CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Iron Schoolhouse Timber Sale
Proposed Implementation Date:	2012
Proponent:	Libby Unit, Montana Department of Natural Resources and Conservation (DNRC)
Location:	Par. 1 of COS 3069 in the S ½ NE ¼ Sec. 20 (Common Schools), and N ½ NE ¼, SE ¼ NE ¼, NW ¼ SW ¼ Sec. 32 (School of Mines), T31N, R33W, and W ½ Sec. 36 (Common Schools), T31N, R34W
County:	Lincoln

I. TYPE AND PURPOSE OF ACTION

The Montana Department of Natural Resources and Conservation (DNRC), Libby Unit, is proposing a commercial timber harvest approximately 2.5-4 air miles south to southeast of Troy, MT in: Par. 1 of COS 3069 in the S ½ NE ¼ Sec. 20 (Common Schools Trust), and N ½ NE ¼, SE ¼ NE ¼, NW ¼ SW ¼ Sec. 32 (School of Mines Trust), T31N, R33W, and W ½ Sec. 36 (Common Schools Trust), T31N, R34W (Attachment A, Vicinity Map). Under the proposed Iron Schoolhouse Timber Sale, DNRC would harvest and sell approximately 6.7 million board feet of wood products from approximately 8 harvest units, totaling approximately 470.6 acres using ground based, cable and possibly helicopter logging equipment to conduct seedtree, shelterwood, and individual tree selection harvest. As a result of this proposed timber sale, an estimated $817,400.00 would be generated for the Common Schools and School of Mines Trusts.

Additional actions would include the construction of approximately 3.5 miles of new roads, and re-construction of approximately an additional 1.1 miles (Attachment A, Project Area Map). Post timber harvest operations on 470.6 acres could include scarification, and slash burning, as well as planting Western White Pine, Ponderosa pine, Western Larch, or Douglas-fir seedlings. Logging slash would be treated to meet state laws. Timber sale activities would likely begin during the calendar year of 2012 and conclude in the year 2014. Site specific objectives for the project area are: (1) Move the treated stands to a healthier, more vigorous condition (desired future condition), (2) Reduce forest fuels.

Lands involved in this proposed project are held by the State of Montana in trust for the Common Schools, and School of Mines (Enabling Act of February 22, 1889: 1972 Montana Constitution, Article X Section 11). The Board of Land Commissioners and the DNRC are required, by law, to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). The DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (DNRC 1996), the Administrative Rules for Forest Management (ARM 36.11.401 through 456), the recently adopted Montana DNRC Forested State Trust Lands Habitat Conservation Plan (HCP; DNRC 2011), and all other laws applicable to timber harvest activities on State lands.

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.

A public notice was published in the Western News on February 12th, 19th, and 26th, as well as March 5th 12th, and 19th, 2010. Scoping letters were sent to adjacent land owners and other interested parties on the Libby Unit mailing list for scoping notices. Those involved in project development from DNRC include Garrett Schairer – Wildlife Biologist, Marc Vessar - Hydrologist, and Soil Specialist, Patrick Rennie – Archeologist, Dave Marsh – Project leader and forester, and Mark Peck - Libby Unit Manager. Comments and concerns were addressed and incorporated in to the final Environmental Assessment in January, 2012.

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 burning permit holder, DNRC agrees to comply with all of 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 in Missoula, MT.

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:

DNRC would not harvest and sell approximately 6.7 million board feet of wood products. An estimated $817,400.00 would not be generated for the Common Schools and School of Mines Trusts at this time. No new roads would be constructed, re-constructed or maintained. Timber would continue to decay and no forest fuel reduction would occur.

Action:

Under the proposed Iron Schoolhouse Timber Sale, DNRC would harvest and sell approximately 6.7 million board feet of wood products from approximately 8 harvest units totaling approximately 470.6 acres (seedtree and shelterwood, and individual tree selection harvest) using ground based, cable and possibly helicopter logging equipment. As a result of this proposed timber sale, an estimated $817,400.00 would be generated for the Common Schools and School of Mines Trusts. Additional actions would include the construction of approximately 3.5 miles of new roads, and re-construction of approximately an additional 1.1 miles (Attachment A, Project Area Map). Post timber harvest operations on 470.6 acres could include scarification and slash burning, as well as planting Western White Pine, Ponderosa pine, Western Larch, or Douglas-fir seedlings. Logging slash would be treated to meet state laws. Timber sale activities would likely begin during the calendar year of 2012 and conclude in the year 2014. Harvest treatments would move the treated stands towards a healthier, more vigorous condition (desired future condition). Forest fuels would be reduced, which would reduce the potential for stand replacement wildfire.

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.

Using characteristics of parent materials, soils, topography and vegetation, six landtypes were identified in the project area. Soils associated with these landtypes are generally influenced by volcanic ash deposits. Past management in the project area was evidenced by skid trails covering up to 11 percent of proposed harvest units. No substantial erosion was observed along pace transects during field reconnaissance; compaction on skid trails was the most obvious impact from past and current uses. Average coarse woody debris in the harvest units was estimated to be 9.9 tons per acre.

Under the No Action alternative, no additional direct, indirect or cumulative impacts would be expected.

If the Action Alternative is selected, up to 76 acres would be expected to exhibit moderate or higher impacts due to soil compaction, displacement or erosion on skid trails and landings. To limit the risk of adverse direct, indirect and cumulative impacts several contract stipulations and specifications would be required. These mitigation measures would help ensure soil productivity impacts due to compaction, displacement and erosion would remain acceptable.

For a more detailed analysis of impacts to soil resources, see Attachment C, *Soils Analysis* . For a complete list of Soil Resource Mitigations, please refer to Attachment F, Summary of Mitigations Incorporated in to the Iron Schoolhouse Timber Sale.

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.

