no appreciable changes to prey availability would occur.

Direct and Indirect Effects of the Action Alternative to Gray Wolves

Wolves using the area could be disturbed by harvesting activities and are most sensitive at den and rendezvous sites, which are not known to occur in the project area or within 1 mile of the project area. Should either a den or rendezvous site be identified within 1 mile of the project area, a DNRC biologist would be consulted to determine if additional mitigations would be necessary. After proposed harvesting activities, human disturbance levels would likely revert to pre-harvest levels. Likewise, wolf use of the

project area for denning and rendezvous sites would be expected to revert to pre-harvest levels. In the short-term, the proposed activities could lead to slight shifts in big game use, which could lead to a shift in wolf use of the project area, which would be additive to the ongoing shifts in use due to ongoing tree mortality. Proposed harvesting on approximately 3,625 acres would alter canopy closure and potential winter use by big game, including roughly 1,825 acres (55% of the existing stands) that likely have attributes facilitating considerable winter use by big game; however ongoing tree mortality is likely limiting the effectiveness of these areas of thermal cover. The modifications to summer and winter range could alter big game use of the project area, and subsequently alter the use of the project area by wolves. Thus, a low risk of direct and indirect effects would be expected to gray wolves since: 1) minor short-term increases and negligible long-term changes in human disturbance levels would occur, with no increases near known wolf den and/or rendezvous sites anticipated; and 2) changes to summer and winter big game habitats could alter big game use of the project area, but would not appreciably alter prey availability.

Cumulative Effects of the Action Alternative to Gray Wolves

Disturbance to gray wolves in a portion of the cumulative effects analysis area would be possible, but would only occur for the short-period of time that activities are occurring. No changes in motorized human access would be anticipated; negligible increases in non-motorized access would be possible. Reductions in cover associated with the proposed harvesting may cause slight decreases in use by deer and elk; however, no appreciable changes would be expected within the cumulative-effects analysis area. These reductions in cover would be additive to losses from past timber-harvesting activities as well as any ongoing harvesting in the cumulative-effects analysis area and any proposed harvesting that may occur on USFS lands. No substantive change in wolf use of the cumulative-effects analysis area would be expected. Thus, a low risk of cumulative effects to gray wolves would be expected since: 1) elevated human disturbance levels would be short-lived and negligible changes to long-term disturbance levels would be anticipated with no increases near known wolf den and/or rendezvous sites; and 2) modifications to big game winter range could alter big game distributions, but would not appreciably alter prey availability.

Pileated Woodpecker

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

A negligible risk of adverse direct and indirect effects to pileated woodpeckers would be expected since: 1) no harvesting would occur that would alter the amount of continuously forested habitats; 2) no further changes in to existing pileated nesting and foraging habitats would be anticipated; 3) no further changes to snags or snag recruits would be ant be anticipated; and 4) long-term succession-related changes in abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers could further decrease pileated woodpecker habitats in the project area.

Cumulative Effects of the No-Action Alternative to Pileated Woodpeckers

No disturbance of pileated woodpeckers would occur. Continued use of the cumulative-effects analysis area by pileated woodpeckers would be expected at similar levels as presently occurring. Thus, a negligible risk of adverse cumulative effects to pileated woodpeckers would be expected since: 1) no harvesting would occur that would alter the amount of continuously forested habitats; 2) no further changes in to existing pileated nesting and foraging habitats would be anticipated; 3) no further changes to snags or snag recruits would be anticipated ; and 4) long-term, succession-related changes in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would occur.

Direct and Indirect Effects of the Action Alternative to Pileated Woodpeckers

Pileated woodpeckers tend to be tolerant of human activities (Bull and Jackson 1995), but might be temporarily displaced by the proposed harvesting on roughly 3,625 acres (49% of the project area), should those activities occur during the nesting season. No appreciable disturbance to pileated woodpeckers would be anticipated should the proposed activities occur during the non-nesting period. Seasonal harvesting restrictions would minimize disturbance during the early nesting period, but activities would be permitted during the later nesting period or the non-nesting period. Harvesting would alter some of the continuously-forested habitats suitable for pileated woodpeckers in the project area; however

