# CHECKLIST ENVIRONMENTAL ASSESSMENT

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| **Project Name:** | Harris Creek Timber Sale |
| **Proposed Implementation Date:** | 2013 |
| **Proponent:** | Libby Unit, Department of Natural Resources and Conservation (DNRC) |
| **Location:** | Sec 16 T28N R29W; approximately 17 air miles south southeast of Libby, MT. |
| **County:** | Lincoln |

## I. TYPE AND PURPOSE OF ACTION

The Department of Natural Resources and Conservation (DNRC), Libby Unit is proposing a commercial timber harvest in the Harris Creek drainage. Under the proposed Harris Creek Timber Sale, DNRC would harvest and sell approximately 5.3 million board feet (33,000 tons) of timber from 2 harvest units totaling 414 acres using ground based and skyline logging equipment. This proposed action would produce an estimated $660,000 for the Common Schools trust (CS) at an estimated stumpage of $20.00 per ton. Additional activities would include the construction of approximately 2.5 miles of new road. Post timber harvest operations on harvested acres could include broadcast burning, scarification as well as planting of Western larch, Western white pine or ponderosa pine. Logging slash would be treated to meet state laws and best management practices. Timber sale activities could begin during the calendar year of 2013. Site specific objectives for the project area are:

- maintain and improve forest health,
- reduce fuel loading,
- increase forest productivity,
- create and improve transportation infrastructure to be used for land management and fire suppression on this trust parcel.

Lands involved in this proposed project area are held by the State of Montana in trust for the common schools trust (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article 1 Section 11). The Board of Land Commissioners and DNRC are required, by law, to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Sections 77-1-202, MCA). DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (DNRC 1996) and the Administrative Rules for Forest Management (ARM 36.11.401 through 456) as well as other laws applicable to timber harvest activities on State lands.

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

## II. PROJECT DEVELOPMENT

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

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

Public notices were placed in the Western News in January and February of 2012. Scoping letters were sent to adjacent landowners and other interested parties on the Libby Unit mailing list for scoping notices. Those involved in the project development from DNRC include: Leah Breidinger, wildlife biologist; Marc Vessar, soil

and hydrology specialist; Jeremy Rank, project leader and forester. Comments and concerns were addressed and incorporated in the design of the project.

**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.*

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

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

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

**No Action**: Under the No Action alternative, no activity would be undertaken. No timber would be harvested, no road construction or improvements would occur. This alternative would not generate revenue for the Common School trust. Effects of the No Action alternative are shown in the Checklist and Attachments and can be used to compare effects of the proposed action.

**Action**: The Action alternative is described in Section 1, Type and Purpose of Action. No other action alternatives were identified during project scoping or analysis; therefore only forest product removal and sale was analyzed. Mitigations would be incorporated into the proposed action.

## III. IMPACTS ON THE PHYSICAL ENVIRONMENT

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

**4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:**
*Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify direct, indirect, and cumulative effects to soils.*

During the public scoping, no specific issues regarding soil impacts were identified by the public. The following issue statements were compiled from interdisciplinary team discussions regarding the effects of the proposed timber harvesting:

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

***EXISTING CONDITIONS***
The *Soil Survey of Kootenai National Forest Area, Montana* (*Kuennen and Nielsen –Gerhardt, 1995*) combines landform and soil information with habitat types to inventory and map soils in the project area. Three landtypes were identified in the project area and harvesting is proposed on all three of these landtypes (252, 352, and 355). These landtypes have a moderate susceptibility to erosion and moderate or high (252 only) sediment delivery efficiency. Susceptibility to erosion is based upon observations and soil properties. *A* brief description of the landtypes within the project area can be found in the project file.

*Compaction, Displacement and Erosion*
Approximately 20 acres of proposed harvest units have been previously harvested. On areas previously harvested, effects from past forest management in the proposed harvest units are evident as a result of roads, skid trails and landings. An estimate of up to 10 percent of previously harvested areas exhibit moderate or higher impact on skid trails due to compaction. These skid trails do not appear to be eroding more than the surrounding un-trailed areas, but regeneration is limited on these areas and tree densities and vigor is reduced where revegetation has occurred.
In the *DNRC SOIL MONITORING REPORT (DNRC, 2011),* effects on a subset of DNRC timber sales from 1988 to 2011 showed an average of 11.3 percent soil impacts due to compaction, displacement or severe erosion across all parent materials (*DNRC 2011*). However, cable yarded units showed impacts averaging approximately 6.8 percent of the harvest unit.

***Nutrient Cycling***
During field reconnaissance, 11 transects were used to estimate coarse woody debris in the project area. All transects were located in proposed units. *TABLE ST-1 – COARSE WOODY DEBRIS AMOUNTS* displays the average, minimum, maximum and median levels of coarse woody debris within transects. The median is the point with half the transects showing more and half the transects showing less.

**TABLE ST-1: COARSE WOODY DEBRIS AMOUNTS**

| | Number of transects | Average | Minimum | Maximum | Median |
|---|---|---|---|---|---|
| | | *tons per acre* | | | |
| Project Area | 11 | 13.6 | 1.7 | 30.6 | 10 |

This average is within the recommendations in *Managing Coarse Woody Debris in Forests of the Rocky Mountains* (Graham et al, 1994) on similar habitat types post timber harvest. Subalpine fir habitat types are recommended to have a level of coarse woody debris in the range of 7 to 24 tons per acre to maintain forest productivity while grand fir habitat/beargrass habitat types are recommended to have 11 to 23 tons per acre.

***ENVIRONMENTAL EFFECTS***

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

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

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

The comparison of the soil type map, field reconnaissance notes, and topographic map features with the proposed harvest unit map, indicates that ground-based skidding would occur on slopes of up to 40 percent. The extent of expected impacts would likely be similar to those reported in the *DNRC SOIL MONITORING REPORT (DNRC, 2011)* or approximately 11.3 percent of the proposed harvest area for ground-based operations during summer conditions. For the proposed cable yarded area, impacts would be expected to approximately 6.8 percent. Using these percentages of expected impacts, moderate or higher impacts would cover approximately 30.2 acres in harvest units. Additionally, the proposed 2.5 miles of road construction would remove approximately 12.3 acres from forest production. Table ST-2 below exhibits the expected level of impacts from the proposed activities.

**TABLE ST-2: EXPECTED AREA OF IMPACTS**

| Description | Acres of harvest | Expected percentage of area impacted | Acres of reduced productivity | Acres removed from forest production |
|---|---|---|---|---|
| Ground base | 223 | 11.3% | ~25.2 | - |
| Cable yarding | 191 | 6.8% | ~13.0 | - |
| Road Construction | - | - | - | 12.3 |

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|---|---|---|---|---|
| TOTAL | 414 | 9.2% weighted average | 38.2 | |

The magnitude, area and duration of compaction would remain very low due to the majority of the proposed harvest expected to be implemented with cable yarding methods.

Sediment delivery efficiency for Landtype 252 is high; however, because a vegetative buffer of at least 150 feet would be maintained adjacent to Harris Creek, the risk of sediment delivery to the stream would be moderate. Wasting of excess soil on steep slopes during road construction could increase the risk of sediment delivery to streams if not properly mitigated. A moderate risk of unacceptable levels of displacement and erosion would be expected primarily due to the soil and landform properties described in the *EXISTING CONDITION*.

Coarse woody debris would be left on-site in volumes recommended to help maintain soil moisture and forest productivity, generally in the 10 to 20 tons per acre range for habitat types found in the harvest locations (Graham et al. 1994). Because coarse woody debris would be left on site in amounts recommended by scientific literature, and fine debris would be maintained as much as practicable, the risk of measureable adverse direct or indirect impacts to nutrient cycling would be low on 253 acres. Because approximately 161 acres would be broadcast burned, the risk of reducing coarse woody debris to levels less than recommended would be moderate.

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

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

Refer to Attachment C – Water Resources Analysis for in-depth evaluation of hydrology and fisheries issues. For a complete list of Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

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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.*

During the initial scoping, no issues were identified regarding water-quality, water-quantity, or fisheries resources from the public. Within DNRC, issue statements were developed during interdisciplinary team meetings to measure application of Forest Management Rule criteria. The following issue statements were compiled from internal discussions regarding the effects of the proposed timber harvesting:

- *Timber harvesting and road construction activities may increase sediment delivery into streams and affect water quality.*
- *Cumulative effects from timber harvest may affect channel stability and fisheries habitat by decreasing the amount of recruitable woody debris into streams and /or increasing stream temperatures.*

These issues will be addressed by assessing:

- the risk of sediment delivery to water bodies from roads and harvest units;
- the risk of destabilizing channels from annual water yield increases;
- the risk of impacting recruitable woody debris and stream temperature due to harvesting.

**EXISTING CONDITION**

The Harris Creek parcel is drained by Harris Creek; an approximate 2,400-acre tributary to the Fisher River. The 1971-2000 30-year average precipitation data from the Natural Resources Information System (http://nris.mt.gov) shows a precipitation ranges from 20 to 50 inches per year in the Harris Creek watershed. The average annual precipitation for Harris Creek is estimated at approximately 30 inches per year.

While the stream provides habitat for westslope cutthroat trout per FWP website and Forest Service personnel (Hooper, pers comm.), the flow regime shifts from perennial to intermittent within the DNRC managed parcel. Bankfull widths were measured on Harris Creek at both road crossings; the upper crossing had an average bankfull width of approximately 5.7 feet and the lower crossing had an average bankfull width of approximately 7 feet. Using the protocol for channel stability evaluation on the Kootenai National Forest (USFS, 1993), stream stability appeared to be fair-to-good. No large mass wasting sites were observed during field reconnaissance, although some sediment from streambanks was noted. Sediment from streambanks was primarily found at outcurves and constrictions; however some scouring can be attributed high flows during spring runoff of 2012.

Ownership in this watershed is split three ways: Plum Creek Timber Company (~69%); Kootenai National Forest (~7%); and, Montana DNRC (~24%).

***SEDIMENT DELIVERY***

A field review of the haul route found very few sediment sources from roads. Within the Harris Creek watershed, only two stream crossings exist. One was replaced during 2012 to reduce the risk of failure and minimized sediment delivery into Harris Creek. The second stream crossing is located adjacent to the DNRC managed parcel, but on a road that is solely owned by Plum Creek Timber Company. The crossing structure is a native log stringer bridge that has partially failed at the inlet due to rot. Some sediment delivery at this site was observed during field review, but most of the fill slope and road at this site is well vegetated. This crossing structure is planned for replacement by Plum Creek Timber Company. The erosion risk for landtypes in the project area with proposed timber harvest proposed is considered moderate. No mass wasting sites were observed in any of the proposed harvest areas.

***WATER YIELD***

Using the ECA method, the existing annual water-yield increase for the Harris Creek watershed is estimated 8.1% percent annual water yield increase over fully forested conditions and approximately 340 ECA available before the threshold is reached. After reviewing the beneficial uses, existing channel conditions, and existing watershed condition per *ARM 36.11.423*, the threshold of concern for the Harris Creek watershed threshold was set at 14 percent. These threshold values expect up to a moderate degree of risk of adverse impacts to beneficial uses due to water-yield increases, as described in *ARM 36.11.423(f)(iv)*.

***RECRUITABLE WOODY DEBRIS***

Tree heights have ranged from 91 feet to 104 feet for the dominant, open grown tree species in the riparian area. The $SPTH_{100}$ for this project is estimated at 98 feet. Approximately 97 acres of forest is within a $SPTH_{100}$ of Harris Creek. Using the 2011 NAIP photos from the Natural Resources Information System, an estimated 38 acres has been harvested and is in varying stages of regeneration.

***STREAM TEMPERATURE INCREASES***

Because stream temperatures are generally sensitive to direct solar radiation, an assessment of the existing riparian stream shading was conducted using 2011 aerial photos. In the Harris Creek watershed, approximately 39 percent of the vegetation within 100 feet of the streams or lake has been impacted by timber harvest.

**ENVIRONMENTAL EFFECTS**

***DIRECT AND INDIRECT EFFECTS***

- ***Direct and Indirect Effects of the No-Action Alternative to Water Resources***
  Under this alternative, no timber harvesting or related activities would occur. Sediment from all sources would continue as described in the existing condition, and no increases in annual water yield, woody debris recruitment or stream shading would be expected.

- ***Direct and Indirect Effects of the Action Alternative to Water Resources***
  **Sediment Delivery**
  Proposed harvest units would have a 150 foot no-harvest buffer along Harris Creek. Beyond this 150-foot no-harvest buffer, an additional 100-foot buffer with at least 50 percent retention would provide sediment filtering capabilities along Harris Creek for approximately 2/3rd of the harvest unit.

Existing roads would have drainage improvements and BMP upgrades implemented under this alternative to maintain a very low risk of sediment delivery to streams. Minor drainage improvements include reshaping drain dips and cleaning ditches.

New road construction would not cross any streams. Material side cast during construction of roads on steep slopes could potentially be transported to streams due to the high sediment delivery efficiency of Landtype 252 (see *SOILS ANALYSIS*). The 150 foot no-harvest buffer would be expected to filter sediment and reduce the risk of delivery into the stream.
Because DNRC would incorporate BMPs into the project design as required by *ARM 36.11.422 (2)* and all laws pertaining to SMZs would be followed, a moderate risk of low impacts to beneficial uses from sediment would result from the implementation of this alternative.

**Water Yield**
Approximately 414 acres would be harvested using conventional ground-based and cable yarding methods, and approximately 342 ECA would be generated from these activities in the Harris Creek watershed which would result in an annual water yield increase of 7.2 percent. Individually, this would not be expected to result in increased stream channel erosion; however, this will be further discussed under *Cumulative Effects*

**Large Woody Debris Recruitment**
Because no harvest would occur within 150 feet of Harris Creek, all recruitable woody debris within one SPTH would be retained. This would remain very similar to the existing conditions.

**Stream Temperature Increases**
Because no harvest would occur within 150 feet of Harris Creek (the only Class 1 stream), stream shading post-project is expected to maintain a very low risk of increasing stream temperatures due to timber harvesting.

*CUMULATIVE EFFECTS*

- ***Cumulative Effects of the No-Action Alternative to Water Resources***
  Because no timber harvesting or associated activities would occur under this alternative, cumulative effects would be limited to the existing condition. Sediment delivery risk from existing sources would remain in the project area. Conditions would continue to provide adequate levels of large woody debris recruitment and shade retention. Under this alternative, fisheries habitat and water quality variables described in this assessment would be maintained at their current level.
- ***Cumulative Effects of the Action Alternative to Water Resources***
  All timber-harvesting activities would follow BMPs as required by *ARM 36.11.422* and the direct and indirect effects would be expected to have up to a moderate risk of low impacts. Because ECA/annual water yield thresholds would be increased to the recommended threshold or higher, the risk to impacting beneficial uses would be moderate. However, due to the extra buffering along Harris Creek, the impact would only be moderately detrimental to beneficial uses. This expectation includes (1) no change in the recruitable woody debris; (2) soil disturbance associated with road work and CMP installations; and, (3) increases in annual water yield.

Refer to Attachment C – Water Resources Analysis for in-depth evaluation of hydrology and fisheries issues.
For a complete list of Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

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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 project area is located in Montana Airshed 1. Smoke would be generated from the burning of slash; however, adherence to the Montana/Idaho State Airshed Group regulations requires that burning occur during periods with adequate airshed ventilation. This would reduce the potential for excessive contributions of associated air pollutants. Dust may be created from log hauling on portions of native surface roads during summer and fall months. Due to the temporary nature of truck operations and burning operations with the proposed action, there would be a low risk of cumulative effects.

## 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.*

The project area is surrounded by the Plum Creek industrial timberland. The project area currently is dominated by Western larch and Douglas-fir cover types. Silvicultural prescriptions would promote healthy, historic stand conditions. Approximately 84% of the harvest area would be maintained in its current desired cover type while the remaining 16% of harvest area would be converted to the desired future cover type. This proposed action, in addition to other timber sales on state land in the Libby Unit, are moving stands toward the Desired Future Conditions.

Implementation of the proposed action would alter stand conditions considerably. Silvicultural systems would emulate appropriate natural disturbance regimes (primarily fire) as required by ARM 36.11.408. Large ponderosa pine scattered throughout the project area would likely survive such an event as relic trees, commonly seen in western forests. Post-harvest stands would vary in density and have a patchy appearance, similar to post-fire stands where fire intensity increased as it encountered heavy fuel loads. The proposed harvest would reduce canopy cover by 95% in the stands where seed tree harvesting is prescribed, emulating a mixed severity fire regime, and would reduce canopy cover by 100% in the stands where clearcut harvest is prescribed, emulating a stand replacing fire. Growth rates and tree vigor would improve in stands where prescribed treatments and planting were applied.

Rare plants or cover types listed by the Montana Natural Heritage program have not been found within the project area. The proposed action alternative would not reduce the amount of old growth in the project area. An integrated weed management approach would be implemented to limit the potential for the spread and introduction of noxious weeds into the project area.