Potential impacts to water quality due to channel destabilization, sediment delivery from roads and changes in riparian conditions were analyzed for Iron and Falls creeks which are tributaries to Lake Creek. DNRC-managed land in each watershed is 5 percent in Iron Creek and 1.7 percent in Falls Creek.

Iron Creek is perennial in the headwaters but is intermittent in the lower portions of the watershed. A large adjacent wetland is present on DNRC-managed lands immediately above the private land holdings. A non-hybridized population of westslope cutthroat trout is found above the state parcel. No mass wasting sites along the channel were found during field reconnaissance. A sediment source was identified on the county road adjacent to the DNRC-managed parcel. Existing annual water yield for Iron Creek is estimated at 6.7 percent. Although evidence of past harvest is present in the riparian area within the DNRC-managed parcel, the 8 acres of riparian area is fully stocked with sawtimber size trees.

Approximately half of the Falls Creek watershed lies in the Cabinet Mountain Wilderness. This stream is perennial above, within and below the DNRC-managed parcel. Available data indicates the stream supports westslope cutthroat trout and eastern brook trout; however electrofishing within the DNRC-managed parcel found predominately eastern brook trout and one rainbow trout. Fish barriers are present above and below the DNRC-managed parcel. In-channel sediment is prevalent throughout the state parcel, although the source of the sediment is unknown. Field review did not identify any substantial natural or human-caused sediment from within the DNRC-managed parcel. Riparian condition along Falls Creek varies from clearcut to fully forested. DNRC manages approximately 24 acres of riparian area within the state parcel. No annual water yield analysis was necessary for this watershed due to the limited ownership by the State of Montana and the large portion of the watershed that lies in the Cabinet Mountain Wilderness.

Under the No Action Alternative, no changes to the existing condition would be expected. Existing sediment sources would continue, riparian conditions would remain the same. Cumulative annual water yield increases would continue to recover.

If the Action Alternative is selected, a low risk of sediment delivery to stream would result because BMPs would be followed. Road construction would occur away from streams; maintenance activities on haul routes would maintain or improve surface drainage and would not be expected to increase sediment delivery from roads. Existing delivery from county roads and private roads would continue. Iron Creek would have a 50-foot no-harvest buffer, but approximately 4.4 acres of riparian area outside of the no-harvest buffer would have reduced woody debris available for recruitment into the stream. This level of retention would be expected to continue to provide adequate woody debris recruitment for the stream and maintain adequate shading with a low risk of adverse impacts. Annual water yield would increase by an estimated 1.1 percent.

Along Falls Creek, up to 50 percent of the merchantable trees would be removed from the riparian area including the SMZ. This harvest prescription is expected to have a moderate risk of a measurable increase in stream temperatures although potential impacts would not be expected to be measurably detrimental. Recruitment of woody debris into Falls Creek would have a moderate risk of measurable impacts to fisheries habitat complexity. No changes to fish passage along the haul route are proposed under the Action Alternative.

Because all timber-harvesting activities would follow BMPs as required by *ARM 36.11.422* and the direct and indirect effects would have a low or moderate risk of impacts, a low risk of additional adverse cumulative effects would be expected to occur under this alternative. This expectation includes the results of (1) a decrease in the recruitable large woody debris in the RMZ along fish-bearing streams; (2) a risk of increased stream temperature in Falls Creek and (3) a minor increase in modeled annual water-yield estimates. Conditions would be expected to continue to support fish-habitat parameters and provide large woody debris and shade to maintain channel form and function and also support a natural range of water temperatures. Under this alternative, fisheries habitat quality would also be maintained at its current level, with a low to moderate degree of risk of change due to anthropogenic sources.

Because the annual water-yield increases would remain below the thresholds of concern and BMPs would be implemented during timber-harvesting and road-construction operations, the risk of adverse cumulative impacts to water quality and beneficial uses, including fisheries habitat, would be low.

For a more detailed analysis of impacts to water resources including fisheries habitat, see Attachment B, *Water Resources Analysis* . For a complete list of Water Resource Mitigations, please refer to Attachment F, Summary of Mitigations Incorporated in to the Iron Schoolhouse Timber Sale.

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 detrimental contributions of associated air pollutants. Dust may be created from log hauling on portions of native surface roads during summer and fall months. Contract clauses would provide for the use of dust abatement if necessary to reduce dust near any affected residences.

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 bordered by USFS, industrial private and small private ownerships. The private ownerships are intensively managing their lands for timber, recreation, grazing, and residential uses. The project area currently is dominated by the Mixed Conifer and Western larch/Douglas-fir cover types.

Harvesting, according to the silvicultural prescriptions would result in the even-aged harvest of approximately 444.4 acres, while another 26.2 acres would result in un-even-aged harvest. The resulting even-aged stands would contain healthy overstory seed trees of naturally occurring seral (primarily PP, WL, WWP, and DF) species. Regeneration of these seral species would be encouraged both naturally and through artificial planting where necessary. The un-even-aged stands would consist of slightly healthier, more disease resistant trees.

All treated stands, currently containing Mixed Conifer, Western Larch/Douglas-fir, Western White Pine, and Ponderosa Pine cover types, would help move the distribution of cover types in the project area and across the Libby unit, closer toward desired future conditions.

Rare plants or cover types listed by the Montana Natural Heritage Program have not been found within the project area.

Approximately 26.2 acres of an identified 36 acre old growth stand would remain in an old growth condition following harvest however, the conversion of 9.6 acres of old growth to the 0–39 year age class would bring the total Libby Unit old growth acres to 2,643.4.

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 E, Vegetative *Analysis for the Iron Schoolhouse Timber Sale*. For a complete list of Vegetative Resource Mitigations, please refer to Attachment F, Summary of Mitigations Incorporated in to the Iron Schoolhouse Timber Sale.