many of these stands are experiencing ongoing tree mortality, which is already reducing the amount of continuously-forested habitats available for pileated woodpeckers. Roughly 1,498 acres (65%) of the potential nesting habitat and an additional 814 acres (40%) of potential foraging habitats would be harvested. Most of these acres would likely be too open to be used by pileated woodpeckers following proposed treatments; ongoing tree mortality is reducing the usefulness of many of these stands for pileated woodpeckers. Proposed pre-commercial thinning could improve habitat quality in the future. Following proposed activities, habitats would gradually improve in quality for pileated woodpeckers over the next 30-80 years, depending on the density of trees retained. Elements of the forest structure important for nesting pileated woodpeckers, including snags, coarse woody debris, numerous leave trees, and snag recruits would be retained in the proposed harvest areas. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979), pileated woodpecker densities in the project area would be expected to be reduced with the proposed harvesting. The silvicultural prescriptions would retain healthy ponderosa pine, western larch, and Douglas-fir while promoting the growth and/or regeneration of many of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Thus, a minor-moderate risk of adverse direct and indirect effects to pileated woodpeckers would be anticipated since: 1) harvesting would alter the amount of continuous-forested habitats available, but ongoing tree mortality is altering the availability of continuously forested habitats in the project area; 2) potential nesting habitats and potential foraging habitats would be removed, which could alter the suitability of those habitats for pileated woodpeckers; 3) snags and snag recruits would be removed; however, mitigation measures to retain some snags and snag recruits would be included, and 4) proposed treatments would promote seral species in the project area.

Cumulative Effects of the Action Alternative to Pileated Woodpeckers

Reductions in pileated woodpecker habitats and further modifications in the amount of continuously forested habitats available in the cumulative effects analysis area would occur; some reductions in pileated woodpecker habitats and continuously forested habitats are occurring with the ongoing tree mortality. Several snags, coarse woody debris, and potential nesting trees would be retained in the project area; however, future recruitment of these attributes would be reduced in a portion of the area by the proposed activities. Potential pileated woodpecker habitats on DNRC-managed lands in the cumulative effects analysis area would drop from 2,631 acres (25%) to 1,133 (11%) and potential foraging habitats would decrease from 2,253 acres (21%) to 1,439 acres (13%). Any modifications to pileated woodpecker habitats under this alternative would be additive to modifications associated with ongoing and past harvesting; additional habitats could be affected by the proposed USFS harvesting that may occur. Continued use of the cumulative-effects analysis area by pileated woodpeckers would be expected at levels similar to the existing levels. Through time, continued maturation of younger stands across the cumulative-effects analysis area would increase suitable pileated woodpecker habitats in the cumulative effects analysis area. Thus, a minor risk of adverse cumulative effects to pileated woodpeckers would be anticipated since: 1) harvesting would alter the amount of continuous forested habitats available in the cumulative-effects analysis area, but ongoing tree mortality is affecting the level of continuously forested habitats in the cumulative effects analysis area; 2) potential nesting and foraging habitats would be removed, but some habitats would persist in the cumulative-effects analysis area; 3) snags and snag recruits could be removed; however, mitigation measures would retain some of these attributes within the DNRC-managed parcels; and 4) proposed treatments would promote seral species in a small portion of the cumulative effects analysis area.

Wolverine

Direct and Indirect Effects of the No-Action Alternative to Wolverine

A negligible risk of adverse direct and indirect effects to wolverine would be expected since: 1) no activities would occur in high elevation areas that support persistent spring snow; and 2) ongoing tree mortality would continue to alter landscape connectivity in areas that have seen connectivity compromised in the past.

Cumulative Effects of the No-Action Alternative to Wolverine

A negligible risk of adverse cumulative effects to wolverine would be expected since: 1) no changes to areas supporting persistent spring snow would occur; and 2) ongoing tree mortality in the cumulative effects analysis area would continue altering landscape connectivity.

Direct and Indirect Effects of the Action Alternative to Wolverine

Activities would occur outside of any areas that support persistent spring snow. Harvesting would alter some of the continuously-forested habitats in the project area; however many of these stands are experiencing ongoing tree mortality, which is already reducing the amount of continuously-forested habitats available and subsequently landscape connectivity. Some connectivity would be provided by retaining some corridors along riparian areas, draws, ridges, and other topographic features. Thus, a minor risk of adverse direct and indirect effects to wolverine would be anticipated since: 1) no activities would occur in areas that support persistent spring snow; and 2) harvesting would alter the amount of continuous-forested habitats, but landscape connectivity would be partially retained in the project area.