For detailed analysis, please refer to Attachment D - Vegetation Resources Analysis. For a complete list of Resource Mitigations, please refer to Attachment F - Summary of Mitigations.

## 8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

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

### Existing Condition

The project area provides habitat for a variety of wildlife species, including a host of species that require mature forests and/or use snags and coarse woody debris. Old-growth forest habitat would not be affected by the proposed activities. Mature forest is abundant and well-connected within the project area, but less abundant in the cumulative effects analysis areas. Harris Creek does contain westslope cutthroat trout. Potential affects to fisheries habitat—reductions of woody debris and stream temperature increases—were discussed in section 5 above as part of the Water Resources assessment.

### Environmental Effects

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

Under the No-Action Alternative, no timber harvesting or related activities would occur. Thus, no appreciable changes to existing wildlife or fisheries habitat would be anticipated.

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

Under the Action Alternative, approximately 414 acres of grand fir, Douglas-fir, western larch, and lodgepole, and ponderosa pine forest habitat would be harvested. Seed tree and clearcut silviculture prescriptions on 407 acres would lead to young, open stands likely not suitable for forest interior species. An additional 7 acres would receive partial cut treatments that would reduce canopy cover and create scattered openings, but could provide suitable habitat for some species that use mature forested habitat. The Action Alternative would decrease habitat for wildlife species requiring interior forest conditions, while creating habitat for species preferring more open stands or younger forest. Coarse woody debris and snags would be altered during the proposed timber harvesting; however, snags, snag recruits, and coarse woody debris would be retained in all proposed harvest

units. Overall, no moderate adverse direct, indirect, and cumulative effects would be anticipated on terrestrial and avian wildlife habitats.

Refer to Attachment C - Water Resources Analysis for in-depth evaluation of fisheries issues and Attachment E - Wildlife Resources Analysis for in-depth evaluation of wildlife. For a complete list of Resource Mitigations, please refer to Attachment F - Summary of Mitigations.

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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.*

**Existing Condition**
***Threatened and Endangered Species***
Suitable potential habitat Canada lynx is present in the project area. The Northwestern Land Office "Sensitive Species List" as developed from the State Forest Land Management Plan, was also consulted. The following species were included for detailed study due to historical observations and habitat present within the proposed project area: (1) fishers, (2) gray wolves, (3) pileated woodpeckers, and (4) big game winter range.

**Environmental Effects**
***Direct, Indirect and Cumulative Effects of the No-Action Alternative***
Under this alternative, no timber harvesting or related activities would occur. Thus no appreciable changes to disturbance levels or existing Canada lynx or sensitive species' habitat conditions would be anticipated.

***Direct, Indirect, and Cumulative Effects of the Action Alternative***
Under the Action Alternative, harvesting would temporarily (10 to 15 years) reduce habitat availability for Canada lynx by 385 acres. Forest stands receiving partial cut treatments would experience less of a reduction in habitat quality and recover previous levels of suitability faster than stands receiving regeneration treatments. Suitable habitat connectivity would be retained at a reduced level by retaining a travel corridor along Harris Creek. No new open roads would be built; minimizing disturbance to lynx and other sensitive wildlife species. Overall, moderate adverse direct, indirect, effects and minor cumulative effects would be anticipated that could affect lynx. Under the Action Alternative, suitable habitat for fishers, gray wolves, pileated woodpeckers, and big game would be altered. The proposed logging would remove trees, some snags, and reduce forest cover. The proposed activities could temporarily (up to 3 years) disturb or displace these sensitive species should they be present in close proximity to harvest units. Mitigations and vegetation treatments outlined by the Action Alternative would minimize affects to these wildlife species and meet forest management goals. Overall, moderate adverse effects to sensitive species in the project area would be anticipated.

For detailed analysis, please refer to Attachment E - Wildlife Resources Analysis. For a complete list of Resource Mitigations, please refer to Attachment F - Summary of Mitigations.

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

The DNRC's records show there to be no cultural resource concerns. No additional archaeological investigative work is recommended.

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

**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.*

Active forest management is prevalent in this area, and is evident on all viewsheds surrounding the project area. Within the project area, harvested stands would look more open with fewer trees per acre. The proposed project would be expected to have a low risk of negatively affecting the aesthetic quality of the area. Some noise from harvesting equipment and log hauling may be heard within the area and on haul routes. This is expected to be short in duration.

Proposed new road construction would likely reduce the visible appeal of the project area by exposing bare soil and creating unnatural patterns on the landscape. Revegetation efforts associated with weed control would reduce the visibility of new roads. The appearance of the project area from a distance would likely be very similar to management patterns on adjacent property. The short term effect on aesthetics would likely be negative due to the appearance of fresh slash, stumps and skid trails. Natural revegetation and slash decomposition would reduce the effects within 2-4 years.

**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 impacts are likely to occur under either alternative.

**13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:**

*List other studies, plans or projects on this tract considered in the cumulative impacts analyses.*

Environmental Analysis for the Six Hills Timber Sale, 2009 (DNRC)

## 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.*

The proposed Harris Creek Timber Sale resides outside any established Environmental Protection Agency (EPA) operating units within the Libby super fund area. However, recent studies have revealed that traces of the Libby Amphibole Asbestos (LA) may exist in the soil, duff and tree bark in areas outside of the operating units. Although DNRC has done no testing and has no knowledge of any contamination in the sale area, the DNRC is disclosing that trace contamination LA has been found outside the EPA's designated operating areas.

**15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:**

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

Commercial logging would occur on approximately 414 acres of land over a 2-3 year period. An estimated 5.327 million board feet of logs would be harvested and sold. This is approximately 10% of DNRC's annual harvest.

**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.*

People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale program, there would be no measureable direct, indirect or cumulative impacts from the proposed action on employment.

**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.*

Due to the relatively small size of the timber sale program, there would be no measureable direct, indirect or cumulative impacts from the proposed action on tax base and tax revenues.

**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*

Due to the relatively small size of the timber sale program, there would be no measureable direct, indirect or cumulative impacts from the proposed action on government services.

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

The are no locally adopted environmental plans and goals that would affect this project.

**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 area is used infrequently for hiking, hunting, snowmobiling and general recreating. Roads through the area are closed to motorized use yearlong. There would be no change in road closure status on existing roads. Newly constructed roads would be restricted to non-motorized use yearlong, being used only for administrative purposes. The selection of either alternative would not affect the ability of people to recreate on this parcel, and use is expected to remain the same following this 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 will be no measurable direct, indirect or cumulative impacts related to population and housing due to relatively small size of the timber sale program, and the fact that people are already employed in this occupation in the region.

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

The communities and lifestyles of this area have traditionally been and still are dependent on forest management and timber production for employment and other benefits received from this type of land use and management. The action alternative would be consistent with current and traditional lifestyles in this area.

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

No impacts related to cultural uniqueness and diversity would be expected under either alternative.

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

**No Action**: The No Action alternative would not generate any revenue to the trust at this time.

**Action**: The timber harvest would generate additional revenue for the Common Schools Trust. The estimated revenue to the Common Schools Trust for the proposed harvest is $660,000 based on an estimated harvest of 33,000 tons and an overall stumpage value of $20.00 per ton. Forest Improvement fees would generate $132,250. Costs and revenues are estimates intended for relative comparison of alternatives, they are not intended to be used as absolute.

| | | | | |
|---|---|---|---|---|
| **EA Checklist Prepared By**: | **Name:** | Jeremy Rank | **Date:** | 3/12/2013 |
| | **Title:** | Management Forester – Libby Unit MT DNRC | | |

## V. FINDING

### 25. ALTERNATIVE SELECTED:

Upon review of the Checklist EA and attachments, I find the Action Alternative as proposed meets the intent of the project objectives as stated on page 1, Type and Purpose of Action. It complies with all pertinent environmental laws, best management practices and the DNRC State Forest Land Management Plan. The No Action Alternative does not meet the project objectives. For these reasons I have selected the Action Alternative for implementation on this project.

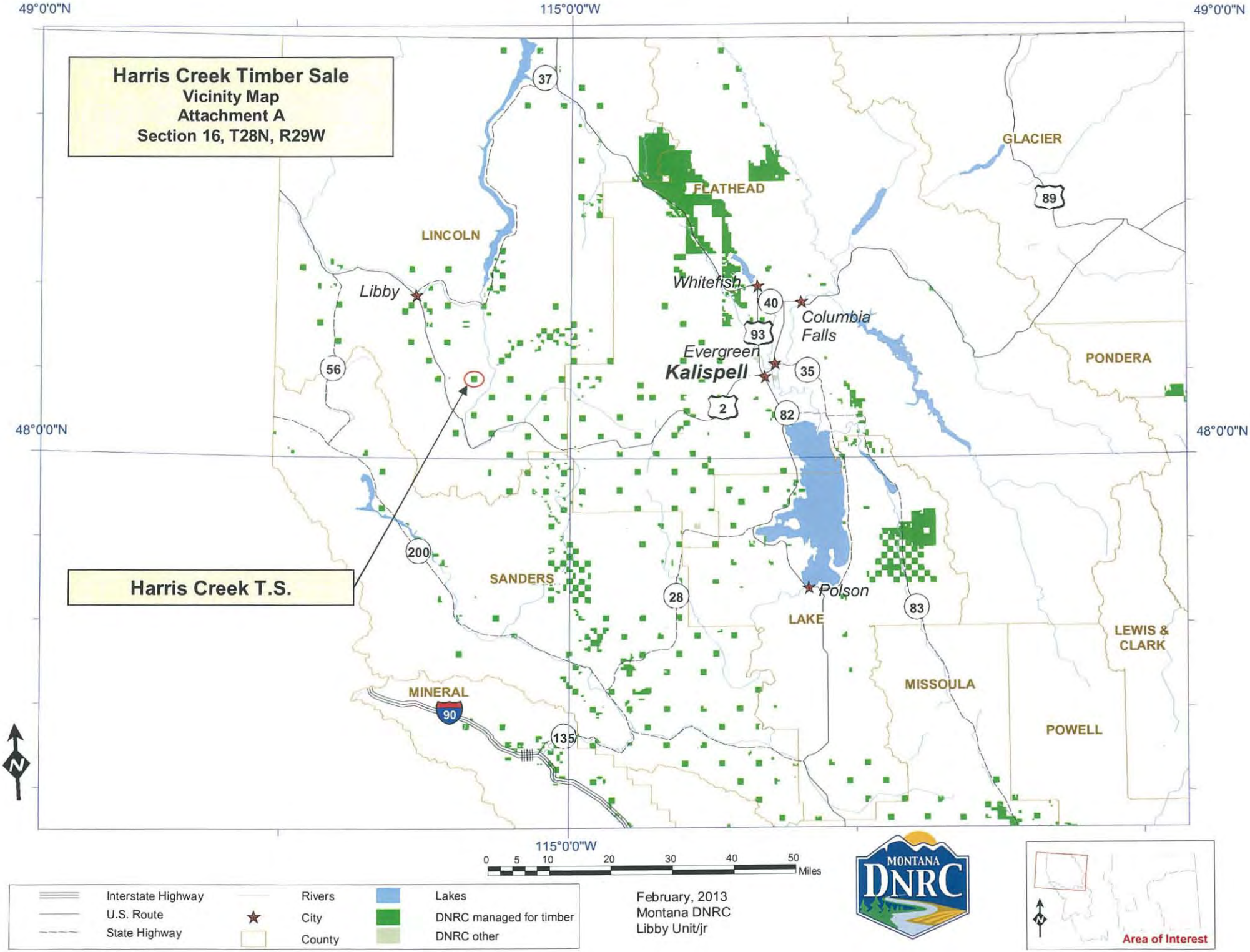
### 26. SIGNIFICANCE OF POTENTIAL IMPACTS:

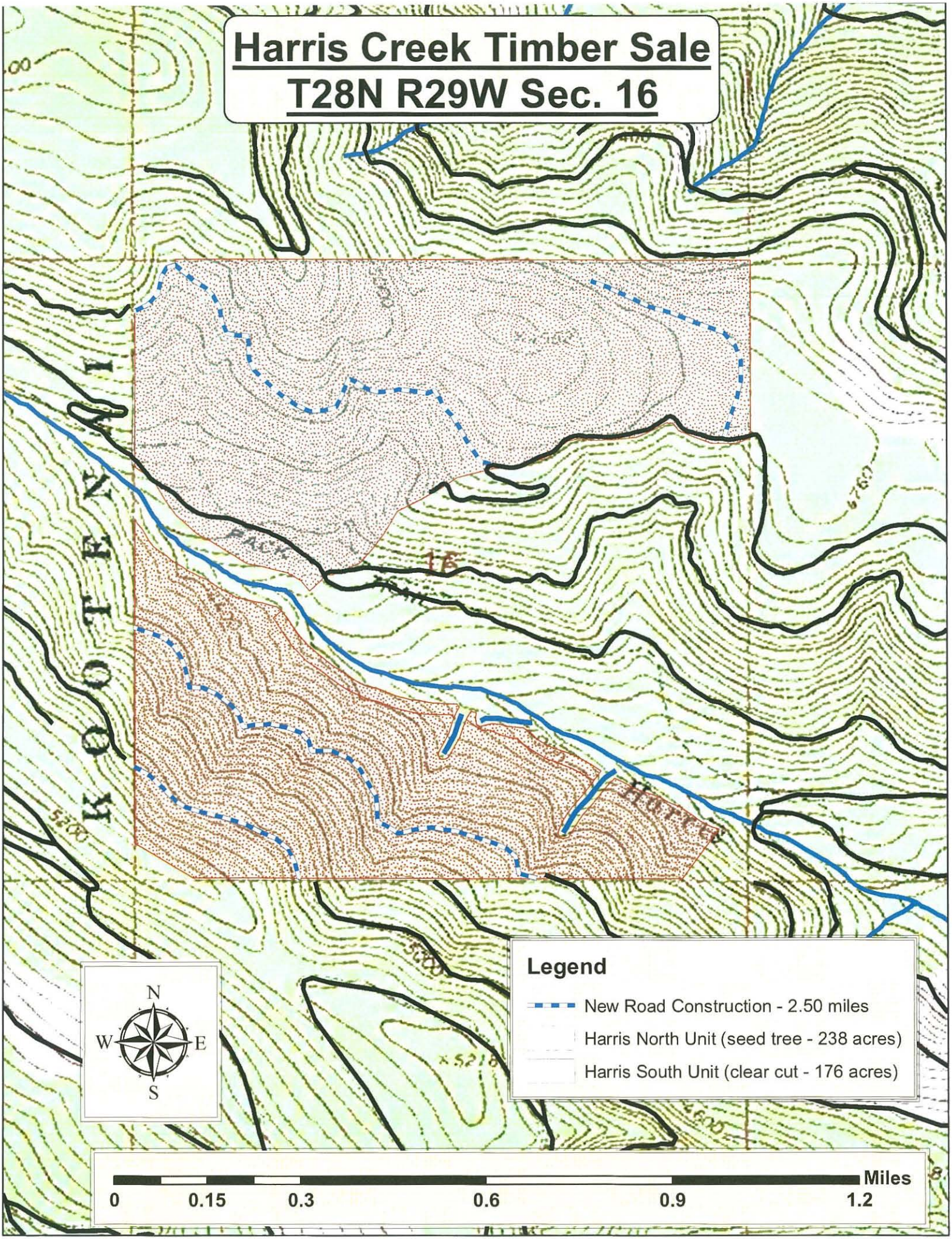
After a thorough review of the scoping documents, Department policies, standards, guidelines, and the State Forest Land Management Plan, I find all the identified resource management concerns have been fully addressed in this Checklist EA and its attachments. Specific mitigation measures for each resource concern are listed in Attachment F. The action alternative provides for income to the trusts and promotes the development of a healthy, biologically diverse, and productive forest. It also provides the opportunity to improve access and road maintenance within the project area. I find there will be no significant impacts as a result of implementing the action alternative. Specific project design features and various resource management specialist recommendations have been implemented to ensure that this project will fall within the limits of acceptable environmental change and result in no significant effects.

### 27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

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

| | | |
|---|---|---|
| **EA Checklist Approved By**: | **Name:** | Mark Peck |
| | **Title:** | Libby Unit Manager |
| **Signature:** /s/ Mark Peck | | **Date**: 3/13/2013 |


Harris Creek Timber Sale
Vicinity Map
Attachment A
Section 16, T28N, R29W
Harris Creek T.S.
49°0'0"N
115°0'0"W
48°0'0"N
LINCOLN
FLATHEAD
GLACIER
PONDERA
SANDERS
LAKE
MISSOULA
LEWIS & CLARK
POWELL
MINERAL
Libby
Whitefish
Columbia Falls
Evergreen
Kalispell
Polson
37
89
40
93
35
2
82
56
200
28
83
135
90
Miles
0 5 10 20 30 40 50
Interstate Highway
U.S. Route
State Highway
Rivers
City
County
Lakes
DNRC managed for timber
DNRC other
February, 2013
Montana DNRC
Libby Unit/jr
MONTANA DNRC
Area of Interest


Harris Creek Timber Sale
T28N R29W Sec. 16
Legend
New Road Construction - 2.50 miles
Harris North Unit (seed tree - 238 acres)
Harris South Unit (clear cut - 176 acres)
N
W
E
S
Miles
0
0.15
0.3
0.6
0.9
1.2

# HARRIS CREEK TIMBER SALE
# SOILS ANALYSIS

## INTRODUCTION

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

- *Timber harvesting activities may adversely affect soil resources due to increased compaction, displacement and erosion.*

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

### *ANALYSIS METHODS and ANALYSIS AREAS*

The project area for this proposal includes approximately 635 acres. Because harvesting is proposed on just a portion of the project area, the analysis area is smaller. The analysis area for compaction, displacement and erosion will be the proposed harvest units and road locations while the analysis area for nutrient cycling will be the harvest units.