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

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

Terrestrial and Avian Life and Habitats

The project area currently contains approximately 434 acres of mature stands (100-plus years in age) of Douglas-fir/western larch and mixed-conifer stands that have a reasonably closed canopy. One stand in the project area meets the definition of old-growth (*Green et al. 1992*). Currently, forested areas cover the majority of the project area, facilitating some use by those species requiring connected forested conditions and/or forested interior habitats. Connectivity of mature forested habitats in the project area is relatively intact, but the based on the sizes of the parcels and the presence of open roads in portions of the project area, connectivity for some species may still be somewhat limited. Presently, roughly 57 percent of the cumulative-effects analysis area is not in mature, forested conditions due to residential clearing, human development, agriculture, and other past harvesting. The network of open roads in the cumulative-effects analysis area, coupled with timber management and land clearing has reduced some of the landscape-level connectivity. During field visits to the project area, an average of 1.2 large (>21” dbh) snags per acre were observed (range 0-6.6 per acre), which were largely dominated by western larch and Douglas-fir. Past harvesting in the cumulative-effects analysis area has reduced the availability of snags, snag recruits, and coarse woody debris. Montana Department of Fish, Wildlife, and Parks identified the entire project area as white-tailed deer, mule deer, elk, and moose winter ranges. These winter ranges are part of much

larger white-tailed deer (3,798,066 acres), mule deer (1,075,969 acres), elk (2,314,459 acres), and moose (211,845 acres) winter ranges, respectively. Presently, a variety of stands across the winter range in the cumulative effects analysis area are providing thermal cover and snow intercept for big game.

Direct and Indirect Effects of the No-Action Alternative

No direct or indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area since: 1) no changes to existing stands would occur; 2) no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

Negligible direct and indirect effects would be anticipated to snags, coarse woody debris, and subsequently to those wildlife species requiring these habitat attributes since: 1) no harvesting would occur that would alter present or future snag or coarse woody debris concentrations; and 2) no changes to human access for firewood gathering would occur.

No direct or indirect effects to big game winter range would be anticipated since: 1) subtle changes in thermal cover due to mortality and successional advances increasing canopy densities would be anticipated; 2) the amount of mature forested habitats on the winter range would not further change; and 3) the levels of human disturbance would remain similar.

Direct and Indirect Effects of the Action Alternative

Moderate adverse direct and indirect effects to mature forested habitats and connectivity would be expected since: 1) harvesting would revert succession on roughly 384 acres of mature forested stands, reducing stand age and the amount of forested cover, while reducing canopy closure on another 87 acres; 2) minor-moderate changes to landscape connectivity would occur; and 3) some changes to wildlife use would be expected.

Minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect wildlife species requiring these habitat attributes since: 1) harvesting would reduce snags and snag-recruitment trees increasing increase coarse woody debris levels; and 2) no changes to human access for firewood gathering would occur.

Moderate adverse direct or indirect effects to big game would be expected since: 1) the relatively short-term that logging activities could create disturbance in this area; 2) limited areas of thermal cover and snow intercept exist in the project area outside of the proposed units following proposed treatments; and 3) harvesting would remove much of the mature forested habitats that are providing thermal cover and snow intercept habitats for big game species.

Cumulative Effects of the No-Action Alternative

No cumulative effects to mature forested habitats and connectivity would be expected since: 1) no changes to existing stands would occur; 2) no further changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

No cumulative effects to snags and coarse woody debris would be anticipated since: 1) no further harvesting would occur; 2) changes in the numbers of snags would be negligible; and 3) no change in the level of firewood gathering would be expected.

Negligible beneficial cumulative effects to big game and big game winter range would be anticipated since: 1) subtle changes in thermal cover due to advances in succession that would increase canopy densities would be anticipated over time; 2) the amount of mature forested habitats on the winter range would not change; and 3) the levels of human disturbance would remain similar.

Cumulative Effects of the Action Alternative

Moderate adverse cumulative effects to mature forested habitats and connectivity would be expected since: 1) harvesting would remove mature stands, further reducing the amount of forested cover in the cumulative-effects analysis area; 2) minor reductions to landscape connectivity would occur; and 3) some changes to wildlife use would be expected.

Minor adverse effects to wildlife species requiring snags and coarse woody debris would be anticipated in the cumulative-effects analysis area since: 1) a cumulative amount of the cumulative-effects analysis area would be harvested, reducing snags and snag-recruit trees while increasing coarse woody debris levels, 2) slight reductions in general public access and associated firewood gathering would be anticipated, and 3) the slightly increased representation of shade-intolerant species that could become snags in the long term.

Minor adverse cumulative effects to big game would be anticipated since 1) the relatively short-term that logging activities would create disturbance in a small portion of the cumulative effects analysis area; 2) a small percentage of the winter range in the cumulative effects analysis area would be altered; 3) areas of high quality thermal cover and snow intercept would be removed from areas in the cumulative effects analysis area, which would further reduce the amount of these attributes available for big game; and 4) availability of lower-quality cover on surrounding ownerships that provides some opportunity for big game should they be displaced.

Potential impacts to aquatic life and habitats is addressed in section 5 above. For a detailed analysis on aquatic impacts, see Attachment B, *Water Resources Analysis* .

(See attachment D, *Wildlife Analysis for the Iron Schoolhouse Timber Sale* for detailed information on wildlife. See Attachment F, for a Summary of Wildlife Mitigations Incorporated in to the Iron Schoolhouse Timber Sale.

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.

The following species were considered but eliminated from detailed study due to lack of habitat present within the proposed project area: Black-backed Woodpecker, Coeur d'Alene Salamander, Columbian Sharp-tailed Grouse, Common Loon, Harlequin Duck, Northern Bog Lemming, Peregrine Falcon, and Townsend's Big-eared Bat.

Threatened and Endangered Species

The project area is in the "occupied habitat" area as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (Wittinger, 2002). Open road densities in the cumulative effects analysis area are fairly high with at least 3.44 miles/square mile (simple linear calculation). No security habitat exists in the project area, and no security habitat exists in the cumulative effects analysis area due to the existing network of open roads. Hiding cover exists within both the project area and cumulative effects analysis area.