Cumulative Effects of the Action Alternative to Wolverine

Activities would occur outside of any areas that support persistent spring snow. Harvesting would alter some of the continuously-forested habitats; however, many of these stands are experiencing ongoing tree mortality, which is already reducing the amount of continuously-forested habitats available and subsequently landscape connectivity. Some connectivity would be provided by retaining some corridors along riparian areas, draws, ridges, and other topographic features. Ongoing harvesting in the cumulative effects analysis area would continue to alter landscape connectivity; any harvesting that may occur with the proposed project on USFS lands could also alter landscape connectivity. A negligible risk of adverse cumulative effects to wolverine would be expected since: 1) no changes to areas supporting persistent spring snow would occur; and 2) a slight reduction in landscape connectivity could occur, but some connectivity would be maintained.

BIG GAME

Big Game Winter Range

Direct and Indirect Effects of the No-Action Alternative to Big Game Winter Range

No direct or indirect effects to big game winter range would be anticipated since: 1) no further changes in the amount of mature-forested habitats in the winter range would be anticipated; 2) no further changes in thermal cover and snow intercept would be anticipated; and 3) human disturbance levels would not change.

Cumulative Effects of the No-Action Alternative to Big Game Winter Range

Continued use of the larger winter range would be expected. Levels of human disturbance would be expected to remain similar to present levels. Past harvesting and any ongoing harvesting may cause shifts in big game use of the cumulative-effects analysis area; proposed salvage harvesting on USFS lands could also cause shifts in big game use of the vicinity. No appreciable changes to big game distribution or habitat use would be anticipated. Thus, no cumulative effects to big game winter range would be expected since: 1) no further changes in the amount of mature-forested habitats in the winter range would be anticipated; 2) no further changes in thermal cover and snow intercept would occur; and 3) human disturbance levels would not change

Direct and Indirect Effects of the Action Alternative to Big Game Winter Range

Some logging activities could occur in the winter, and disturbance created by mechanized logging equipment and trucks would likely temporarily displace big game animals during periods of operation for 2 to 4 years. However, winter logging provides felled tree tops, limbs, and slash piles that could concentrate feeding deer during nighttime and quiet periods when logging operations are shut down. Increasing short-term forage availability in this manner may partially offset some of the effects associated with temporary displacement caused by logging disturbance. There would be short-term added risk of disturbance and displacement of wintering animals that could result in moderate adverse effects associated with logging operations, short term road construction, and road use in the project area.

However, no long-term appreciable impact to winter range carrying capacity or factors that would create long-term displacement or reduced numbers of big game would be anticipated.

Proposed harvesting would occur on roughly 2,709 acres (44%) of white-tailed deer winter range, 1,352 acres (34%) of elk winter range, and 2,888 acres (41%) of moose winter range. Similarly, proposed activities would reduce canopy closure and potential winter use by big game on roughly 1,825 acres (55% of existing stands) that likely have attributes facilitating considerable winter use by big game, however many of these acres have and are continuing to experience the ongoing tree mortality that is removing the capability of these stands to provide snow intercept and thermal cover for big game species. Harvested stands where snow intercept and thermal cover would be removed could require 30 to 50 years to regenerate and attain a size capable of providing thermal cover for big game. Proposed timber harvesting would not prevent big game movement through the project area appreciably in winter and could stimulate browse production in the units. Thus, a moderate risk of adverse direct or indirect effects to big game winter range would be anticipated since: 1) the relatively short-term that logging activities could create disturbance in this area; 2) harvesting would alter a moderate-high amount of the stands that are providing thermal cover and snow intercept habitats for big game species; however ongoing tree mortality is reducing these attributes in many of these stands; and 3) sizeable portions of winter ranges for several species of big game would be altered.