#### *Compaction, Displacement and Erosion*

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

#### *Risk Assessment Description*

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.

#### *Nutrient Cycling*

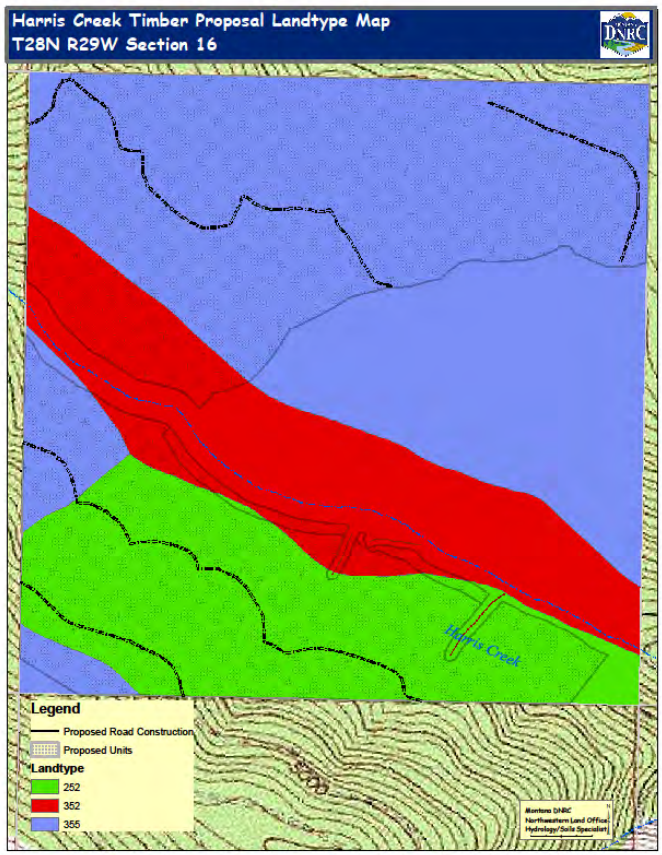
Coarse woody material will be addressed by, first, disclosing existing levels from transect data collected during field reconnaissance. The transect data will be compared with scientific literature as required by ARM 36.11.414 (2). If the action alternative is selected, this assessment will assist in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

### *REGULATORY DOCUMENTS and PAST FOREST MANAGEMENT*

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

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

**FIGURE SF-1: LANDTYPES IN PROJECT AREA**




### *EXISTING CONDITIONS*

The *Soil Survey of Kootenai National Forest Area, Montana* (*Kuennen and Nielsen –Gerhardt, 1995*) combines landform and soil information with habitat types to inventory and map soils in the project area. Three landtypes were identified in the project area and harvesting is proposed on all three of these landtypes (252, 352, and 355) as shown in ***Figure SF-1***. These landtypes have a moderate susceptibility to erosion and moderate or high (252 only) sediment delivery efficiency. Susceptibility to erosion is based upon observations and soil properties. The hazard is described as slight, moderate, or severe (*Kuennen and Nielsen –Gerhardt, 1995*):

- a rating of slight indicates that erosion is unlikely under ordinary climatic conditions;
- a rating of moderate indicates that some erosion is likely and that erosion-control measures may be needed;
- a rating of severe indicates that substantial erosion is expected, loss of soil productivity and off-site damage are likely, and erosion–control measures are costly and generally impractical.

Sediment delivery efficiency rates the probability of eroded soil being transported to streams. The transport of eroded soils to streams is dependent upon slope, landform and distance to streams.

- a rating of low indicates the landform is on a mountain ridge, moraine, drumlin or high terrace. Slopes are less than 35 percent with no surface drainage channels. Generally, less than 10 percent of these landforms are near drainage channels that would be expected to have delivery of eroded soil to streams.
- a rating of moderate is for mountain slopes with a dendritic drainage pattern. Slopes are typically 15 to 60 percent. Approximately 10 to 40 percent of these areas are near enough to streams for sediment delivery.
- a rating of high is for breaklands, dissected glaciated mountain slopes, floodplains and low terraces. The breaklands can have slopes of 60 to 80 percent and long sediment travel distances. Generally, over 40 percent of these landforms are near enough to streams for sediment delivery.

*A* brief description of the landtypes within the project area can be found in the project file.

***Compaction, Displacement and Erosion***

Approximately 20 acres of proposed harvest units have been previously harvested. On areas previously harvested, effects from past forest management in the proposed harvest units are evident as a result of roads, skid trails and landings. Records of harvest for the state managed parcel indicate commercial harvest in the 1980's and 1990's, although most of the section has not been harvested. Impacts due to compaction on skid trails and landings from older sales have been reduced through freeze-thaw cycles and root mass penetrating the soil. While many of the impacts have ameliorated over time, some skid trails are still visible in the proposed harvest units. An estimate of up to 10 percent of previously harvested areas exhibit moderate or higher impact on skid trails due to compaction. These skid trails do not appear to be eroding more than the surrounding un-trailed areas, but regeneration is limited on these areas and tree densities and vigor is reduced where revegetation has occurred.

Other forest product removals include firewood, and personal Christmas tree harvests.

In the *DNRC SOIL MONITORING REPORT (DNRC, 2011),* effects on a subset of DNRC timber sales from 1988 to 2011 showed an average of 11.3 percent soil impacts due to compaction, displacement or severe erosion across all parent materials (*DNRC 2011*). However, cable yarded units showed impacts averaging approximately 6.8 percent of the harvest unit.

***Nutrient Cycling***

Coarse and fine woody debris provide a crucial component in forested environments through nutrient cycling, microbial habitat, moisture retention and protection from mineral soil erosion. (Harmon et al 1986). While coarse woody debris decays at various rates due to local climatic conditions, the advanced stages of decay contains many nutrients and holds substantial amounts of moisture for vegetation during dry periods (Larson et al. 1978, Wicklow et al. 1973). Forest management can affect the volumes of fine and coarse woody debris through timber harvesting and result in changes to the available nutrients for long term forest production. The

method for quantifying the coarse woody debris is described in the *Handbook for Inventorying Downed Woody Material* (Brown, 1974)

During field reconnaissance, 11 transects were used to estimate coarse woody debris in the project area. All transects were located in proposed units. *TABLE ST-1 – COARSE WOODY DEBRIS AMOUNTS* displays the average, minimum, maximum and median levels of coarse woody debris within transects. The median is the point with half the transects showing more and half the transects showing less.

**TABLE ST-1: COARSE WOODY DEBRIS AMOUNTS**

| | Number of transects | Average | Minimum | Maximum | Median |
|---|---|---|---|---|---|
| | | *tons per acre* | | | |
| Project Area | 11 | 13.6 | 1.7 | 30.6 | 10 |

This average is within the recommendations in *Managing Coarse Woody Debris in Forests of the Rocky Mountains* (Graham et al, 1994) on similar habitat types post timber harvest. Subalpine fir habitat types are recommended to have a level of coarse woody debris in the range of 7 to 24 tons per acre to maintain forest productivity while grand fir habitat/beargrass habitat types are recommended to have 11 to 23 tons per acre. Currently, two of the 11 transects located in proposed units were below the recommendations; six were within the recommended levels; and, three are above the recommendations.

***DESCRIPTION OF ALTERNATIVES***

- *No-Action Alternative*

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

- *Action Alternative*

  Two units totaling approximately 414 acres would be commercially harvested under this alternative. All of the proposed harvest prescriptions would be regeneration harvests; 191acres would be cable-yarded and 223 acres would use ground-based harvest methods. The prescription on the south side of Harris Creek would be clearcut and have approximately 161 acres broadcast burn. Other site prep would be completed using excavators. A minimum no-harvest buffer of 150 feet would be implemented along Harris Creek. Approximate miles of road activities include:

  - 2.5 miles of new permanent road construction
  - 13.8 miles of existing road would be maintained or have drainage improvements installed as necessary to protect water quality.

**Recommended Mitigation Measures and Contract Clauses**

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

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

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

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

4) Skyline corridors shall be spaced not less than 75 feet apart. In the case of ridges where fan-shaped settings are required, the minimum distance at the widest divergence will be 150 feet. Clearing width for corridors to accommodate yarding should not exceed 12 feet.

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

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

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

***ENVIRONMENTAL EFFECTS***

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

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

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

The comparison of the soil type map, field reconnaissance notes, and topographic map features with the proposed harvest unit map, indicates that ground-based skidding would occur on slopes of up to 40 percent. The extent of expected impacts would likely be similar to those reported in the *DNRC SOIL MONITORING REPORT (DNRC, 2011)* or approximately 11.3 percent of the proposed harvest area for ground-based operations during summer conditions. For the proposed cable yarded area, impacts would be expected to approximately 6.8 percent. Using these percentages of expected impacts, moderate or higher impacts would cover approximately 30.2 acres in harvest units. Additionally, the proposed 2.5 miles of road construction would remove approximately 12.3 acres from forest production. Table ST-2 below exhibits the expected level of impacts from the proposed activities

**TABLE ST-2: EXPECTED AREA OF IMPACTS**

| Description | Acres of harvest | Expected percentage of area impacted | Acres of reduced productivity | Acres removed from forest production |
|---|---|---|---|---|
| Ground base yarding | 223 | 11.3% | ~25.2 | - |
| Cable yarding | 191 | 6.8% | ~13.0 | - |
| Road Construction | - | - | - | 12.3 |
| **TOTAL** | **414** | **9.2% weighted average** | **38.2** | |

The magnitude, area and duration of compaction would remain very low due to the majority of the proposed harvest expected to be implemented with cable yarding methods.

Sediment delivery efficiency for Landtype 252 is high; however, because a vegetative buffer of at least 150 feet would be maintained adjacent to Harris Creek, the risk of sediment delivery to the stream would be moderate. Wasting of excess soil on steep slopes during road construction could increase the risk of sediment delivery to streams if not properly mitigated. A moderate risk of unacceptable levels of displacement and erosion would be expected primarily due to the soil and landform properties described in the *EXISTING CONDITION*.

Coarse woody debris would be left on-site in volumes recommended to help maintain soil moisture and forest productivity, generally in the 10 to 20 tons per acre range for habitat types found in the harvest locations (Graham et al. 1994). Because coarse woody debris would be left on site in amounts recommended by scientific literature, and fine debris would be maintained as much as practicable, the risk of measureable adverse direct or indirect impacts to nutrient cycling would be low on 253 acres. Because approximately 161

acres would be broadcast burned, the risk of reducing coarse woody debris to levels less than recommended would be moderate.

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

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

**References:**

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

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

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

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

Kuennen, Louis J. and Marci L. Nielsen –Gerhardt. 1995. Soil Survey of Kootenai National Forest Area, Montana. USDA Forest Service, Kootenai National Forest, Libby, Montana.

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

# HARRIS CREEK TIMBER SALE
# WATER RESOURCES ANALYSIS

## INTRODUCTION

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

- *Timber harvesting and road construction activities may increase sediment delivery into streams and affect water quality.*
- *Cumulative effects from timber harvest may affect channel stability and fisheries habitat by increasing annual water yields and by decreasing the amount of recruitable woody debris into streams and /or increasing stream temperatures.*

These issues will be addressed by addressing by assessing the risk of sediment delivery to water bodies from roads and harvest units; assessing the risk of destabilizing channels from annual water yield increases; and, assessing the risk of impacting recruitable woody debris and stream temperature due to harvesting.

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

## ANALYSIS METHOD

### *Risk Assessment Description*

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.

### *Sediment Delivery*

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

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

***Water Yield***

Impacts from increases in annual water yield will be addressed using the Equivelant clearcut acres (ECA) method. The ECA calculation method is outlined in *Forest Hydrology, Part II (Haupt et al, 1974).* ECA is a function of total area roaded, harvested, or burned; percent of crown removed during harvesting or wildfire; and amount of vegetative recovery that has occurred in the harvested or burned areas. As live trees are removed, the water that would have evaporated and transpired either saturates the soil or is translated to runoff.

In order to evaluate the potential effects of water-yield increases, a threshold of concern for each watershed was established per *ARM 36.11.423*. Thresholds were established based on evaluation of the acceptable risk level, resources value, and watershed sensitivity. Increased annual water yields above the threshold of concern may result in an increased risk of in-channel erosion and degradation of fisheries habitat and may have detrimental impacts on other downstream beneficial uses.

***Woody Debris Recruitment***

The analysis method for woody debris recruitment will evaluate the potential reduction in available woody debris and shading due to timber-harvesting activities in the riparian management zone (RMZ) of the project area.

***Stream Temperature Increases***.

Stream temperature will be addressed by comparing the existing condition or past analysis information with the risk of stream temperature increases due to reduced shading from existing vegetation from this project.

**ANALYSIS AREA**

***Sediment Delivery***

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

***Water Yield***

The analysis area for annual water yield will include the Harris Creek watershed. This is a second-order watershed that would be expected to exhibit potential impacts.

***Woody Debris Recruitment***

The analysis area for woody debris recruitment is generally the RMZ along Harris Creek within the DNRC managed parcel for direct and indirect effects. Cumulative effects will include the entire Harris Creek RMZ across all ownerships.

***Stream Temperature Increases***
The analysis area for stream temperature increases is identical to the analysis area for woody debris recruitment.

**WATER USES AND REGULATORY FRAMEWORK**

***WATER QUALITY STANDARDS***
This portion of the Kootenai River basin, is classified as B-1 by the Montana Department of Environmental Quality as stated in the ARM 17.30.609. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases over natural turbidity. "Naturally occurring," as defined by *ARM 17.30.602* (*19*), includes conditions or materials present during runoff from developed land where all reasonable land, soil, and water conservation practices (commonly called Best Management Practices or BMPs) have been applied. The State of Montana has adopted BMPs through its non-point source management plan (MDEQ, 2007) as the principle means of meeting the Water Quality Standards. Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of activities that could create impacts.

***WATER QUALITY LIMITED WATERBODIES***
Harris Creek is not listed as a water quality limited water body in the 2012 303(d) list. However, the Fisher River downstream of the project area is the listed as partially supporting aquatic life. The probable causes of impairment are high flow regimes and lead. The probable source of impairments includes channelization, grazing in riparian zones, highway/Road/bridge runoff, silviculture activities and streambank modifications/destabilization. A thorough list of potential impairments, sources and assessments can be found at MDEQ Clean Water Act Information Center (http://cwaic.mt.gov/).

The 303(d) list is compiled by the Montana Department of Environmental Quality as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency Water Quality Planning and Management Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify water bodies that do not fully meet water quality standards, or where beneficial uses are threatened or impaired.

***STREAMSIDE MANAGEMENT ZONE LAW (SMZ)***

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

***FOREST MANAGEMENT RULES AND HABITAT CONSERVATION PLAN (HCP)***
In 2003, DNRC drafted Administrative Rules for Forest Management. The portion of those rules applicable to watershed and hydrology resources include ARM 36.11.422 through 426 and 470 through 471.

DNRC is managing the habitats of threatened and endangered species on this project by implementing the Montana DNRC Forested Trust Lands Habitat Conservation Plan (HCP) and the associated Incidental Take Permit that was issued by the United States Fish & Wildlife Service (USFWS) in February of 2012 under Section 10 of the Endangered Species Act. The HCP identifies specific conservation strategies for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout. This project complies with the HCP, which can be found at *http://dnrc.mt.gov/HCP*. This includes implementing RMZs on all Class 1 streams to ensure adequate recruitable coarse woody debris and shade are maintained, and channel migration zones are implemented.

***WATER RIGHTS AND BENEFICIAL USES***
No water rights for surface water exist within three miles downstream of the project area.

Designated beneficial water uses within the project area include cold-water fisheries, aquatic life support, and recreational use in the streams.

***FISHERIES—THREATENED, ENDANGERED AND SENSITIVE SPECIES***
Westslope cutthroat trout are listed as a Class-A Montana Animal Species of Concern. A Class-A designation is defined as a species or subspecies that has limited numbers and/or habitats both in Montana and elsewhere in North America, and elimination from Montana would be a significant loss to the gene pool of the species or subspecies (Montana Fish, Wildlife and Parks, Montana Natural Heritage Program, and Montana Chapter American Fisheries Society Rankings). DNRC has also identified westslope cutthroat trout as a sensitive species (ARM 36.11.436).