Approximately 261 acres in the Iron Creek parcel (section 36, T31N, R34W) was identified as lynx habitats. Much of this habitat was considered forested travel/other habitats (197 acres) with lesser amounts of mature-foraging (63 acres) habitats. Connectivity of forested habitats within the project area is relatively intact. In general, the project area appears to contain marginal lynx habitats and extensive use of the project area would not be anticipated.

Direct and Indirect Effects of the No-Action Alternative on Threatened and Endangered Species

No direct or indirect effects to grizzly bears would be anticipated since: 1) no disturbance or displacement would be expected, 2) no changes in hiding cover would occur, 3) security habitat would not be altered, and 4) no changes in long-term open-road densities would be anticipated.

Minor beneficial direct and indirect effects to lynx habitats would be expected since: 1) no denning habitats would exist, but could develop in the future; 2) sufficient mature foraging habitat would exist; 3) young foraging habitats would continue to be absent without disturbance; 4) no lynx habitats would be in the temporary non-lynx habitat category, meaning all of the lynx habitats would be in a usable state for lynx; and 5) landscape connectivity would not be altered.

Direct and Indirect Effects of the Action Alternative on Threatened and Endangered Species

Minor adverse direct or indirect effects to grizzly bears would be anticipated since: 1) negligible disturbance and displacement would be anticipated; 2) hiding cover would be reduced in much of the project area, but would remain in portions of the project area, and would be expected to recover in the short-term; 3) no changes to security habitats would be expected; and 4) no changes to long-term open road density would be anticipated.

Moderate adverse direct and indirect effects to lynx habitats would be expected since: 1) denning habitats would continue to be absent and development of these attributes would be further delayed; 2) mature foraging habitats would be reduced, but some mature foraging habitats would be retained; 3) young foraging habitats would develop in the next 20 to 30 years in the project area; 4) considerable amounts of lynx habitats would be in the temporary non-lynx habitat category, meaning most of the lynx habitats would not be in a usable state for lynx; and 5) connectivity along riparian areas would persist despite an overall reduction in landscape connectivity, particularly in the uplands.

Cumulative Effects of the No-Action Alternative on Threatened and Endangered Species

No further adverse cumulative effects to grizzly bears would be anticipated since: 1) no changes in human disturbance levels would be expected; 2) no changes to open road density would occur; 3) no further losses of hiding cover would occur; and 4) no changes to security habitats would be expected.

Negligible adverse cumulative effects to lynx habitats would be expected since: 1) no changes to any potential denning or foraging habitats would occur; 2) young foraging habitats could continue developing in the near-term across the cumulative-effects analysis area; 3) longer-term availability of young foraging habitats would likely decline without disturbance; 4) no changes in the amount of lynx habitats in the temporary non-lynx habitat category would occur, meaning most of the lynx habitats would be in a usable state for lynx; and 5) landscape connectivity would not be altered.

Cumulative Effects of the Action Alternative on Threatened and Endangered Species

Minor adverse cumulative effects to grizzly bears would be anticipated since: 1) minor increases in human disturbance levels would be expected within the cumulative effects analysis area in the short-term; 2) hiding cover would be removed in the

short-term on a small portion of the cumulative effects analysis area, but would be expected to recovery fairly rapidly; 3) no changes in long-term open road density would occur, and 4) no changes to security habitats would be expected.

Minor adverse cumulative effects to lynx habitats would be expected since: 1) no changes to denning habitats would occur; 2) some foraging habitats would persist despite reductions in available habitats on DNRC-managed lands; 3) young foraging habitats would continue developing for the next 10 to 30 years; 4) limited additional amounts of lynx habitats would be in the temporary non-lynx habitat category, but large portions of the existing lynx habitats on DNRC-managed lands would be in this category ; and 5) reductions in landscape connectivity would not prevent lynx movements through the cumulative-effects analysis area.

Sensitive Species

The project area is partially included in the Throops Lake bald eagle territory and observations of eagles nesting in the vicinity have been recorded since 1996. Modeling fisher habitats using SLI data generated an estimate of 421 acres of fisher foraging, resting, denning, and travel habitats (382 upland acres and 39 riparian acres) in the project area (*Heinemeyer and Jones 1994*). Within the riparian areas, all of the preferred fisher covertypes (38 of 39 acres, or 97.4 percent) are moderately or well-stocked and likely support the structural features necessary for use as fisher resting and denning habitats in addition to serving as travel habitats and maintaining landscape connectivity. Within the riparian habitats on DNRC-managed lands in the cumulative effects analysis area, most (38 of 39 acres; 97.4 percent) of the area in preferred fisher covertypes presently provides structural features necessary for use as fisher resting and denning habitats, which exceeds the required threshold of 75 percent. Additionally, roughly 389 acres of upland fisher habitats exist on DNRC-managed lands in the cumulative effects analysis area. Preferred fisher covertypes occur across portions of the cumulative effects analysis area; suitable habitats likely occur on a smaller subset of those lands. Within the project area there are approximately 109 acres of potential flammulated owl habitats. The O' Brien, Twilight, and Preacher wolf packs have been in the vicinity of the project area; continued use of the project area would be anticipated. In the project area, potential pileated woodpecker nesting habitat exists on approximately 366 acres that are dominated by Douglas-fir/western larch and mixed conifers. Additionally, 153 acres of sawtimber stands dominated by mixed conifers and western larch/Douglas-fir exist in the project area that may be lower-quality foraging stands. Presently, roughly 57 percent of the cumulative effects analysis area is not in mature, forested conditions due to residential clearing, human development, agriculture, and other past harvesting, and thus is not likely providing pileated woodpecker habitats. A pair of goshawks was observed in the project area in the central portion of section 36, T31N R34W in the recent past during field visits, but no nest site was identified. Roughly 320 acres of the project area exist within 8,680 feet of the potential nest site. Within this area, approximately 314 acres of mixed conifers and Douglas-fir dominated stands could be potentially suitable nesting habitats (crown cover $\geq$50%, pole or mature forest) for northern goshawks. Within the analysis area, at least 2,886 acres exists as potential goshawk nesting habitat (crown cover $\geq$50%, pole or mature forest), and additionally some portion of the 1,990 acres of thinned forest in the analysis area could also be suitable nesting or foraging habitats. A great blue heron rookery comprised of at least 7 nest trees was observed in the project area during field visits.