Cumulative Effects of the Action Alternative to Big Game Winter Range

Disturbance and displacement associated with this alternative could be additive to any displacement associated with ongoing activities in the cumulative effects analysis area and any other disturbances that may be affecting wintering big game; proposed salvage harvesting on USFS lands would likely also contribute to big game disturbance and displacement. Forested stands across the cumulative effects analysis area would continue to experience tree mortality, which would continue to reduce snow intercept and thermal cover for big game. Harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue altering big game winter range and/or disturbing big game; proposed harvesting that may occur on USFS lands could also alter big game winter range. Proposed harvesting with this alternative would remove additional acres of thermal cover and snow intercept on the winter range. However, continued use of the larger winter range would be expected. Thus, a moderate risk of adverse cumulative effects to big game would be anticipated since 1) the relatively short-term that logging activities would create disturbance in a portion of the cumulative effects analysis area; 2) a moderate amount of the larger winter range would be altered; 3) availability of lower-quality cover in the vicinity that provides some opportunity for big game should they be displaced.

Big Game Security

Direct and Indirect Effects of the No-Action Alternative to Big Game Security

None of the proposed forest management activities would occur. No direct or indirect effects to security habitat for moose, elk, mule deer and white-tailed deer would be expected since: 1) no changes in open roads would occur; 2) no changes in non-motorized access would occur; 3) no changes to hiding cover or big game security would be occur; and 4) no appreciable changes in big game survival would occur.

Cumulative Effects of the No-Action Alternative to Big Game Security

None of the proposed forest management activities would occur. No adverse cumulative effects to big game security would be anticipated since: 1) no changes in open roads or motorized access would be anticipated; 2) no changes to non-motorized access would occur; 3) no further changes to hiding cover or big game security would occur; and 4) no appreciable changes to big game survival would be anticipated.

Direct and Indirect Effects of the Action Alternative to Big Game Security

No changes in open roads or motorized access for the general public would occur. During all phases of the project, all roads opened with project activities would be restricted to the public and closed after the completion of project activities. Slight increases in non-motorized access would occur with the proposed construction of 5.6 miles of new, restricted road. Proposed activities could reduce hiding cover on 3,625 acres (39% of the project area) in the project area. Proposed units would remove forested cover from approximately 16 acres (6% of security habitats in the project area) in the Alice Creek area that is contributing to a 5,014-acre block of security habitat that extends beyond the project area. Following proposed activities, harvested stands could require up to 30 years before security cover would re-establish. Overall, slight increases in sight distances and the modification of hiding cover may slightly increase big game vulnerability risk in the project area. Additionally, numerous contract stipulations would minimize the effect on the existing big game security by prohibiting contractors from carrying firearms while conducting contract operations and prohibiting contractors from accessing restricted areas for other purposes, such as hunting. Negligible changes in numbers of big game animals in the area would be anticipated. Collectively, a negligible risk of adverse effects to big game security would be anticipated since: 1) no changes in open roads or motorized access for the general public would be anticipated; 2) minor increases in non-motorized access would occur that would alter hunter access; 3) modifications to existing hiding cover would occur, but negligible changes to big game security in the project area would occur; and 4) negligible changes in big game survival would be anticipated.

Cumulative Effects of the Action Alternative to Big Game Security

No changes in public, motorized access would be expected, which would not affect big game vulnerability in the cumulative effects analysis area. A slight increase in non-motorized access would be possible with the construction of 5.6 miles of roads, increasing the total road density from 0.85 mi. / sq. mi. to 0.86 mi. / sq. mi. in the cumulative effects analysis area. Alterations of cover could negligibly alter the quality of big game security in a small portion of the cumulative effects analysis area; overall negligible changes to big game security would be anticipated and roughly 32% of the cumulative effects analysis area would continue to provide big game security. Reductions in hiding cover and modifications to big game security would be additive to the losses associated with past timber harvesting in the cumulative-effects analysis area as well as any ongoing harvesting; proposed USFS harvesting could also these habitats in the cumulative effects analysis area. Negligible effects to big game survival would be anticipated. Thus, a negligible risk of adverse cumulative effects to big game security would be anticipated since: 1) no changes in open roads or motorized access for the general public would be expected; 2) negligible increases in non-motorized access would occur; 3) modifications to existing hiding cover would occur, but negligible changes to big game security areas in the cumulative effects analysis area would occur; and 4) no appreciable changes in big game survival would be anticipated.

OTHER ISSUES

Northern Goshawk

Direct and Indirect Effects of the No-Action Alternative to Northern Goshawks

No disturbance of northern goshawks would occur. Thus, no direct and negligible indirect adverse effects to northern goshawks in the project area would be anticipated since: 1) no further changes in the amount of the project area in the stand-initiation (seedling/sapling) stage of stand development would occur; 2) no further changes in the amount of continuously forested habitats would occur; and 3) no further changes in goshawk prey availability would occur.