## EXISTING CONDITION

### *GENERAL DESCRIPTION*

The Harris Creek parcel is drained by Harris Creek; an approximate 2,400-acre tributary to the Fisher River. The 1971-2000 30-year average precipitation data from the Natural Resources Information System (http://nris.mt.gov) shows a precipitation ranges from 20 to

50 inches per year in the Harris Creek watershed. The average annual precipitation for Harris Creek is estimated at approximately 30 inches per year.

While the stream provides habitat for westslope cutthroat trout per FWP website and Forest Service personnel (Hooper, pers comm.), the flow regime shifts from perennial to intermittent within the DNRC managed parcel. Bankfull widths were measured on Harris Creek at both road crossings; the upper crossing had an average bankfull width of approximately 5.7 feet and the lower crossing had an average bankfull width of approximately 7 feet. Using the protocol for channel stability evaluation on the Kootenai National Forest (USFS, 1993), stream stability appeared to be fair-to-good. No large mass wasting sites were observed during field reconnaissance, although some sediment from streambanks was noted. Sediment from streambanks was primarily found at outcurves and constrictions; however some scouring can be attributed high flows during spring runoff of 2012.

Ownership in this watershed is split three ways: Plum Creek Timber Company (~69%); Kootenai National Forest (~7%); and, Montana DNRC (~24%).

***SEDIMENT DELIVERY***

A field review of the haul route found very few sediment sources from roads. Within the Harris Creek watershed, only two stream crossings exist. One was replaced during 2012 to reduce the risk of failure and minimized sediment delivery into Harris Creek. The site is revegetating and the risk of sediment delivery into Harris Creek will continue to diminish. The second stream crossing is located adjacent to the DNRC managed parcel, but on a road that is solely owned by Plum Creek Timber Company. The crossing structure is a native log stringer bridge that has partially failed at the inlet due to rot. The existing risk of complete failure of this structure is moderate and likely increasing year to year. Some sediment delivery at this site was observed during field review, but most of the fill slope and road at this site is well vegetated.

Some drainage features on the haul route are marginally functional and will need maintenance, prior to use. Improvements include reshaping drain dips and grading the road to ensure all features are properly functioning.

The erosion risk for landtypes in the project area with proposed timber harvest proposed is considered moderate. No mass wasting sites were observed in any of the proposed harvest areas. One landtype (252) is considered to have a high sediment delivery efficiency which indicates a high risk of displaced soil being transported on steep slopes. See the *SOILS ANALYSIS* for more information on landtype erosion risk.

***WATER YIELD***

A harvest history was developed for the Harris watersheds from aerial photos, timber sale contracts, and section record cards to estimate the annual water-yield increases. Past harvesting operations in the watershed include harvests since the mid-1900's. Records of

harvest for the state managed parcel indicate commercial harvest in the 1980's and 1990's, although most of the section has not been harvested. A list of harvesting in the project area can be found in the project file. Other forest product removals include firewood and individual Christmas tree harvests that generally have no measurable impact on annual water yield due to the very small scale of harvesting.

Using the ECA method described earlier, the existing annual water-yield increase for the Harris Creek watershed is estimated 8.1% percent annual water yield increase over fully forested conditions and approximately 340 ECA available before the threshold is reached.

After reviewing the beneficial uses, existing channel conditions, and existing watershed condition per *ARM 36.11.423*, the threshold of concern for the Harris Creek watershed threshold was set at 14 percent. These threshold values expect up to a moderate degree of risk of adverse impacts to beneficial uses due to water-yield increases, as described in *ARM 36.11.423(f)(iv)*.

### *RECRUITABLE WOODY DEBRIS*

Tree heights have ranged from 91 feet to 104 feet for the dominant, open grown tree species in the riparian area. The $SPTH_{100}$ for this project is estimated at 98 feet.

The riparian area along Harris Creek is a mosaic of conifer trees ranging from fully forested with mature trees to regenenerating sapling and pole –sized trees. Approximately 97 acres of forest is within a $SPTH_{100}$ of Harris Creek. Using the 2011 NAIP photos from the Natural Resources Information System, an estimated 38 acres has been harvested and is in varying stages of regeneration.

### *STREAM TEMPERATURE INCREASES*

Because stream temperatures are generally sensitive to direct solar radiation, an assessment of the existing riparian stream shading was conducted using 2011 aerial photos. In the Harris Creek watershed, approximately 39 percent of the vegetation within 100 feet of the streams or lake has been impacted by timber harvest.

## ENVIRONMENTAL EFFECTS

### *DESCRIPTION OF ALTERNATIVES*

- *No-Action Alternative*

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

- *Action Alternative*

  Two units totaling approximately 414 acres would be commercially harvested under this alternative. All of the proposed harvest would be regeneration harvest with 191acres that would be completed using cable yarding and 223 acres that would be accomplished using ground based harvest methods. The prescription on the south side of Harris Creek would be clearcut and have approximately 161 acres broadcast burn. Other site prep would be completed using excavators. A minimum no-harvest

buffer of 150 feet would be implemented along Harris Creek. Approximate miles of road activities include:

- 2.5 miles of new permanent road construction
- 13.8 miles of existing road would be maintained or have drainage improvements installed as necessary to protect water quality.

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

***DIRECT AND INDIRECT EFFECTS***

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

**Sediment Delivery**

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

**Water Yield**

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

**Large Woody Debris Recruitment**

No reduction in recruitable large woody debris would result from the implementation of this alternative.

**Stream Temperature Increases**

No increases in stream temperature from a reduction in stream shading would be expected under this alternative.

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

**Sediment Delivery**

Past monitoring of DNRC timber harvests has shown erosion on approximately six percent of the sites monitored, although no water-quality impacts from the erosion were found (*DNRC 2011*) and the erosion averages less than 0.1 percent of the harvest areas. Average area of displacement within monitored harvest units has averaged approximately eight percent; cable yarding units averaged less at approximately 5 percent. By minimizing displacement, less erosion would likely occur compared to other harvest methods with more extensive disturbance (*Clayton 1987 in DNRC 2005*).

During a review of BMP effectiveness, including stream buffer effectiveness, *Raskin et al* 2006 found that 95 percent of erosion features (disturbed soil) greater than 10 meters (approximately 33 feet) from the stream did not deliver sediment. Their findings indicated that the main reasons stream buffers are effective include 1) keeping active erosion sites away from the stream, and 2) stream buffers may intercept and filter

runoff from upland sites as long as the runoff is not concentrated in gullies or similar features (*Raskin et al 2006*).

Proposed harvest units would have a 150 foot no-harvest buffer along Harris Creek. Beyond this 150-foot no-harvest buffer, an additional 100-foot buffer with at least 50 percent retention would provide sediment filtering capabilities along Harris Creek for approximately 2/3rd of the harvest unit.

Existing roads would have drainage improvements and BMP upgrades implemented under this alternative to maintain a very low risk of sediment delivery to streams. Minor drainage improvements include reshaping drain dips and cleaning ditches.

New road construction would not cross any streams. Material side cast during construction of roads on steep slopes could potentially be transported to streams due to the high sediment delivery efficiency of Landtype 252 (see *SOILS ANALYSIS*). The 150 foot no-harvest buffer would be expected to provide adequate sediment filtration and reduce the risk of delivery into the stream.

Because DNRC would incorporate BMPs into the project design as required by *ARM 36.11.422 (2)* and all laws pertaining to SMZs would be followed, a moderate risk of low impacts to beneficial uses from sediment would result from the implementation of this alternative.

**Water Yield**

Approximately 414 acres would be harvested using conventional ground-based and cable yarding methods, and approximately 342 ECA would be generated from these activities in the Harris Creek watershed which would result in an annual water yield increase of 7.2 percent. Individually, this would not be expected to result in increased stream channel erosion; however, this will be further discussed under *Cumulative Effects*

**Large Woody Debris Recruitment**

Because no harvest would occur within 150 feet of Harris Creek, all recruitable woody debris within one SPTH plus an additional 50 feet would be retained. This would remain very similar to the existing conditions.

**Stream Temperature Increases**

As described in the Montana DNRC Forested Trust Lands Habitat Conservation Plan Final EIS (*DNRC 2010*), a no-harvest zone of 50 feet immediately adjacent to this Class 1 streams would be expected to retain a level of stream shading similar to pre-harvest conditions. Because no harvest would occur within 150 feet of Harris Creek (the only Class 1 stream), stream shading post-project is expected to maintain a very low risk of increasing stream temperatures due to timber harvesting.

*CUMULATIVE EFFECTS*

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

**Sediment Delivery**

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

**Water Yield**

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

**Large Woody Debris Recruitment**

No reduction in recruitable large woody debris would result from the implementation of this alternative. Recruitable large woody debris would be retained at an adequate level to maintain stream form and function. Past impacts to recruitable woody debris would continue to ameliorate as existing harvest units revegetate and grow.

**Stream Temperature Increases**

No increases in stream temperature from a reduction in stream shading would be expected under this alternative because no harvesting would occur.

- ***Cumulative Effects Summary - No-Action Alternative***

  Because no timber harvesting or associated activities would occur under this alternative, cumulative effects would be limited to the existing condition. Sediment delivery risk from existing sources would remain in the project area. Conditions would continue to provide adequate levels of large woody debris recruitment and shade retention. Under this alternative, fisheries habitat and water quality variables described in this assessment would be maintained at their current level.

- ***Cumulative Effects of the Action Alternative to Water Resources***

  **Sediment Delivery**

  Under this alternative, the proposed timber harvesting and road construction activities would occur. While no stream crossing structures would be replaced under the action alternative, a failing log stringer bridge would be replaced by Plum Creek Timber Company prior to the implementation of this project. This crossing structure is located on a road owned solely by PCTC. Although forestry BMPs would likely be followed by PCTC to minimize sediment delivery, a short-term increase in sediment would be expected during and immediately following this work resulting in a high risk of low impacts to beneficial uses for a short period. Increases in sediment attributed to stream crossing removal would be short-term and would not be expected to result in a long-term increase in sediment delivery.

  After the short-period of potential sediment delivery from the crossing structure replacement, a moderate risk of low cumulative increases in sediment delivery as a result of timber harvesting and roadwork would be expected because of the BMP application and increased stream buffers to filter potential displaced soil.

  **Water Yield**

If this alternative were selected, the estimated cumulative water-yield increase in the Harris Creek watershed would be 15.3 percent in 2013. The cumulative ECA for the watershed would be 841, which is approximately 3 ECA over the recommended level. The variance in the recommended ECA threshold and the recommended annual water yield increase can be attributed to differing levels of precipitation throughout the watershed. Because this level would be above the recommended threshold set in accordance with *ARM 36.11.425(g)*, a moderate degree of moderate impacts would be expected to beneficial uses meaning a 50/50 chance of moderately detrimental impacts to beneficial uses could occur.

**Large Woody Debris Recruitment**

Because this project would not harvest any trees within one site potential tree height of Class 1 streams—namely Harris Creek—a very low risk of low impacts to beneficial uses from reduced levels of recruitable woody debris would result from this alternative.

**Stream Temperature Increases**

Due to the retention of all shade producing canopy within the RMZ of Class 1 streams, a very low risk of low cumulative impacts to beneficial uses from temperature increases would result from the implementation of this alternative.

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

All timber-harvesting activities would follow BMPs as required by *ARM 36.11.422* and the direct and indirect effects would be expected to have up to a moderate risk of low impacts. Because ECA/annual water yield thresholds would be increased to the recommended threshold or higher, the risk to impacting beneficial uses would be moderate. However, due to the extra buffering along Harris Creek, the impact would only be moderately detrimental to beneficial uses. This expectation includes (1) no change in the recruitable woody debris; (2) soil disturbance associated with road work and CMP installations; and, (3) increases in annual water yield.

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# Harris Creek Timber Sale
# VEGETATION ANALYSIS

## INTRODUCTION
This analysis is designed to disclose the existing condition of the vegetative resource and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, issues were developed by the public and internally regarding vegetative conditions. The following concerns were expressed from these comments regarding proposed timber harvesting and related activities:

- Concern for maximizing the return to the Common Schools Trust Fund by intensively managing for healthy and biologically diverse forests.
- Improve forest health. Minimize losses in timber volume from mortality due to insect and disease conditions present within the sale area.
- Promote the continued presence and/or reestablishment of historically appropriate timber types on Trust Land included in this project.
- Reduce fire hazard and associated risks of loss to State of Montana, United States Forest Service, and privately owned lands in the area.
- Concern regarding the impacts to threatened and endangered plant and animal species.

## ANALYSIS AREAS
The analysis area for direct and indirect effects is state section 16 of T28N R29W. This section is located 17 air miles south southeast of Libby, Montana, in Lincoln County. Cumulative impacts are considered at the scale of the Libby Unit and will adequately allow for the disclosure of existing conditions, direct, indirect, and cumulative impacts.

## ANALYSIS METHODS
The Libby Unit typically prepares one to two timber sales per year. Each proposed project is evaluated for its potential effects on lands managed by the DNRC and the surrounding landscape. Methods used in the analysis included:

- review of stand level inventory (SLI) data,
- field visits,
- review of scientific literature,
- aerial photography,
- consultation with other professionals.

## EXISTING CONDITION
Past and current events have changed the forest conditions on the proposed parcels involved in the project area from what would have been present historically according to Losensky's "Historical Vegetation of Montana" (1997). The area being analyzed was historically characterized by infrequent, mixed severity and stand replacing wildfires prior to the early 1900's. Since the early 1900's, fire has been virtually eliminated from the project area. The current conditions have created dense, dead and live fuels from ground level to overstory crowns. This stand and fuel structure contributes to an increased risk of stand replacing fire hazard.

The project area has no threatened or endangered plant species according to the Montana Natural Heritage Program database. SLI identified 95 acres of potential old growth in the project area, and after field verification only 8 acres were found to meet the old growth minimum criteria according to Green et al. The old growth stand is near Harris Creek and would be excluded from harvest operations because they

are with the SMZ and wildlife corridor surrounding Harris Creek, these acres are not included in the proposed cutting units.

Logging activity has occurred in the past on this section. Two large timber sales have occurred in the project area from 1988 to the present. 1,408 mbf was harvested in 1988, and 1,281mbf was harvested in 2011. The remainder of the section has not been logged. The area that produced this volume is not part of the proposed harvest area.

Approximately 1/3 of the project area has been intensively managed while the remaining 2/3 of the project area have naturally occurring stand conditions. The over mature condition of the unmanaged stands exhibits poor quality, form class, overcrowding and a high incidence of disease and mortality. Measurements show 57 trees per acre over the entire range of size classes, are standing dead (scores more per acre of recently downed trees) due to defoliators, root rots and mistletoe. This represents more than 12% of standing trees are dead. Standing high quality wildlife snags are plentiful due to the high mortality and lack of road access to this section.

Table V-1: Current cover types and desired future conditions for harvest units in section 16 T28N R29W.

| Cover Type for harvest units in Section 16 | Current Acres | DFC Acres | Current minus (-) DFC* |
|---|---|---|---|
| Western larch/Douglas-fir | 303 | 324 | -21 |
| Mixed Conifer | 0 | 41 | -41 |
| Ponderosa pine | 45 | 49 | -4 |
| Douglas-fir | 45 | 0 | 45 |
| Lodgepole pine | 21 | 0 | 21 |
| Totals | 414 | 414 | |

**Direct and Indirect Effects**

*No Action Alternative*

No timber harvest or associated activities would occur under this alternative. Timber types would continue to advance towards climax conditions with shade tolerant trees continuing to thrive in the understory. Within the next 50 - 100 years these shade tolerant species may replace the current overstory. Growth and vigor of trees present in the analysis area would continue to decline as competition increases.

*Action Alternative*

The proposed action alternative would harvest timber on approximately 414 acres. The proposed harvest would not reduce the amount of old growth in the project area. The proposed harvest would capture value currently being lost and focus on the regeneration of the stand to preferred seral species, converting 66 acres that are currently in lodgepole pine and Douglas-fir cover types to Western larch/Douglas-fir and Mixed Conifer cover types. More detailed information for treatment of individual units can be found in Attachment D-1A&B, Harvest Prescriptions. Gated road closure of the new road would help prevent the unauthorized removal of snags and snag recruits. Fuel loading would be reduced by implementation of harvest prescriptions. Growth and vigor of the regenerated stand would increase. Noxious weeds would be monitored and addressed through the Libby Unit integrated weed management program.

**Cumulative Effects**

*No Action Alternative*

Under this alternative, stand structure and species composition on state land across the Libby Unit will move towards a shade tolerant, climax condition. Fuel loadings are expected to increase due to tree mortality from insects and disease outbreaks.

*Action Alternative*

The Libby Unit manages 30,218 Classified Forest acres. Across Libby Unit there would be a slight shift towards Desire Future Conditions. This proposed action, in addition to other timber sales on state land on the Libby Unit, are moving stands toward the Desired Future Condition through the use of harvest treatments that generally favor the development of early seral cover types. The project area would be altered with regard to size class distribution and stocking levels. Fuel loading, ladder fuels, insect and disease incidence would be reduced.