Most of the project area includes potentially suitable nesting areas, including coniferous uplands and riparian woodlands, many of which include large trees with stout limbs potentially suitable for nesting.

Direct and Indirect Effects of the No-Action Alternative on Sensitive Species

Negligible direct and indirect effects would be expected to affect bald eagles since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees would be expected.

No direct and indirect effects to fishers would be anticipated since: 1) no changes to existing habitats would be anticipated; 2) landscape connectivity would not be altered; 3) no appreciable changes to snags, snag recruits, and coarse woody debris levels would be anticipated; and 4) no changes to human access or potential for trapping mortality would be anticipated.

Negligible adverse direct and indirect effects to flammulated owls would be anticipated since: 1) no harvesting would occur; 2) no changes to potential nesting habitats would be anticipated; and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession leading to denser stands.

No direct and indirect effects would be expected to affect gray wolves in the project area since: 1) no changes in human disturbance levels would occur; and 2) no changes to big game winter range would occur.

Negligible adverse indirect effects to pileated woodpeckers in the project area would be expected until some other disturbance reverses stand succession since: 1) no further harvesting would occur; 2) no changes in the amount of continuously forested habitats would be anticipated; 3) no appreciable changes to existing pileated woodpecker habitats would be anticipated; and 4) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would be anticipated.

No adverse direct and negligible indirect effects to northern goshawks in the project area would be anticipated since: 1) no further harvesting would occur that would increase the amount of the project area in the stand-initiation (seedling/sapling) stage of stand development; 2) no changes in the amount of continuously forested habitats or existing northern goshawk nesting habitats would be anticipated; and 3) availability of mature stands with large trees, snags, coarse woody debris, high canopy closure, and a relatively open understory would provide habitats for a host of goshawk prey species, but those prey

species that rely on small openings and would gradually be reduced in the project area with continued advances in succession.

No adverse direct and indirect effects to great blue herons would be anticipated since: 1) no changes in the availability of large trees with stout limbs capable of supporting nesting herons would occur; 2) no changes to potential foraging habitats would occur; and 3) no changes in human disturbance levels would occur.

Direct and Indirect Effects of the Action Alternative on Sensitive Species

Minor direct and indirect effects to bald eagles would be anticipated since: 1) disturbance could be elevated within the territory during operations; 2) no change in human access within the project area would occur; and 3) negligible changes in the availability of large, emergent trees would be expected.

Moderate adverse direct and indirect effects to fisher would be anticipated since: 1) harvesting would reduce potential habitat quality in much of the riparian areas; 2) harvesting would reduce upland fisher habitats; 3) moderate reductions in landscape connectivity would occur, facilitating some travel, but largely only in a fairly constricted area immediately adjacent to the streams; 4) harvesting would reduce snag and coarse woody debris levels; however, some of these resources would be retained; and 5) no appreciable changes in motorized human access levels would be anticipated.

Minor positive direct and indirect effects to flammulated owls would be anticipated since: 1) harvesting would open denser stands up; 2) elements of forest structure (snags, snag recruits, and coarse woody debris) used for foraging and nesting by flammulated owl would be retained; 3) prescriptions would lead to more open stands with scattered mature ponderosa pine; and 4) prescriptions could promote future development of ponderosa pine within the units.

Minor direct and indirect effects would be expected to affect gray wolves since: 1) minor short-term increases and negligible long-term changes in human disturbance levels would occur, with no increases near known wolf den and/or rendezvous sites anticipated; and 2) changes to summer and winter big game habitats would alter big game use of the project area.

Moderate direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area since: 1) harvesting would reduce the amount of continuous forested habitats available in the project area; 2) potential nesting and foraging habitats would be reduced; 3) several snags and snag recruits per acre would be removed; however, mitigation measures to retain a minimum of 2 snags per acre and 2 snag recruits per acre in most of the harvest areas would be included; and 4) harvest prescriptions would retain and promote seral species in the proposed harvest areas.

Moderate adverse direct and indirect effects to northern goshawks in the project area would be anticipated since: 1) much of the area would be transformed to the stand-initiation (seedling/sapling) stage of stand development; 2) reductions in the amount of continuously forested habitats and potentially suitable nesting habitats would be anticipated; and 3) goshawk prey availability would be altered with the proposed habitat modifications, including reducing habitats for those prey relying on mature trees, large snags, small patches of dense mid-aged stands, and closed canopied stands, while increasing potential habitat for those prey species relying on small openings and coarse woody debris.

Moderate adverse direct and indirect effects to great blue herons would be anticipated since: 1) reductions in the availability of large trees with stout limbs capable of supporting nesting herons would occur, but would not occur in the vicinity of the existing rookery; 2) negligible changes to potential foraging habitats would occur; and 3) increases in human disturbance would occur, but would avoid the majority of the nesting season when herons would be dependent upon the rookery habitats.

Cumulative Effects of the No-Action Alternative on Sensitive Species

No cumulative effects to bald eagles would be expected since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees would be expected.

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

Negligible adverse cumulative effects to flammulated owls would be anticipated since: 1) no harvesting would occur; 2) no changes to potential nesting habitats would be anticipated; and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession leading to denser stands.

No further cumulative effects would be expected to affect gray wolves since: 1) no changes in human disturbance levels would occur, particularly near known wolf den and/or rendezvous sites; and 2) no changes to big game winter ranges would occur.