Cumulative Effects of the No-Action Alternative to Northern Goshawks

No further disturbance to northern goshawks would occur. Thus, no direct and indirect adverse effects to northern goshawks in the cumulative effects analysis area would be anticipated since: 1) no further harvesting would occur that would increase the amount of the cumulative effects analysis area in the stand-initiation (seedling/sapling) stage of stand development, but some increases from the ongoing tree mortality could occur; 2) no further changes in the amount of continuously forested habitats would occur; and 3) no further changes in goshawk prey availability would occur.

Direct and Indirect Effects of the Action Alternative to Northern Goshawks

Some disturbance to northern goshawks could be possible, but seasonal restrictions (April 1 – July 15) on activities in the southern half of Bear Gulch (Section 34) would minimize potential for disturbing this pair should they be nesting in the vicinity of their past nest. Activities in the other portions of the project area would not be expected to disturb known nesting goshawks; potential goshawk nesting habitats exist across the project area and adjacent lands and some disturbance to any unknown nest could occur. Of the 3,625 acres of commercial harvesting proposed (39% of the project area), roughly 393 acres (11% of all proposed units) would occur within 8,680 feet of the nest. Activities would alter forested habitats on 393 acres (71% of DNRC-managed lands within 8,680 feet of the previous nest). Approximately 101 acres (67%) of the potential nesting habitats in the project area would be altered with the proposed activities. The vast majority of the acres proposed for treatment would receive overstory removal or shelterwood type treatments, which would likely reduce canopy closure and basal area to a point where they would no longer be suitable nesting habitats. The resultant stands would be more open, contain fewer large trees, fewer snags, more coarse woody debris, fewer areas of dense mid-aged forest, but would perpetuate some small openings for additional prey species; overall a reduction in prey availability would be anticipated, but use by goshawks for foraging could persist. An increase in potential nest predation would be possible with the increasingly openness in the canopy. Thus, moderate adverse direct and indirect effects to northern goshawks in the project area would be anticipated since: 1) much of the project area that isn't already in the stand-initiation stage of stand development (seedling/sapling) would be transformed into that stage of stand development; 2) reductions in the amount of continuously forested habitats and potentially suitable nesting habitats would be anticipated; and 3) goshawk prey availability would be altered with the proposed habitat modifications, including reducing habitats for those prey relying on mature trees, large snags, small patches of dense mid-aged stands, and closed canopied stands, while increasing potential habitat for those prey species relying on small openings and coarse woody debris.

Cumulative Effects of the Action Alternative to Northern Goshawks

Reductions in northern goshawk nesting and foraging habitats would be anticipated in the project area. Roughly 101 acres of the 422 acres (24%) of potential nesting habitats in the cumulative effects analysis area would be harvested and would not be suitable for nesting for 30-80 years. Recent harvesting in the cumulative-effects analysis area reduced goshawk nesting habitats while altering foraging habitats. Ongoing harvesting would continue to alter potential goshawk habitats while reducing the amount of the cumulative-effects analysis area that would be in mature, forested covertypes and increasing the amount of stand-initiation stage of stand development within the cumulative effects analysis area; proposed USFS harvesting could also modify goshawk habitats or habitats for their prey in the cumulative effects analysis area. Overall, modifications to nesting and foraging habitats under this alternative would be additive to habitat losses associated with past harvesting and any ongoing or proposed harvesting. Thus, moderate adverse cumulative effects to northern goshawks in the cumulative effects analysis area would be anticipated since: 1) a moderate amount of the cumulative effects analysis area would be converted to the stand-initiation (seedling/sapling) stage of stand development; 2) reductions in the amount of continuously forested habitats and potentially suitable nesting habitats would be anticipated; and 3) goshawk prey availability would be altered with the proposed habitat modifications, including reducing habitats for those prey relying on mature trees, large snags, small patches of dense mid-aged stands, and closed canopied stands, while increasing potential habitat for those prey species relying on small openings and coarse woody debris.

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18 Copies of this document were published at an estimated cost of $16.00 per copy. The total includes $14.00 for printing/binding and $2.00 for distribution.