# SILVICULTURAL PRESCRIPTION

**Sale Name:** Harris Creek Timber Sale

**Unit Number:** ST north of creek **Acres:** 238

**Location:** T28N R29W sec. 16

**Elevation:** 4,240ft – 5,210ft **Slope:** 5-45% **Aspect:** Generally South

**Habitat type:** dominated by ALBA/VAGL this group is in the cool and moderately dry habitat type group.

**Soils:** Andic Dystrochrepts, rock outcrop complex, glaciated mountain slopes.

**Current Cover Type:** Western larch/Douglas-fir, ponderosa pine, lodgepole pine

**Appropriate Cover Type:** Western larch/Douglas-fir and ponderosa pine

**Current Land Uses:** classified forest – timber production; and some recreation does occur.

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## Description of stand(s):

**Stand History:** These stands have no record or evidence of previous harvest activities. This unit is dominated by Douglas-fir, Western larch, grand fir, ponderosa pine and lodgepole pine.

## Treatment Objectives:

1. Produce a source of revenue to the Common School Trust.
2. Promote historic forest stand conditions and species compositions.
3. Reduce susceptibility to insects and disease.
4. Reduce susceptibility to stand replacement wildfire.

## Prescribed Treatment:

**2013-2014: Seed Tree Harvest:**

Utilize conventional or mechanical harvesting with ground based and skyline based skidding systems. Treatment will focus on the removal of approximately 95% of all merchantable timber and slashing of all non-merchantable trees. Western larch and Douglas-fir snags greater than 17" DBH will be retained.

**2015: Site Preparation:**

Following a post harvest review, mechanical scarification may be implemented to achieve the exposure of approximately 20% bare mineral soil.

**2016: Regeneration:**

Planting should occur within one year after site preparation in order to re-establish western larch as the cover-type representing historical conditions. Planting at 14 x 14 foot spacing would be prescribed. Depending on the intensity of big game predation on planted stock, netting or repellent may be required to provide for the protection of planted stock.

**2016-2026: Maintain appropriate stocking:**

Survival survey of planted stock within 1 year of planting
Regeneration survey 3 years following planting
Evaluate area for stand density and prescribe pre-commercial thinning if necessary to achieve free-to-grow condition.

**MARKING GUIDELINES FOR HARVEST OF UNIT ST20**

**Section Line / Ownership Boundary Markings:**
Section lines are marked with RED painted Xs at eye level and facing into the State ownership and facing monuments.

**Harvest Unit Boundary Markings:**
Designate unit boundary by 3 horizontal BLUE painted stripes at eye level and facing toward the inside of the unit.

**Streamside Management Zone Markings:**
Streamside Management Zone boundaries are marked with 3 horizontal ORANGE painted stripes at eye level and facing away from the stream and into the adjacent harvest unit.

**Tree Marking**:
No trees in this unit are marked. Only merchantable trees will be harvested. A merchantable tree will be defined as any tree that contains at least one 16-foot log with a 5 1/2 inch top diameter.

**Prescription:**
The end result will be to achieve approximately 5-10 leave trees per-acre on average. Tree selection is more important than consistent spacing. 70 foot spacing may be used as a guide. The desired leave tree will be a shade intolerant species from the upper or mid-canopy level that has a conical crown that has a 30% live crown ratio, and has desirable form and vigor.

**Prescription Criteria:**

1. Leave trees: All ponderosa pine are prescribed as leave trees. Healthy and vigorous WL and DF from upper and mid-canopy level are prescribed to be left on 70 foot x 70 foot spacing. Select well formed trees which are free from dwarf mistletoe, root rot infection and have crown ratios of 30% or greater should be retrained. Crowns on leave trees should be full and conical.

2. High Quality Wildlife Snags: Leave snags that are equal to or greater than 17" DBH (preferably WL, PP or DF if available). If those are not present, select to leave the next largest available size for high quality wildlife snags. A minimum of 2 snags per acre should be left (145ft x 145ft)

# SILVICULTURAL PRESCRIPTION

**Sale Name:** Harris Creek Timber Sale

**Unit Number:** CC south of creek **Acres:** 176

**Location:** T28N R29W sec. 16

**Elevation:** 3,800ft – 5,250ft **Slope:** 35-85% **Aspect:** Generally North

**Habitat type:** dominated by ABGR/XETE this group is in the moderately cool and dry habitat type group.

**Soils:** Andic Dystrochrepts, breaklands.

**Current Cover Type:** Western larch/Douglas-fir and Douglas-fir

**Appropriate Cover Type:** Western larch/Douglas-fir and Mixed Conifer

**Current Land Uses:** classified forest – timber production and some recreation does occur.

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## Description of stand(s):

**Stand History:** These stands have no record or evidence of previous harvest activities. This unit is dominated by Douglas-fir, Western larch and grand fir.

## Treatment Objectives:

1. Produce a source of revenue to the Common School Trust.
2. Promote historic forest stand conditions and species compositions.
3. Reduce susceptibility to insects and disease.
4. Reduce susceptibility to stand replacement wildfire.

## Prescribed Treatment:

**2013-2014: Clear Cut Harvest:**

Utilize conventional or mechanical harvesting with ground based and skyline based skidding systems. Treatment will focus on the removal of all merchantable timber and slashing of all non-merchantable trees. Western larch and Douglas-fir snags greater than 12" DBH will be retained.

**2015: Site Preparation:**

Following a post harvest review, fire line will be constructed and prescribed broadcast fire will be employed.

**2016: Regeneration:**

Planting should occur within one year after site preparation in order to re-establish western larch as the cover-type representing historical conditions. Planting at 14 x 14 foot spacing would be prescribed. Depending on the intensity of big game predation on planted stock, netting or repellent may be required to provide for the protection of planted stock.

**2016-2026: Maintain appropriate stocking:**

Survival survey of planted stock within 1 year of planting
Regeneration survey 3 years following planting
Evaluate area for stand density and prescribe pre-commercial thinning if necessary to achieve free-to-grow condition.

**MARKING GUIDELINES FOR HARVEST OF UNIT CC**

**Section Line / Ownership Boundary Markings:**
Section lines are marked with RED painted Xs at eye level and facing into the State ownership and facing monuments.

**Harvest Unit Boundary Markings:**
Designate unit boundary by 3 horizontal BLUE painted stripes at eye level and facing toward the inside of the unit.

**Streamside Management Zone Markings:**
Streamside Management Zone boundaries are marked with 3 horizontal ORANGE painted stripes at eye level and facing away from the stream and into the adjacent harvest unit.

**Tree Marking**:
No trees in this unit are marked. All merchantable trees will be harvested. A merchantable tree will be defined as any tree that contains at least one 16-foot log with a 5 1/2 inch top diameter. Inside the Streamside Management Zone there are no trees designated to be cut.

**Prescription Criteria:**

1. Leave trees: All merchantable trees will be cut and yarded. All trees not merchantable will be slashed and left in the woods.

2. High Quality Wildlife Snags: Leave western larch and Douglas-fir snags that are equal to or greater than 17" DBH.

# Harris Creek Timber Sale
# Wildlife Analysis

## INTRODUCTION

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

- **Mature forest cover and connectivity.** The proposed activities could decrease mature forested cover, which could reduce habitat connectivity and suitability for wildlife species associated with mature forest.
- **Snags and coarse woody debris.** The proposed activities could reduce the availability of snags and coarse woody debris and increase human access for firewood harvesting, which could adversely affect the quality of wildlife habitat.
- **Canada lynx.** The proposed activities could reduce landscape connectivity and the availability of suitable Canada lynx habitat, reducing the capacity of the area to support Canada lynx.
- **Fishers.** The proposed activities could reduce the availability and connectivity of suitable fisher habitat and increase human access, which could reduce fisher habitat suitability and increase trapping mortality.
- **Gray wolves.** The proposed activities could disturb gray wolves and reduce winter range habitat quality for big game, which could displace gray wolves from denning and rendezvous sites and reduce prey availability.
- **Pileated woodpeckers.** The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers.
- **Big game winter range.** The proposed activities could reduce cover, which could reduce the quality of big game winter range habitat.

## ANALYSIS AREAS

*Direct and Indirect Effects*

The direct and indirect effects of the proposed activities on all species/issues were analyzed within the project area (FIGURE W-1 –ANALYSIS AREAS), which consists of 635 acres of DNRC-managed lands in Section 16 T28N, R29W.

*Cumulative Effects*

The cumulative effects of the proposed activities on all species/issues were analyzed at a broad surrounding landscape scale that varies according to the issue or wildlife species being discussed. Cumulative effects analysis areas are named according to the size of the area and are summarized in TABLE W-1 –ANALYSIS AREAS and FIGURE W-1 –ANALYSIS AREAS. Cumulative effects analysis areas (CEAAs) include the project area as well as lands managed by other agencies and private landowners. Detailed descriptions of each analysis area are located in the **Existing Condition** section for each issue or species evaluated.

**TABLE W-1. ANALYSIS AREAS.** Descriptions of the project area and cumulative effects analysis areas.

| ANALYSIS AREA NAME | DESCRIPTION | TOTAL ACRES | ISSUE(S)/SPECIES ANALYZED |
|---|---|---|---|
| Project Area | DNRC managed lands in Section 16 T28N, R29W. | 635 | direct & indirect effects for all issues/species |
| Medium CEAA | Portions of the Middle Fisher River Subwatershed including the Harris Creek watershed and portions of the Leckrone Creek and Brush Creek watersheds | 8,332 | mature forest cover & connectivity, snags & coarse-woody debris, pileated woodpeckers |
| Large CEAA | The Middle Fisher River Subwatershed | 26,457 | Canada lynx, fishers, gray wolves, big game winter range |

## ANALYSIS METHODS

Analysis methods are based on DNRC State Forest Land Management Rules, which are designed to promote biodiversity. The primary basis for this analysis included information obtained by: field visits, review of scientific literature, Montana Natural Heritage Program (MNHP) data queries, DNRC Stand Level Inventory (SLI) data analysis, aerial photograph analysis, and consultation with wildlife professionals. The coarse-filter wildlife analysis section includes analyses of the direct, indirect, and cumulative effects of the proposed alternatives on old-growth, connectivity of mature forest habitats, and snags and coarse woody debris. However, old-growth occurs in the project area, but would not be affected by the proposed activities so the issue will not be discussed further. In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species federally listed under the Endangered Species Act, species listed as sensitive by DNRC, and species managed as big game by DFWP.

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

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

| Sale Name | Agency | Sale Date/Status | Project Area | Medium CEAA | Large CEAA |
|---|---|---|---|---|---|
| Six Hills Timber Sale | DNRC | 2010/Ongoing | 188 | 188 | 618 |

Changes to forest structure resulting from the Six Hills Timber Sale have been accounted for in existing conditions will be discussed in cumulative effects analyses. Timber harvest is complete and the project is

expected to be completed in spring 2013 following the completion of site preparation (excavator piling). Timber sales that occurred on other ownerships are accounted for in analyses of aerial photographs.

## RELEVANT AGREEMENTS, LAWS, PLANS, RULES, AND REGULATIONS

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

## COARSE-FILTER WILDLIFE ANALYSIS

### *MATURE FOREST COVER AND CONNECTIVITY*

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

**Introduction**

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

**Analysis Areas**

The analysis area for direct and indirect effects is the 635-acre project area (FIGURE W-1 –ANALYSIS AREAS). The analysis area for cumulative effects is the 8,332-acre medium CEAA described in TABLE W-1 –ANALYSIS AREAS (FIGURE W-1 –ANALYSIS AREAS). The medium CEAA is defined by geographic features including ridgelines and streams and represents an area large enough to support a diversity of species that use mature forest habitat and/or require connected forest habitat.

**Analysis Methods**

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

mature forested habitat (≥40% canopy cover, trees >9 inches dbh average), 3) open and restricted road density, and 4) the availability of potential travel corridors.

**Existing Conditions**

*Mature Forested Habitats and Connectivity*

The project area currently contains approximately 455 acres of mature stands composed primarily of Douglas-fir and larch stands (TABLE W-3 –MATURE FOREST). The mature forested habitat is a part of one large connected patch and connectivity across the project area is high (FIGURE W-1 –ANALYSIS AREAS). The majority of the stands are well stocked (70-100% canopy cover) and likely provide suitable habitat for species requiring connected and/or mature forested habitat. The remaining 180 acres in the analysis area consist of 141 acres of recently harvested stands with <40% canopy cover and 39 acres of young lodgepole and larch stands located in the northern portion of the project area. The project area does not occur in any particular area of documented importance for habitat connectivity; however, riparian habitat in the project area associated with Harris Creek likely facilitates wildlife movements between the project area and adjacent stands of mature forested habitat. The network of restricted roads in the project area has somewhat reduced some landscape connectivity (2.9 miles/square mile), however, no open roads occur in the project area.

The medium CEAA contains 3,076 acres (36.9% of CEAA) of mature stands with ≥40% canopy cover (>9 inches dbh average) (TABLE W-3 –MATURE FOREST). The remaining acres in the medium CEAA consist primarily of young regenerating stands as well as mature stands that contain <40% canopy cover due to the history of timber harvest on private lands. Connectivity of mature forested habitat is moderate with patches of mature forested habitat facilitating travel throughout the drainages in the medium CEAA (FIGURE W-1 –ANALYSIS AREAS). Across the analysis area, riparian areas associated with Harris Creek, Brush Creek, Leckrone Creek, and additional smaller streams provide wildlife travel corridors. The network of open roads has reduced some landscape connectivity. Open road density in the medium CEAA is low (0.7 miles/square mile) and total road density is high (6.6 miles/square mile).

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

| ANALYSIS AREA | AVERAGE PATCH SIZE | | TOTAL ACRES OF MATURE FOREST | |
|---|---|---|---|---|
| | Existing | Post-harvest | Existing | Post-harvest |
| Project Area -- 635 Acres (% of area) | 455 | 17 | 455 (71.6%) | 48 (7.6%) |
| Medium CEAA –8,332Acres (% of area) | 89 | 65 | 3,076 (36.9%) | 2,669 (32.0%) |

**Environmental Effects**

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

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

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

The proposed activities would occur in 414 (91.0%) of the 455 acres of mature stands available in the project area. The treatments proposed for 407 of these acres would reduce canopy cover to approximately 2-10% and these areas would not provide mature forested habitat post-harvest. Approximately 7 acres of mature forest would be treated with a partial cut, but this area would continue providing mature forested habitat post-harvest. Approximately 2.5 miles of roads that would be restricted following their use are proposed for construction, which may reduce connectivity. Patch size and connectivity of upland mature canopy forest within the proposed project area would be reduced, but a 300-foot wide travel corridor would remain along Harris Creek facilitating travel between the Fisher River and USFS lands located in the Swamp Creek drainage. Thus, since: 1) the abundance of mature forested habitat would decrease by 407 acres (89.5% of existing mature forest); 2) average patch size of mature forested habitat would decrease by 438 acres; 3) approximately 2.5 miles of restricted roads are proposed for construction; 4) stand density would decrease on 7 acres, but this area would continue providing mature forested habitat post-harvest; and 5) connectivity would be reduced, but riparian harvest would not occur and a 300-foot wide travel corridor along Harris Creek would be retained; moderate-to-high adverse direct or indirect effects to mature forested habitat abundance, suitability, or connectivity would be anticipated as a result of the Action Alternative.

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

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

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

The proposed activities would affect 414 acres of the 3,076 acres (13.5%) of mature forested habitat available in the medium CEAA (TABLE W-3 –MATURE FOREST). The proposed activities would open the timber stands in 407 of these acres to <40% canopy cover and the average patch size of mature forested habitat would be reduced from 89 to 65 acres. Stand density would be reduced in 7 acres, but this area would continue providing mature forested habitat post-harvest. Additionally, 2.5 miles of restricted roads are proposed, potentially reducing connectivity. Reductions in the availability of suitable

mature forested habitat would be additive to harvest activities that are proposed or ongoing in the medium CEAA, including the DNRC Six Hills Timber Sale, which is ongoing in the project area. The Six Hills Timber Sale affected 141 acres of mature forested habitat. However a 300-foot wide travel corridor would be retained along Harris Creek, which would facilitate travel of wildlife in the Harris Creek Drainage. Overall, connectivity of upland mature forest within the medium CEAA would be reduced. Thus, since: 1) the abundance of mature forested habitat in the medium CEAA would decrease by 407 acres (13.2%); 2) average patch size of mature forested habitat would decrease by 24 acres; 3) 2.5 miles of restricted roads are proposed for construction; and 4) Stand density would be reduced in 7 acres of mature forested habitat; 5) connectivity would be reduced, but riparian habitat would not be harvested and a 300-foot wide travel corridor would be retained along Harris Creek; moderate adverse cumulative effects to mature forested habitat abundance, suitability, or connectivity would be anticipated as a result of the Action Alternative.