Negligible adverse cumulative effects to pileated woodpeckers in the cumulative-effects analysis area would be expected since: 1) no further changes to existing habitats would occur; 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated; and 3) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would occur.

No adverse cumulative effects to northern goshawks would be anticipated since: 1) no further harvesting would occur that would increase the amount of the cumulative effects analysis area in the stand-initiation (seedling/sapling) stage of stand development; 2) no further changes in the amount of continuously forested habitats or existing northern goshawk nesting habitats would be anticipated; and 3) availability of mature stands with large trees, snags, coarse woody debris, high canopy closure, and a relatively open understory as well as a diversity of stand structures could provide an array of potential prey species.

No adverse cumulative effects to great blue herons would be anticipated since: 1) no further changes in the availability of large trees with stout limbs capable of supporting nesting herons would occur; 2) no changes to potential foraging habitats would occur; and 3) no changes in human disturbance levels would occur.

Cumulative Effects of the Action Alternative on Sensitive Species

Minor cumulative effects to affect bald eagles would be anticipated since: 1) disturbance would be elevated within the territory during harvesting operations; 2) no changes in human access within the territory would occur; and 3) negligible changes in the availability of large, emergent trees would be expected.

Minor-moderate adverse cumulative effects to fisher would be anticipated since: 1) harvesting would remove upland fisher habitats, but some upland habitats would persist in the cumulative effects analysis area; 2) roughly 22% of the fisher habitats associated with the riparian areas on DNRC-managed lands would be removed, which would be additive to past losses across all ownerships; 3) minor changes in landscape connectivity in the cumulative effects analysis area would be anticipated; 4) harvesting in a relatively small portion of the cumulative effects analysis area would partially reduce snags and snag recruits, while increasing the coarse woody debris levels, largely in the smaller-sized pieces; and 5) no appreciable changes to motorized human access would occur.

Negligible beneficial cumulative effects to flammulated owls would be anticipated since: 1) harvesting would reduce flammulated owl nesting habitats while potentially increasing foraging habitats; and 2) an increase in the amount of the cumulative effects analysis area would be more representative of historic conditions.

Negligible further cumulative effects would be expected to affect gray wolves since: 1) negligible short-term and long-term changes in human disturbance levels would occur with no increases near known wolf den and/or rendezvous sites anticipated; and 2) alterations to big game habitats would occur that would cause some shifts in big game use of a small portion of the cumulative effects analysis area.

Moderate cumulative effects would be anticipated that would affect pileated woodpeckers since: 1) harvesting would further reduce the amount of continuous forested habitats available in the cumulative-effects analysis area, but some forested habitats would persist; 2) potential nesting and foraging habitats would be reduced; 3) several snags and snag recruits per acre would be removed in the proposed harvest areas; however, mitigation measures would retain some of these attributes in several of the harvest areas; and 4) harvest prescriptions would promote seral species in the proposed harvest areas.

Moderate adverse cumulative effects to northern goshawks in the cumulative effects analysis area would be anticipated since: 1) an additional 314 acres would be converted to the stand-initiation (seedling/sapling) stage of stand development; 2) reductions in the amount of continuously forested habitats and potentially suitable nesting habitats would be anticipated; and 3) goshawk prey availability would be altered with the proposed habitat modifications, including reducing habitats for those prey relying on mature trees, large snags, small patches of dense mid-aged stands, and closed canopied stands, while increasing potential habitat for those prey species relying on small openings and coarse woody debris.

Minor adverse cumulative effects to great blue herons would be anticipated since: 1) reductions in the availability of large trees with stout limbs capable of supporting nesting herons would occur across the project area, but would not occur in the area immediately around the existing rookery; 2) negligible changes to potential foraging habitats would occur; and 3) elevated human disturbance levels would occur, but would be limited within 0.5 miles of the rookery during the seasonally important nesting season.

See attachment D, *Wildlife Analysis for the Iron Schoolhouse Timber Sale* for details on wildlife. See Attachment F, *Summary of Wildlife Mitigations* Incorporated in to the Iron Schoolhouse Timber sale for a complete list of mitigations.

10. HISTORICAL AND ARCHAEOLOGICAL SITES:

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

The DNRC staff archaeologist reviewed the project area. A series of log cabin remains were identified in one of the sale areas (Sec. 36, T31N, R34W). These structures did not appear to constitute Heritage Properties, so no additional archeological investigative work was recommended.

See Attachment G for the E-mail communication received from the DNRC Archeologist.

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.

Proposed harvest areas would not be located on prominent topographic features, or visible from any populated or scenic areas. Active forest management is prevalent in this area on adjacent private ownerships. Within the project area, the approximately 470.6 acres of 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 would be expected to be short in duration.

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 would be likely to occur under either alternative.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

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

The Iron Schoolhouse 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.

There are no other DNRC environmental documents that pertain to the project area, however, within the analysis area, the Sparring Bulls Draft EIS, February, 2010 exists, which proposes vegetation management activities including timber harvest, fuels reduction, prescribed burning, wildlife habitat improvement, access management changes and watershed rehabilitation.

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.

Harvesting would result in a short term increase of flashy fuels within the project area from the resulting logging slash, thereby increasing the potential fire hazard. Slash treatments prescribed as part of the action plan would meet or exceed the standards for treating logging slash under the Fire Hazard Reduction Law and associated administrative rules.

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 470.6 acres of land over approximately a 2 year period.

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. According to Montana Bureau of Business and Economic Research for about 10 jobs are supported for one year for every 1 MMBF that is harvested. For this project, that equates to approximately 60 jobs for one year.
.

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 will be no measurable direct, indirect, and cumulative impacts from this proposed action on tax base or 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

There would be no measurable direct, indirect, and cumulative impacts related to demand for government services due to the relatively small size of the timber sale program. There would be short-term increases in traffic, and the small possibility of a few people temporarily relocating to the area.