### *SNAGS AND COARSE WOODY DEBRIS*

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

#### Introduction

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

#### Analysis Areas

The analysis area for direct and indirect effects is the 635-acre project area (FIGURE W-1 –ANALYSIS AREAS). The analysis area for cumulative effects is the 8,332-acre medium CEAA described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The medium CEAA is defined by geographic features and represents an area large enough to support a diversity of species that use coarse woody debris and snags.

#### Analysis Methods

The abundance of snags and coarse-woody debris was quantitatively estimated in the project area using 11 systematically-placed fixed plots (each 100 feet x 66 feet). Coarse-woody debris tons/acre was estimated for material ≥3 in diameter where it intersected the 100-ft transect line according to methods described by Brown (*1974*). Snags per acre were estimated by recording all snags ≥8 in dbh and ≥6 ft tall

located within in each plot. Factors considered in the analysis include: 1) the level of harvesting, 2) availability of snags and coarse woody debris, and 3) risk of firewood harvesting.

**Existing Conditions**

*Snags and Coarse Woody Debris*

During field assessments, 16 snags/acre ≥ 8 inches dbh were observed (range: 0-40 snags/acre) and 6 snags ≥21 inches dbh occurred within study plots. Wildlife use of snags was observed throughout the project area. The majority of snags observed were Douglas-fir, western larch, and grand fir snags. Coarse woody debris levels ranged from 2 to 31 tons/acre across the project area and averaged 14 tons/acre. The project area is at a low risk of firewood harvesting due to the absence of open roads.

In the medium CEAA, snag and coarse woody debris levels on surrounding parcels vary widely depending on motorized access, harvest history, and natural disturbance history. Snag and coarse woody debris levels are likely limited due to the level of timber harvest that has occurred on private lands (85.8% of medium CEAA). Snags and coarse woody debris are collected for firewood in the medium CEAA; however there are few open roads in the medium CEAA providing limited access for firewood cutting (0.7 miles/square mile open road density, 6.6 miles/square mile total road density).

**Environmental Effects**

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

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

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

Some existing snags and snag recruits would be removed from 414 acres (65.6% of project area) due to timber felling operations. Additional recruitment trees and snags may also be lost following timber harvest due to wind throw. Given operability and human safety constraints, existing non-merchantable snags would be left standing where possible. Across the project area, at least 2 large snags and 2 large recruitment trees (>21 inches dbh) per acre would be retained within DNRC harvest units (*ARM 36.11.411*). If such large trees and snags are absent, the largest available snags and/or recruitment trees would be retained. Additionally, 10-20 tons/acre of coarse woody debris would be retained (*ARM 26.11.414*). Firewood cutting risk in the project area would not change following the proposed harvest because no additional open roads are proposed for construction. Thus, since: 1) the proposed actions would remove some snags and influence the amount of coarse woody debris on 414 acres (65.6% project area), 2) accessibility for firewood harvesting would not change, and 3) snags and coarse woody debris would be retained to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*), moderate adverse direct and indirect effects to snags and coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the Action Alternative.

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

None of the proposed forest management activities would occur. No changes in the availability of snags and coarse woody debris would be expected. Existing snags would continue to provide habitat

attributes, and new snags would be recruited as trees die. Ongoing and proposed forest management activities may affect the availability of snags and coarse woody debris in the medium CEAA; however, no changes would be expected within the project area under the No-Action alternative. Thus, since: 1) no timber harvesting on DNRC lands would alter present or future snag or coarse woody debris abundance, and 2) no changes to human access for firewood harvesting would occur, no cumulative effects to snags and coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the No-Action Alternative.

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

Some existing snags and snag recruits would be removed from the 414 acres (4.7% of medium CEAA) proposed for harvest within the medium CEAA, but retention measures would apply (*ARM 36.11.411, ARM 26.11.414*). Reductions in the availability of coarse woody debris and snags would be additive to forest management activities occurring in the CEAA (see **ANALYSIS METHODS** section of the Introduction for a detailed description of recent projects). The DNRC Six Hills Timber Sale, which occurred in the project area, affected 188 acres (6.9% of medium CEAA total), but is expected to have minor effects on snags and coarse woody debris. Firewood cutting risk in the medium CEAA would not change due to DNRC activities under the Action Alternative because no open roads are proposed for construction. Thus, since: 1) proposed actions would be additive to the DNRC Six Hills Timber Sale and would affect a total of 605 acres (6.9% of medium CEAA); 2) accessibility for firewood harvesting would not change; and 3) snags and coarse woody debris would be retained in amounts required to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*); minor cumulative effects to snags and coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the Action Alternative.

## FINE-FILTER WILDLIFE ANALYSIS

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

| SPECIES/HABITAT | EFFECTS ASSESSMENT |
|---|---|
| THREATENED & ENDANGERED SPECIES | |
| Canada lynx (*Felis lynx*)<br><br>Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zones | ***Detailed Analysis Provided Below*** – The project area contains approximately 505 acres of suitable lynx habitat. |

| | |
|---|---|
| Grizzly bear (*Ursus arctos*)<br><br>Habitat: Recovery areas, security from human activity | The project area is located 4 miles outside of grizzly bear non-recovery occupied habitat associated with the Cabinet-Yaak Ecosystem (*Wittinger* 2002). A few grizzly bear sightings have been documented in this area, but based on radio-telemetry and genetic sampling data (*Kasworm et al. 2011*), the majority of grizzly bear activity occurs outside of the project area west of highway 2. Additionally, the area is located outside of important linkage zones between grizzly bear recovery zones (*Servheen et al. 2003*). Thus considering that the area is located outside of linkage zones, and bear use of the area is infrequent and located outside of recovery and non-recovery occupied habitat, negligible direct, indirect, or cumulative effects to grizzly bears would be expected to occur as a result of either alternative. |
| SENSITIVE SPECIES | |
| Bald eagles (*Haliaeetus leucocephalus*)<br><br>Habitat: Late-successional forest less than 1 mile from open water | No bald eagle nests occur in the vicinity of the project area and no large water bodies occur within 1 mile of the project area. Thus no direct, indirect, or cumulative effects to bald eagles would be anticipated. |
| Black-backed woodpeckers (*Picoides arcticus*)<br><br>Habitat: Mature to old burned or beetle-infested forest | No recently (<5 years) burned areas occur within 0.25 miles of the project area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative. |
| Coeur d'Alene salamanders (*Plethodon idahoensis*)<br><br>Habitat: Waterfall spray zones, talus near cascading streams | No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative. |
| Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*)<br><br>Habitat: Grassland, shrubland, riparian, agriculture | No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative. |

| | |
|---|---|
| Common loons (*Gavia immer*)<br><br>Habitat: Cold mountain lakes, nest in emergent vegetation | No suitable lake habitat occurs within 500 feet of the project area. Thus, no direct, indirect, or cumulative effects to common loons would be expected to occur as a result of either alternative. |
| Fishers (*Martes pennanti*)<br><br>Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian | ***Detailed Analysis Provided Below*** – Approximately 340 acres of suitable fisher habitat occur within the project area. |
| Flammulated owls (*Otus flammeolus*)<br><br>Habitat: Late-successional ponderosa pine and Douglas-fir forest | Approximately 83 acres of flammulated owl habitat types occur in the project area. However, only 4 acres would be affected by the proposed activities. Thus, given the small amount of preferred flammulated owl habitat types that would be affected by the activities, negligible direct, indirect, or cumulative effect to flammulated owls are anticipated. |
| Gray wolves (*Canis lupus*)<br><br>Habitat: Ample big game populations, security from human activities | ***Detailed Analysis Provided Below*** – The 2011 home range of the Satire Pack coincides with the project area (*MFWP wolf pack data, 2012*). |
| Harlequin ducks (*Histrionicus histrionicus*)<br><br>Habitat: White-water streams, boulder and cobble substrates | Harris Creek occurs in the project area. However this stream does not contain suitable structure for harlequin duck use and harlequin ducks have not been documented within 2 miles of the project area (*MNHP data, Dec. 27, 2012*). Thus, no direct, indirect and cumulative effects to harlequin ducks would be anticipated. |
| Northern bog lemmings (*Synaptomys borealis*)<br><br>Habitat: Sphagnum meadows, bogs, fens with thick moss mats | Potentially suitable wetlands do not occur in the vicinity of the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative. |
| Peregrine falcons (*Falco peregrinus*)<br><br>Habitat: Cliff features near open foraging areas and/or wetlands | Suitable cliffs/rock outcrops for nest sites were not observed in the project area or within 0.5 miles of the project area. Additionally, peregrine eyries have not been documented in the vicinity of the project area (*MNHP data, Dec. 27, 2012*). Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative. |

| | |
|---|---|
| Pileated woodpeckers (*Dryocopus pileatus*)<br><br>Habitat: Late-successional ponderosa pine and larch-fir forest | ***Detailed Analysis Provided Below*** – Approximately 273 acres of pileated woodpecker habitat occur in the project area. |
| Townsend's big-eared bats (*Plecotus townsendii*)<br><br>Habitat: Caves, caverns, old mines | No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats would be expected to occur as a result of either alternative. |
| BIG GAME | |
| Elk (*Cervus canadensis*) | ***Detailed Analysis Provided Below*** – The project area contains potential elk, mule deer, and white-tailed deer winter range habitat as identified by DFWP (*2008*). |
| Mule Deer (*Odocoileus hemionus*) | |
| White-tailed Deer (*Odocoileus virginianus*) | |

## THREATENED AND ENDANGERED SPECIES

### *CANADA LYNX*

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

**Introduction**

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

**Analysis Areas**

The analysis area for direct and indirect effects is the 635-acre project area (FIGURE W-1 –ANALYSIS AREAS). The analysis area for cumulative effects is the, 26,457-acre large CEAA described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The large CEAA approximates the size of a lynx home range, is centered on the project area, and is defined according to geographic features (i.e., ridgelines), which are likely to influence movements of Canada lynx in the vicinity of the project area. Thus, this defined area provides a reasonable analysis area for Canada lynx that could be influenced by project-related activities.

**Analysis Methods**

Analysis methods include field evaluations, aerial photograph interpretation, and GIS analysis of SLI data and suitable lynx habitats. Lynx habitat was subdivided into the following lynx habitat classes: 1) winter foraging, 2) summer foraging, 3) other suitable, and 4) temporary non-habitat. Lynx habitat was classified according to DNRC's lynx habitat mapping protocols (*USFWS and DNRC 2010*) based upon a variety of vegetation characteristics important to lynx and snowshoe hares (i.e., forest habitat type, canopy cover, stand age class, stems/acre, etc.). Other suitable lynx habitat is defined as habitat that has the potential to provide connectivity and lower quality foraging habitat, but does not contain the necessary attributes to be classified as winter or summer foraging habitat classes. The temporary non-habitat category consists of forested stands that are comprised of forest types preferred by lynx, but are not likely to be used by lynx until suitable horizontal cover develops. On non-DNRC lands, data identifying lynx suitable habitat are not readily available. Therefore, for the purpose of this analysis, the stands considered most likely to provide suitable habitat for lynx were mature forest stands (≥40% canopy cover, >9 inches dbh average) below 6,000 feet elevation. Factors considered in the analysis include: 1) the level of harvesting, 2) the availability of lynx habitat within the various classes, and 3) landscape connectivity.

**Existing Conditions**

*Canada Lynx*

The project area contains 505 acres of suitable lynx habitat (TABLE W-5 –LYNX HABITAT). The remaining 83 acres consist of stands that are dry Douglas-fir forest types that are not considered to provide lynx habitat, as well as 47 acres that do not contain adequate canopy cover due to the Six Hills Timber Sale. Riparian habitat associated with Harris Creek in the project area likely provides habitat connectivity for lynx traveling between drainages (see ***MATURE FORESTED COVER AND CONNECTIVITY*** in the coarse filter analysis section for further information). Lynx habitat in the project area occurs in continuous patches and connectivity across the project area is high.

The large CEAA contains a total of 10,292 acres of suitable lynx habitats (38.9% of large CEAA), including 505 acres on DNRC-managed lands (TABLE W-5 –LYNX HABITAT) and 9,787acres on other ownerships. The remaining 16,165 acres in the analysis area consists primarily of stands that do not contain structure necessary for lynx use. The large CEAA contains enough potentially suitable habitat to support a lynx (*Ruedinger et al. 2000*), however, the area is not known to currently support lynx (*MNHP data, 2012*). In the vicinity of the project area and in surrounding lands, connectivity of lynx habitats is moderate and travel in most of the drainages is likely possible considering the distribution of habitat patches (see ***MATURE FORESTED COVER AND CONNECTIVITY*** in the coarse filter analysis section for further information).

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

| LYNX HABITAT CATEGORY | ACRES OF LYNX HABITAT (percent of total potential DNRC lynx habitat) | |
|---|---|---|
| | Project Area | |
| | Existing | Post-Harvest |

| | | |
|---|---|---|
| Summer Foraging | 39 (7.1%) | 0 (0%) |
| Winter Foraging | 369 (66.8%) | 50 (9.0%) |
| Other Suitable | 97 (17.5%) | 71 (9.9%) |
| Temporary non-habitat | 47 (8.5%) | 432 (78.2%) |
| ***Grand Total - Suitable Lynx Habitat[b]*** | **505 (91.5%)** | **121 (21.9%)** |

[a]*Total potential lynx habitat describes all areas that contain appropriate forest habitat types for lynx (i.e., sum of summer foraging, winter foraging, other suitable, and temporary non-suitable lynx habitat classes).*
[b]*Total suitable lynx habitat describes all lynx habitat categories that contain structural attributes necessary for lynx use (i.e., sum of summer foraging, winter foraging, other suitable lynx habitat classes).*

**Environmental Effects**

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

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

*Direct and Indirect Effects of the Action Alternative on Canada Lynx*

The proposed activities would affect 410 acres (81.2%) of the 505 acres of suitable lynx habitat available in the project area (TABLE W-5 –LYNX HABITAT). After harvest, 385 of these acres would be reclassified as temporary non-suitable habitat due to lack of canopy cover in the understory and overstory. Approximately 7 acres of lynx winter foraging habitat located along Harris Creek would remain classified as winter foraging habitat post-harvest. Additionally, 19 acres of summer foraging habitat would be considered suitable for lynx use post-harvest, but would be reclassified as other suitable habitat post-harvest. To ensure that forest structural attributes preferred by snowshoe hares remain following harvest, dense patches of advanced regeneration would be retained where they occur, especially within existing lynx winter foraging habitat. In areas that would be burned post-harvest, advanced regeneration would be retained on the edge of the unit and in drainages when possible. Additionally, 10-20 tons/acre of coarse woody debris would be retained (*ARM 36.11.414)* and retention of downed logs ≥15 inch diameter would be emphasized. Lynx habitat connectivity would be reduced due to the transition of 385 acres of suitable lynx habitat to temporary non-suitable habitat. However, connectivity across the parcel would be retained along a 300-foot wide travel corridor centered on Harris Creek. This travel corridor would facilitate travel between the Fisher River and USFS lands located in the Swamp Creek drainage located west of the analysis area. If present in the vicinity of the project area, lynx could be temporarily displaced by forest management activities for up to 3 years due to disturbance caused by motorized activities. Thus, since: 1) lynx suitable habitat availability would be reduced by 385 acres (76.2% of suitable habitat in the project area); 2) harvest would reduce canopy cover within an additional 25 acres (5.0% of suitable habitat in the project area), but these areas would remain suitable for lynx post-harvest;

3) patches of advanced regeneration would be retained where feasible, especially in winter foraging habitat; and 4) landscape connectivity would be reduced, but a 300-foot wide travel corridor would be retained along Harris Creek; moderate adverse direct and indirect effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the Action Alternative.

*Cumulative Effects of the No-Action Alternative on Canada Lynx*

None of the proposed forest management activities would occur. Ongoing and proposed forest management activities may change the availability of suitable lynx habitats and landscape connectivity in the CEAA; however, no additional cumulative effects that would influence the availability of suitable lynx habitats and landscape connectivity are expected under the No-Action alternative. Thus, since: 1) no changes to lynx habitat would occur, and 2) no changes to landscape connectivity would occur on DNRC lands, no cumulative effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the No-Action Alternative.

*Cumulative Effects of the Action Alternative on Canada Lynx*

The proposed activities would affect 410 acres (4.0%) of the 10,292 acres of suitable lynx habitats available in the large CEAA. After harvest, 385 acres of suitable lynx habitat would be reclassified as temporary non-suitable habitat due to lack of canopy cover in the understory and overstory. Canopy cover would be reduced within an additional 25 acres, but these areas would remain suitable habitat post-harvest. Dense patches of advanced regeneration would be retained where possible, especially within lynx winter foraging habitat. Additionally, 10-20 tons/acre of coarse woody debris would be retained (*ARM 36.11.414)* and retention of downed logs ≥15 inch diameter would be emphasized. Lynx habitat connectivity would be reduced due to the transition of 385 acres of suitable lynx habitat to temporary non-suitable habitat. However, a 300-foot wide travel corridor centered on Harris Creek would be retained to facilitate lynx travel between drainages. Changes to lynx suitable habitat availability and habitat connectivity would be additive to the Six Hills Timber Sale which occurred within the project area. The Six Hills Timber Sale affected approximately 108 acres of suitable lynx habitat, 56 of these acres are anticipated to be unsuitable for Canada lynx use. Lynx could be temporarily displaced by forest management activities associated with the Harris Creek Timber Sale for up to 3 years in addition to displacement that occurred in association with the Six Hills Timber Sale. Thus, since: 1) lynx suitable habitat availability would be reduced by 385 acres (3.7% of potentially suitable lynx habitat in the large CEAA); 2) logging would reduce canopy cover within an additional 25 acres (0.2% of suitable habitat in the large CEAA), but these areas would remain suitable for lynx post-harvest; 3) patches of advanced regeneration and shade-tolerant understory trees would be retained where feasible, especially in winter foraging habitat; and 4) connectivity of lynx habitat between drainages would be maintained along a 300-ft wide corridor centered on Harris Creek; minor adverse cumulative effects to Canada lynx associated with landscape connectivity and suitable habitat type availability would be anticipated as a result of the Action Alternative.

## SENSITIVE SPECIES

### *FISHERS*

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

**Introduction**

In the Rocky Mountains, fishers prefer late-successional moist coniferous forests (*Jones 1991*) and prey upon snowshoe hares, ungulate carrion, and small mammals (*Roy 1991*). Preferred fisher habitat typically contains large live trees, snags, and logs, which are used for resting and denning sites, and dense canopy cover, which is important for snow intercept (*Jones 1991*). Fishers generally avoid large openings in canopy cover, non-forested habitats, and shrub-seedling stands. Forest management considerations for fishers involve providing upland and riparian resting and denning habitats, maintaining a network of travel corridors, and reducing trapping risk associated with motorized access.

**Analysis Areas**

The analysis area for direct and indirect effects is the 635-acre project area (FIGURE W-1 –ANALYSIS AREAS). The analysis area for cumulative effects is the 26,457-acre large CEAA described in TABLE W-I –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The large CEAA is centered on the project area and approximates the home range of a fisher. The CEAA is defined according to geographic features (i.e., ridgelines), which are likely to influence movements of fishers in the vicinity of the project area, and it provides a reasonable analysis area for fishers that could be influenced by project-related activities.

**Analysis Methods**

Analysis methods include field evaluations, aerial photograph interpretation, and GIS analysis of travel corridors, preferred fisher cover types (*ARM 36.11.403(60)*), and habitat structure. Fisher habitat classifications considered in the analysis include: 1) upland fisher habitat, and 2) riparian fisher habitat, which are defined according to proximity of the area to streams. Riparian fisher habitat is located within 100 feet of Class 1 streams or within 50 feet of Class 2 streams (*ARM 36.11.440(b)*). The remaining fisher habitat is considered upland fisher habitat. Habitat structure considered appropriate for fisher use includes stands of sawtimber size class trees (≥9 inches dbh) with 40-100% crown density. Potential fisher habitat (riparian, upland) on other ownerships was identified by examining mature forested habitat below 6,000 feet elevation, and the proximity of mature forested habitat to perennial and intermittent streams. Factors considered in the analysis include: 1) the degree of harvesting, 2) availability and structure of preferred fisher habitats (upland, riparian), 3) landscape connectivity, and 4) human access.

**Existing Conditions**

*Fishers*

The project area contains 340 acres of fisher habitat (53.5% of project area), including 28 acres of fisher riparian habitat. The remaining acres in the project area consist of 172 acres of stands that are not considered suitable forest types for fisher use, and 123 acres of stands that are considered suitable forest types for fisher, but do not contain adequate structure for fisher use (sawtimber size class trees with 40-100% crown density). Suitable fisher habitat is continuous within the project area and mature forested habitat is present on 71.6% of the project area; thus connectivity within the project area is high. Riparian habitat associated with Harris Creek likely provides a suitable travel corridor. Open roads do not occur in the project area and total road density is 2.9 miles/square mile, thus there is a low level of access that could facilitate trapping.

The large CEAA contains approximately 10,126 acres of fisher habitat (38.3% of analysis area), including 340 acres of suitable fisher habitat on DNRC-managed lands and an additional 9,786 acres of mature forested habitat on other ownerships located below 6,000 feet elevation, which are likely to provide suitable fisher habitat. Of these acres of potential fisher habitat, approximately 579 acres are riparian

fisher habitat. The remaining 16,331 acres in the large CEAA consist primarily of young regenerating stands located on privately-owned lands as well as mature stands with <40% canopy cover. Fisher habitat exists in moderately sized connected patches throughout the large CEAA with the majority of potential fisher habitat located along tributaries to the Fisher River and on USFS lands. Habitat patches in the CEAA ranged from 2-1,849 acres and averaged 94 acres. The density of open roads is 0.7 miles/square mile and total road density is 6.6 miles/square mile, thus there is a moderate level of access that could facilitate trapping.

**Environmental Effects**

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

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

*Direct and Indirect Effects of the Action Alternative on Fishers*

The proposed activities would affect 297 acres (87.3%) of the 340 acres of suitable fisher habitat present in the project area. Canopy cover would be reduced to 2-10% in 290 of these acres, thus the structure would be expected to become unsuitable for fishers. The remaining 7 acres would be treated with a partial cut and would remain suitable for fisher use post-harvest due to retention of >40% canopy cover. Riparian fisher habitat would not be harvested. The availability of some important habitat characteristics (i.e., snags, coarse woody debris) could be reduced by harvest activities; although retention of dead material and live snag recruitment trees would meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*). Approximately 2.5 miles of restricted roads are proposed for construction, thus trapping risk associated with human access would potentially increase. However, no open roads are proposed for construction. Connectivity of mature forested habitats suitable for fisher use would be expected to decrease under the Action Alternative, although a 300-foot wide travel corridor associated with Harris Creek would remain, facilitating fisher travel in this drainage. If present in the vicinity of the project area, fishers could be disturbed and temporarily displaced by forest management activities for up 3 years. Thus, since: 1) habitat availability would be reduced by 290 acres (85.3% of suitable fisher habitat), but some snags and coarse woody debris would be retained (*ARM 36.11.411, ARM 26.11.414);* 2) harvest would reduce canopy cover within an additional 7 acres (2.0% of suitable habitat), but this area would remain suitable for fishers post-harvest; 3) riparian fisher habitat would not be harvested; 4) landscape connectivity would be reduced, but a 300-foot wide connectivity corridor would be retained along Harris Creek; and 5) approximately 2.5 miles of restricted roads would be constructed, but open road density would not change; moderate adverse direct and indirect effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the Action Alternative.

*Cumulative Effects of the No-Action Alternative on Fishers*

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

human access would occur that would facilitate trapping, no cumulative effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the No-Action Alternative.

*Cumulative Effects of the Action Alternative on Fishers*

The proposed activities would affect 297 acres (2.9%) of the 10,126 acres of potential fisher habitat available in the large CEAA. The proposed activities would change the structure of these habitats, reducing canopy cover to 2-10% in 290 of these acres and to 40-50% in 7 acres. Riparian fisher habitat would not be harvested. The availability of some important habitat characteristics (i.e., snags, coarse woody debris) could be reduced by harvest activities; although retention of some dead material and live snag recruitment trees would be required to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*). Approximately 2.5 miles of restricted roads would be constructed, increasing trapping risk. Any adverse affects to fisher would be additive to any proposed or ongoing sales in the large CEAA, including the DNRC Six Hills Timber Sale, which recently occurred in the project area. The Six Hills Timber Sale reduced suitable fisher habitat on approximately 105 acres. Connectivity of fisher habitats would be reduced following these timber sales, but a 300-foot wide connectivity corridor would be retained along Harris Creek. If present in the vicinity of the project area, fishers could be temporarily displaced by forest management activities associated with the proposed Harris Creek Timber Sale for up to 3 years, in addition to displacement that may have occurred in association with the Six Hills Timber Sale. Thus, since: 1) habitat availability would decrease by 290 acres (2.9% of suitable habitat), but snags and coarse woody debris would be retained (*ARM 36.11.411, ARM 26.11.414);* 2) harvest would reduce canopy cover within an additional 7 acres (0.1% of suitable habitat), but this area would remain suitable for fishers post-harvest; 3) riparian fisher habitat harvest would not occur; 4) connectivity would be reduced, but a 300-foot wide connectivity corridor would remain along Harris Creek following the completion of the Harris Creek and Six Hills Timber Sales; and 5) approximately 2.5 miles of restricted roads would be constructed, but no changes in open road density would occur; minor adverse cumulative effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the Action Alternative.

### *GRAY WOLVES*

> ***Issue:*** *The proposed activities could disturb gray wolves and reduce winter range habitat quality for big game, which could displace gray wolves from denning and rendezvous sites, and reduce prey availability.*

**Introduction**

Wolves are wide-ranging opportunistic carnivores that prey on ungulates. In general, wolf densities are positively correlated to prey densities (*Fuller et al. 1992*). Wolves prey primarily on white-tailed deer, and, to a lesser extent, elk and moose, in northwest Montana (*Kunkel et al. 1999*). However, some studies have shown that wolves may prey upon elk more frequently during certain portions of the year (particularly winter) or in areas where elk numbers are higher (*Arjo et al. 2002, Kunkel et al. 2004, Garrott et al. 2006*). Thus, reductions in big game numbers and/or winter range productivity could be indirectly detrimental to wolf populations. Forest management considerations for wolves include restricting disturbance near den and rendezvous sites and promoting habitat characteristics necessary for healthy big game populations.

**Analysis Areas**

The analysis area for direct and indirect effects is the 635-acre project area (FIGURE W-1 –ANALYSIS AREAS). The analysis area for cumulative effects is the 26,457-acre large CEAA described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The large CEAA is centered on

the project area, defined according to geographic features (i.e., ridgelines), and provides a reasonable analysis area for wolves that could be influenced by project-related activities.

**Analysis Methods**

Analysis methods include field evaluation, aerial photograph interpretation, and GIS analysis of available habitats. Factors considered in the analysis include: 1) the degree of harvesting, 2) the location of any known den or rendezvous sites, and 3) big game winter range habitat characteristics.

**Existing Conditions**

*Gray Wolves*

The project area is located the within 2011 home range of the Satire Pack (*DFWP 2012*). No wolf rendezvous sites or den sites have been documented within 1 mile of the proposed harvest units (*K. Laudon, DFWP, wolf management specialist, pers. comm., Oct. 1, 2012*); however, wolf use of the area could occur at any time. The entire project area provides winter range for elk, moose, mule deer, and white-tailed deer as described by DFWP (TABLE W-6 BIG GAME, *DFWP 2008*). Although little winter browsing activity was observed in the project area, game trails, tracks, and pellets were observed, and the project area likely provides habitat for prey species, should wolves use the area.

The entire large CEAA is considered a portion of the 2011 home range of the Satire Creek Pack (16.3% of home range). Portions of the CEAA are identified as elk, moose, mule deer, and white-tailed deer winter range by DFWP (TABLE W-6 BIG GAME, DFWP 2008). Winter Range habitat in the large CEAA is centered on the Fisher River.

**Environmental Effects**

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

None of the proposed forest management activities would occur. Wolves would not be disturbed by forest management activities and big game winter range in the project area would remain intact. Thus, since: 1) no disturbance to wolf den or rendezvous sites would occur, and 2) no change in big game winter range habitat characteristics would occur, no direct or indirect effects to wolves associated with displacement or changes in prey availability would be anticipated as a result of the No-Action Alternative.

*Direct and Indirect Effects of the Action Alternative on Gray Wolves*

The proposed activities would occur in 65.2% of the Satire Creek Pack home range present in the project area. The proposed activities would affect winter range for elk, moose, mule deer, and white-tailed deer as identified by DFWP (TABLE W-6 –BIG GAME). Moose are fairly tolerant of winter conditions due to their large body size and the proposed activities are not expected to adversely affect moose. The proposed activities would reduce canopy cover from ≥40% to 2-10% on 407 acres of the 455 acres of mature forested habitat currently providing thermal cover. An additional 7 acres would be treated with a partial cut and would retain >40% canopy cover post-harvest. There are no known wolf rendezvous or den sites in the project area. However, if documented in the vicinity of the project area, mechanized activities would be restricted within 1 mile of wolf dens (*ARM 33.11.430(1)(a)*) and 0.5 miles of wolf rendezvous sites (*ARM 33.11.430(1)(b)*). Wolf use of the area is possible, and if present in the vicinity of the project area, wolves could be displaced by forest management activities for up to 3 years. Thus, since: 1) wolf den or rendezvous sites do not occur within the vicinity of the project area, but restrictions would apply if either are encountered during operations (*ARM 33.11.430(1)(a)(b)*); and 2) canopy cover would be

remove and is anticipated to have a moderate adverse impact on local big game populations; moderate adverse direct and indirect effects to wolves associated with displacement or changes in prey availability would be anticipated as a result of the Action Alternative.

*Cumulative Effects of the No-Action Alternative on Gray Wolves*

None of the proposed forest management activities would occur. Wolves would not be disturbed by forest management activities on DNRC lands. Big game winter range availability in the project area would not change, but may change on other ownerships outside the project area due to other potential proposed and ongoing projects. Thus, since: 1) no disturbance to wolf den or rendezvous sites would occur and 2) no change in big game winter range habitat characteristics would occur, no direct or indirect effects to wolves associated with displacement or changes in prey availability would be anticipated as a result of the No-Action Alternative.

*Cumulative Effects of the Action Alternative on Gray Wolves*

The proposed activities would occur in 1.6% of the Satire Creek Pack home range present within the large CEAA. The proposed activities would affect winter range for elk, moose, mule deer, and white-tailed deer as identified by DFWP (TABLE W-6 –BIG GAME). Moose are fairly tolerant of winter conditions due to their large body size and the proposed activities are not expected to adversely affect moose. The proposed harvest would reduce canopy cover to <40% within 407 (3.9%) of the 10,523 acres of mature habitat available in the large CEAA; however, a 300-foot wide travel corridor would be retained along Harris Creek facilitating travel in the drainage. There are no known rendezvous or den sites on DNRC lands in the large cumulative effects area. However, if documented in the vicinity of the project areas, mechanized activities would be restricted within 1 mile of wolf dens (*ARM 33.11.430(1)(a)*) and 0.5 miles of wolf rendezvous sites (*ARM 33.11.430(1)(b)*). The alteration of canopy cover and disturbance to wolves would be additive to any proposed and ongoing activities occurring in the large CEAA, including the DNRC Six Hills Timber Sale, which recently occurred in the project area. The Six Hills Timber Sale removed approximately 141 acres of thermal cover. These timber sales may cause big game animals to use other portions of their winter range along Harris Creek. If present in the vicinity of the project area, wolves could be displaced by forest management activities associated with the Harris Creek Timber Sale for up to 3 years in addition to any disturbance associated with the Six Hills Timber Sale. Thus, since: 1) wolf den or rendezvous sites do not occur within the vicinity of the project area, but restrictions would apply if either are encountered during operations (*ARM 33.11.430(1)(a)(b)*); and 2) some canopy cover would be removed on 3.9% of the CEAA, but the proposed activities are expected to have a minor affect prey availability for wolves across the large CEAA; minor adverse cumulative effects to wolves associated with displacement or changes in prey availability would be anticipated as a result of the Action Alternative.

### *PILEATED WOODPECKER*

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

**Introduction**

Pileated woodpeckers require mature forest stands with large dead or defective trees for nesting and foraging and their density is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*). Pileated woodpeckers forage primarily on carpenter ants that live in dead and dying wood and prefer to nest in ≥20 inch dbh western larch, ponderosa pine, cottonwood, or quaking aspen, creating ecologically important cavities that are used in subsequent years by a variety of wildlife species

for nesting and roosting. Forest management considerations for pileated woodpeckers include retaining dense patches of old and mature coniferous forest with abundant large snags and coarse-woody debris and promoting the regeneration of seral tree species including ponderosa pine, western larch, and Douglas-fir.

**Analysis Areas**

The analysis area for direct and indirect effects is the 635-acre project area (FIGURE W-1 –ANALYSIS AREAS). The analysis area for cumulative effects is the 8,332-acre medium CEAA described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The medium CEAA is centered on the project area and defined according to geographic features (i.e., ridgelines) and provides a reasonable analysis area for pileated woodpeckers that could be influenced by project-related activities. This scale provides a sufficient area to support multiple pairs of pileated woodpeckers (*Bull and Jackson 1995*).

**Analysis Methods**

Analysis methods include field evaluation, aerial photograph interpretation, and GIS analysis of available habitats. SLI data were used to identify preferred pileated woodpecker habitat (*ARM 36.11.403(58*)). To assess potential pileated woodpecker habitat on DNRC-managed lands, sawtimber stands ≥100 years old within preferred pileated cover types (*ARM 36.11.403(58)*) with ≥40% or greater canopy closure were considered potential pileated woodpecker habitat. On non-DNRC lands, the stands considered potential suitable habitat for pileated woodpeckers were mature forest stands (≥40% canopy cover, >9 inches dbh average) below 6,000 feet elevation. Factors considered in the analysis include: 1) the degree of harvesting and 2) the structure of pileated woodpecker preferred habitat types.

**Existing Conditions**

*Pileated Woodpeckers*

The project area contains 273 acres (43.0% of project area) of suitable pileated woodpecker habitat. This habitat is composed primarily of Douglas-fir, larch, and ponderosa pine stands occurring in two large patches located north and south of Harris Creek. The remaining acres in the project area consist of 304 acres (47.9% of project area) of stands that are not appropriate forest types for pileated woodpeckers and 58 acres (9.1% project area) of young stands (<100 years) or stands with poor stocking density. During field visits, pileated woodpeckers were not heard and recent foraging was not observed. Snag availability in the project is moderate at 16 snags snags/acre ≥8 inches dbh and coarse woody debris moderate at 14 tons/acre. Large snag availability is also moderate at 9 snags/acre ≥15 inches dbh (see ***SNAGS AND COARSE WOODY DEBRIS*** in the coarse-filter analysis section for additional information).

The medium CEAA contains 2,894 acres (34.7% of medium CEAA) of potential pileated woodpecker habitat, which includes 273 acres of DNRC-managed pileated woodpecker habitats and an additional 2,621 acres of mature forested habitat (<6,000 feet elevation) on other ownerships. Open road density in the medium CEAA is low (0.7 miles/square mile) and provides limited accessibility for firewood cutting. However, considering the history of timber harvest on private lands in the medium CEAA (74.7% medium CEAA privately owned), snag and coarse-woody debris availability is likely limited.

**Environmental Effects**

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

None of the proposed forest management activities would occur. Timber harvest would not occur in DNRC-managed pileated woodpecker habitat that occurs in the project area. Thus, since no change in the

structure of pileated woodpecker habitat would occur, no direct or indirect effects to pileated woodpecker habitat suitability would be anticipated as a result of the No-Action Alternative.

*Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers*

The proposed activities would occur in 271 acres (99.3%) of the 273 acres of pileated woodpecker habitat available in the project area. The proposed activities would open stands to 2-10%; thus, the structure of these stands would be expected to become unsuitable for appreciable use by pileated woodpeckers, although some limited use could occur. Snags would be removed by the proposed harvest, but at least 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh) would be retained (*ARM 36.11.411*). Disturbance associated with harvesting could adversely affect pileated woodpeckers on portions of the project area for up to 3 years, should they be present in the project area. Thus, since: 1) forest structural changes would occur, but mitigation would include retention of snags and coarse woody debris (*ARM 36.11.411, ARM 36.11.414*); and 2) harvesting would reduce pileated woodpecker suitable habitat availability by 271 acres (99.3% of suitable habitat); moderate adverse direct and indirect effects to pileated woodpecker habitat suitability in the project area would be anticipated as a result of the No-Action Alternative.

*Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers*

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

*Cumulative Effects of the Action Alternative on Pileated Woodpeckers*

The proposed activities would occur in 271 acres (9.4%) of the 2,894 acres of potential pileated woodpecker habitat in the medium CEAA. The proposed activities would open stands to 2-10% canopy cover in these acres, causing habitat structure to become unsuitable for pileated woodpecker use, although these acres would retain some habitat attributes important to pileated woodpeckers including snags and coarse woody debris. Snags would be removed by the proposed harvest, but at least 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh) would be retained (*ARM 36.11.411*). Changes in pileated woodpecker habitat suitability would be additive to proposed and ongoing activities occurring in the medium CEAA, including the DNRC Six Hills Timber Sale which occurred within the project area. The Six Hills Timber Sale reduced the availability of pileated woodpecker habitat by approximately 18 acres. Disturbance associated with the proposed activities could adversely affect pileated woodpeckers for up to 3 years in addition to any disturbance associated with the Six Hills Timber Sale. Thus, since: 1) structural changes would occur, but mitigations would include retention of snags and coarse woody debris; and 2) harvesting would reduce pileated woodpecker suitable habitat availability by 271 acres (9.4%) within the medium CEAA; moderate adverse cumulative effects to pileated woodpecker habitat suitability would be anticipated as a result of the Action Alternative.

### *BIG GAME WINTER RANGE*

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

**Introduction**

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

**Analysis Areas**

The analysis area for direct and indirect effects is the 635-acre project area (FIGURE W-1 –ANALYSIS AREAS). The analysis area for cumulative effects is the 26,457-acre large CEAA described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The large CEAA is defined according to geographic features, and is centered on the project area and big game winter range areas located along the Fisher River, providing a reasonable biological analysis unit for local big game animals that could be influenced by project-related activities.

**Analysis Methods**

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

**Existing Conditions**

*Big Game Winter Range*

The project area contains elk, mule deer, and white-tailed deer winter range (*DFWP 2008*) (TABLE W-6 – BIG GAME). Approximately 455 acres (71.6%) of the project area contains mature canopy cover (≥40% canopy cover, 9 inch dbh average) composed primarily of Douglas-fir and western larch stands. This habitat consists of 365 acres of well-stocked forest stands with dense canopy cover (70%) as well as stands with <70% canopy cover. Desirable winter range habitat attributes found in the area include low elevation (<5,000 feet), southwest-facing steep slopes, and appreciable amounts of canopy cover. The project area is a part of a large big game winter range area centered on the Fisher River. Little evidence of winter browsing on conifers was observed during field visits; however, big game may still use the area.

The large CEAA contains elk, mule deer, and white-tailed deer winter range (*DFWP 2008*) (TABLE W-6 – BIG GAME). Approximately 10,523acres (39.8% analysis area) of mature forested habitat (≥40% canopy cover, >9 inch dbh average) occur in the large CEAA and provide some thermal protection for big game. The remaining habitat in the large CEAA consists of mature stands with <40% canopy cover as well as young regenerating stands. Desirable winter range habitat attributes that occur in the large CEAA include low elevation, steep slopes, pockets of high canopy cover, and southwest facing aspects, particularly on the east side of the Fisher River. Residential development is not present in the large CEAA and disturbance to big game is likely minimal, but 86.1% of the large CEAA is privately owned and timber harvesting has affected the availability of thermal cover considerably.

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

| BIG GAME | ACRES OF WINTER RANGE | | | |
|---|---|---|---|---|
| | Project Area | | Large CEAA | |
| | Existing[a] | Acres Affected[b] | Existing[a] | Acres Affected[b] |
| Elk | 635<br>100.0% | 414<br>65.2% | 23,251<br>87.9% | 414<br>1.8% |
| Mule deer | 635<br>100.0% | 414<br>65.2% | 25,432<br>96.1% | 414<br>1.6% |
| White-tailed deer | 635<br>100.0% | 414<br>65.2% | 25,378<br>95.9% | 414<br>1.6% |

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

**Environmental Effects**

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

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

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

Big game winter range would be affected by the proposed activities (TABLE W-6 –BIG GAME). The proposed activities would reduce canopy cover on 414 (91.0%) of the 455 acres of mature forested habitat currently providing thermal cover. The proposed activities would open stands to 2-10% canopy cover in 407 acres, reducing the capacity of these areas to provide snow intercept and reduce wind velocity. An additional 7 acres would be treated with a partial cut, retaining >40% canopy cover. Patches of advanced regenerating conifers (>6 feet height) would be retained throughout the harvest units, providing some residual cover. Additionally, a 300-foot wide connectivity corridor would be retained along Harris Creek, allowing big game to travel along Harris Creek between the Fisher River and USFS lands located in the Swamp Creek Drainage. Winter logging may occur, but would not be required and wintering animals could be displaced for up to 3 winters by the proposed activities. Thus, since: 1) canopy cover would be removed on 414 acres (91.0% of available mature canopy cover), 2) some canopy cover and regenerating conifers would be retained, 3) displacement of big game would be temporary and across a relatively small area, and 4) a 300-foot wide connectivity corridor along Harris Creek would facilitate

travel of wintering big game, moderate adverse direct and indirect effects to big game winter range quality and wintering animals would be anticipated as a result of the Action Alternative.

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

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

*Cumulative Effects of the Action Alternative on Big Game Winter Range*

Big game winter range would be affected by the proposed activities (TABLE W-6 –BIG GAME). The proposed harvest would affect 414 acres (3.9%) of the 10,523 acres of mature habitat available in the large CEAA. However, some canopy cover (2-10% in 407 acres and >40% in 7 acres) and advanced regenerating conifers (>6 feet height) would be retained, providing limited residual cover. Reductions in thermal cover would be additive to any proposed and ongoing activities in the large CEAA, including the DNRC Six Hills Timber Sale, which occurred in the project area. The Six Hills Timber Sale affected approximately 141 acres of mature forested habitat, reducing the availability of thermal cover. Winter logging may occur on the Harris Creek Timber Sale, but would not be required and wintering animals could be displaced for up to 3 winters by the proposed activities in addition to any displacement associated with the Six Hills Timber Sale. Thus, since: 1) canopy cover would be removed, reducing the quality of big game winter range on 414 acres (3.9% of available canopy cover) that are currently providing thermal cover; 2) some canopy cover and regenerating conifers would be retained; 3) displacement of big game would be temporary across a relatively small area; and 4) a 300-foot wide travel corridor would facilitate the movement of wintering big game in the Harris Creek Drainage; minor adverse cumulative effects to big game winter range quality and wintering animals would be anticipated as a result of the Action Alternative.

## LIST OF MITIGATIONS

- If a threatened or endangered species is encountered, consult a DNRC biologist and develop additional mitigations that are consistent with the Forest Management Rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*).
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per ARM 36.11.444(2) and *GB-PR2* (*USFWS and DNRC 2010).*
- Contractors will adhere to food storage and sanitation requirements as per GB-PR3 (*USFWS and DNRC 2010*).
- Within Canada lynx winter foraging habitat, retain up to 10% of the stand area in patches of advanced regeneration of shade-tolerant trees (grand fir, subalpine fir, and spruce) as per LY-HB4 (*USFWS and DNRC 2010).*
- Manage for snags and snag recruits, particularly favoring western larch and Douglas-fir.
- Retain 10-20tons/acre of coarse-woody debris and emphasize the retention of downed logs ≥15 inches dbh where they occur as per LY-HB2 (*USFWS and DNRC 2010).*
- Use a combination of topography, group retention, and roadside vegetation to reduce sight distances within harvest units where feasible.

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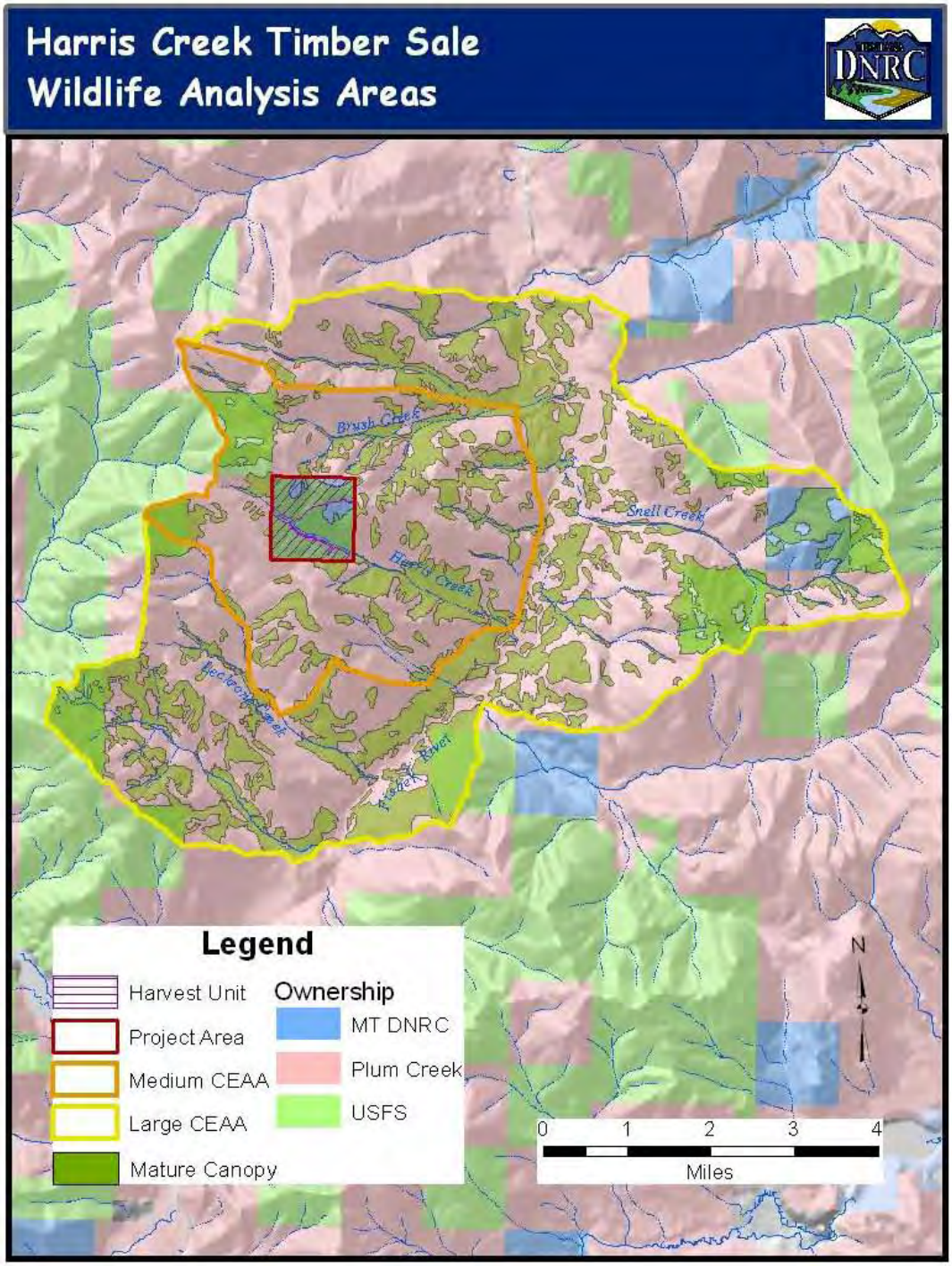
**FIGURE W-1 –ANALYSIS AREAS**. Wildlife analysis areas for the proposed Harris Creek Timber Sale.



**Soil Resource Mitigations:**

1. In order to prevent soil resource impacts, ground based mechanical felling or yarding are restricted to periods when one or more of the following conditions occur:
   a. Soil moisture content at 4" depth less than 20% oven-dry weight.
   b. Minimum frost depth of 3".
   c. Minimum snow depth of 18 inches, loose, or 8 inches, packed.
2. Slash would be retained and distributed on site to contribute nutrients to the soil.
3. Coarse woody debris would be retained on site for maintaining soil productivity.
4. Slash would be trampled and incorporated into skid trails for erosion control.
5. Slopes in excess of 45% would be avoided during skidding or skid with skyline or helicopter logging systems.

**Water Resource Mitigations:**

1. Streamside Management Zones (SMZs) 50 to 150 feet in width (dependant on slope and benches) would be marked along all streams. Harvesting would not be allowed within the SMZs.
2. Road surface drainage and erosion control features would be added or improved on existing roads and installed as part of the road construction to reduce erosion rates and reduce the risk of sediment delivery.
3. Grass seed and fertilizer would be applied to newly disturbed culvert installation sites and road cuts and fills to stabilize erodible slopes and minimize sediment production.

**Vegetation Resource Mitigations:**

1. Larger diameter snags will be protected as needed to assure retention of 2 snags per acre in all units.
2. Ponderosa pine, western larch, western white pine and Douglas-fir would be favored leave trees in all canopy levels.
3. All trees infected with dwarf mistletoe and blister rust would be removed.
4. To deter further establishment of noxious weeds along roads, grass seed and fertilizer would be applied to areas with soil exposed during road construction and maintenance activities.
5. To minimize noxious weed invasion away from roads, "off road" logging equipment would be inspected and required to be free of weed parts prior to moving onto the site.
6. Grass seed would be applied or slash incorporated into heavily used trails with bare soil exposed to limit establishment of noxious weeds.

**Wildlife Resource Mitigations:**

1. Consult a DNRC biologist 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.
2. Restrict public access at all times on restricted roads that are opened using signs during active periods and a physical closure (gate, barriers, equipment, etc) during inactive periods (nights, weekends, etc).
3. Reclose roads and skid trails opened with proposed activities to reduce the potential for unauthorized motor vehicle use.
4. Use a combination of topography, group retention, and roadside vegetation to reduce views into harvest units along open roads.
5. Manage for snags, snag recruits, and coarse woody debris according to ARM 36.11.411 through 36.11.414, particularly favoring western larch, ponderosa pine, and western white pine.