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.

In the management of State forested trust lands, the DNRC operates under the State Forest Land Management Plan (SFLMP, DNRC 1996) and Administrative Rules for Forest Management (ARM 36.11.401 through 456, DNRC 2003). The SFLMP established the agency's philosophy for management of forested trust lands. The Administrative Rules provide specific guidance for implementing forest management projects. Recently, the DNRC received an Incidental Take Permit from the USFWS and approval of the accompanying HCP. The HCP identifies specific mitigation requirements for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout.

Although this project was planned prior to Permit issuance, as part of a phased-in approach to prepare for HCP compliance, DNRC planned this project using both (1) the current rules (ARM 36.11.401 through 456) that govern the forest management program, and (2) all applicable conservation commitments contained in the Selected Alternative (DNRC HCP ROD 2011).

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 for hiking, hunting, cross-country skiing, snowmobiling and general recreating. Currently, roads through the area are closed to motorized use and used only for administrative purposes. There would be no change in road closure status and the selection of either alternative would not affect the ability of people to recreate on this parcel.

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, and cumulative impacts related to population and housing due to the 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.

Costs, revenues and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return. The estimated stumpage is based on comparable sales analysis. This method compares recent sales to find a market value for stumpage. These sales have similar species, quality, average diameter, product mix, terrain, date of sale, distance from mills, road building and logging systems, terms of sale, or anything that could affect a buyer's willingness to pay for.

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

Action: The timber harvest would generate additional revenue for the Common Schools Trust. The estimated return to the trust for the proposed harvest is $817,400.00 based on an estimated harvest of 6.7 million board feet (40,870 tons) and an overall stumpage value of $20.00 per ton. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives, they are not intended to be used as absolute estimates of return.

EA Checklist Prepared By:	**Name:**	Dave Marsh	**Date:**	1/11/12
	Title:	Forest Management Supervisor		

V. FINDING

25. ALTERNATIVE SELECTED:

Upon review of the Checklist EA and appendices I find 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, DNRC State Forest Land Management Plan, and a consensus of professional opinion on limits of acceptable environmental impact. The No Action Alternative does not meet the project objectives. For these reasons I have selected the Action Alternative for implementation on this project.

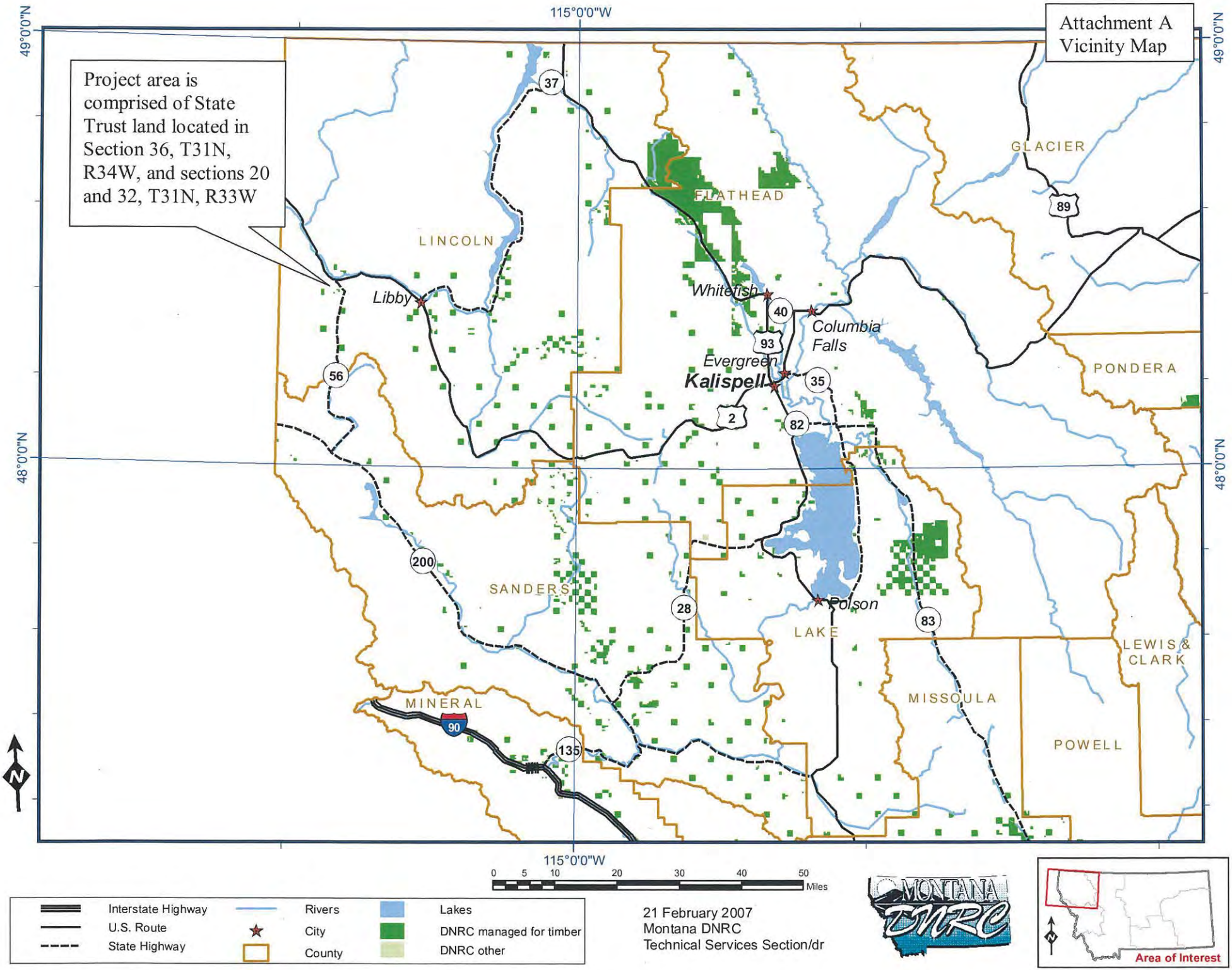
26. SIGNIFICANCE OF POTENTIAL IMPACTS:

After a thorough review of the scoping documents, Department policies, standards, guidelines, and the State Forest Land Management Plan (SFLMP), I find all the identified resource management concerns have been fully addressed in this Checklist EA and it's appendices. Specific mitigation measures for each resource concern are listed in Appendix F. The action alternative provides for income to the school trust 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 to the human environment 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

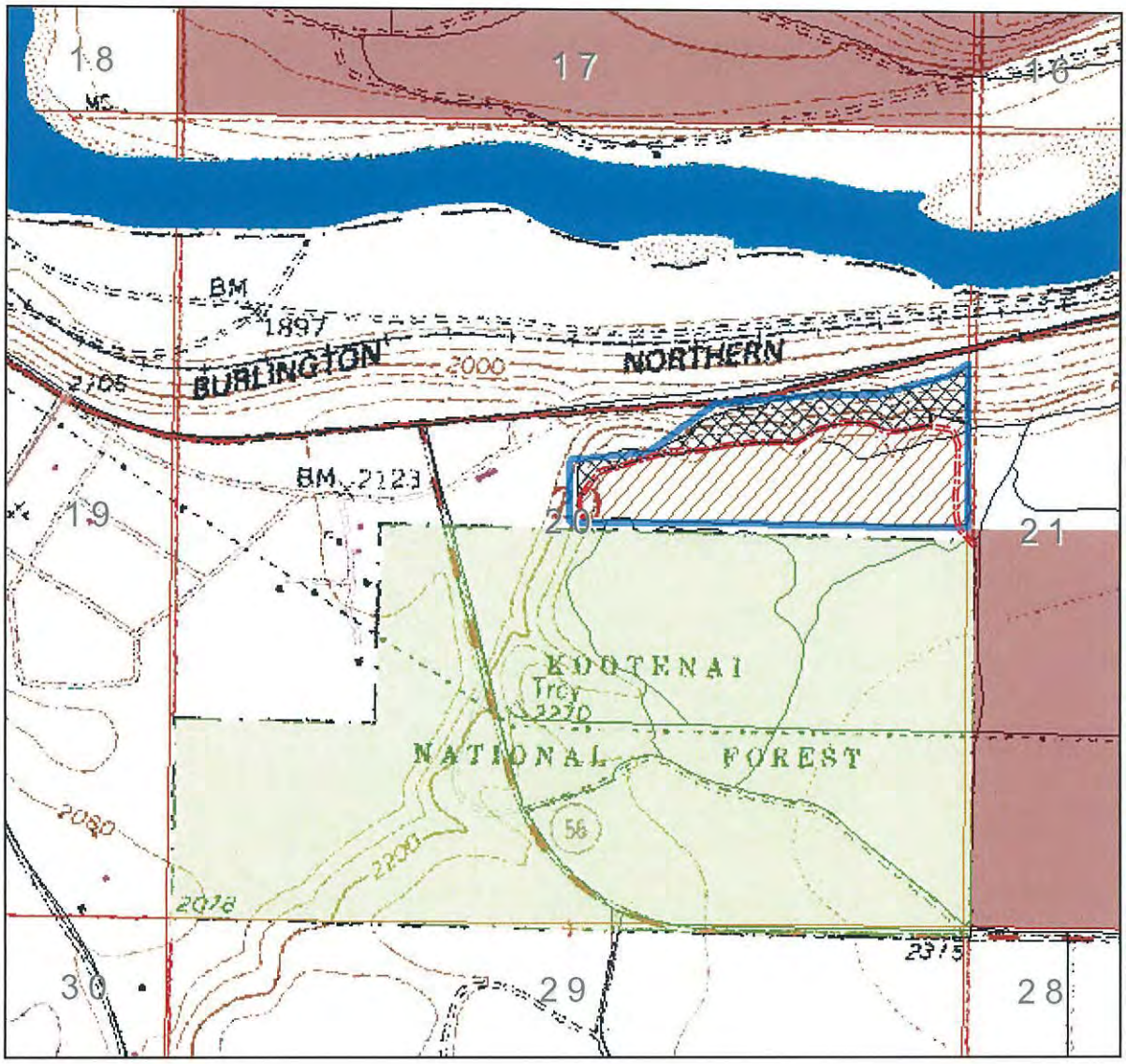
EA Checklist Approved By:	**Name:**	Mark Peck
	Title:	Libby Unit Manager
Signature: /s/Mark Peck		**Date**: 1/13/12


Attachment A
Vicinity Map
Project area is comprised of State Trust land located in Section 36, T31N, R34W, and sections 20 and 32, T31N, R33W
115°0'0"W
49°0'0"N
48°0'0"N
LINCOLN
FLATHEAD
GLACIER
PONDERA
SANDERS
LAKE
MINERAL
MISSOULA
POWELL
LEWIS & CLARK
Libby
Whitefish
Columbia Falls
Evergreen
Kalispell
Polson
37
56
40
93
35
2
82
89
200
28
83
135
90
N
0 5 10 20 30 40 50 Miles
Interstate Highway
U.S. Route
State Highway
Rivers
City
County
Lakes
DNRC managed for timber
DNRC other
21 February 2007
Montana DNRC
Technical Services Section/dr
MONTANA DNRC
Area of Interest

Iron Schoolhouse Timber Sale

Environmental Asessment

Par. 1 of COS 3069 in the S ½ NE ¼ Sec. 20, T31N, R33W



Legend

- Unit 20-1 (30.9 Ac.)
- Unit 20-2 (10 Ac.)
- New Construction
- Re-construction

Ownership

- MT DNRC
- Stimson Lumber Co
- USFS

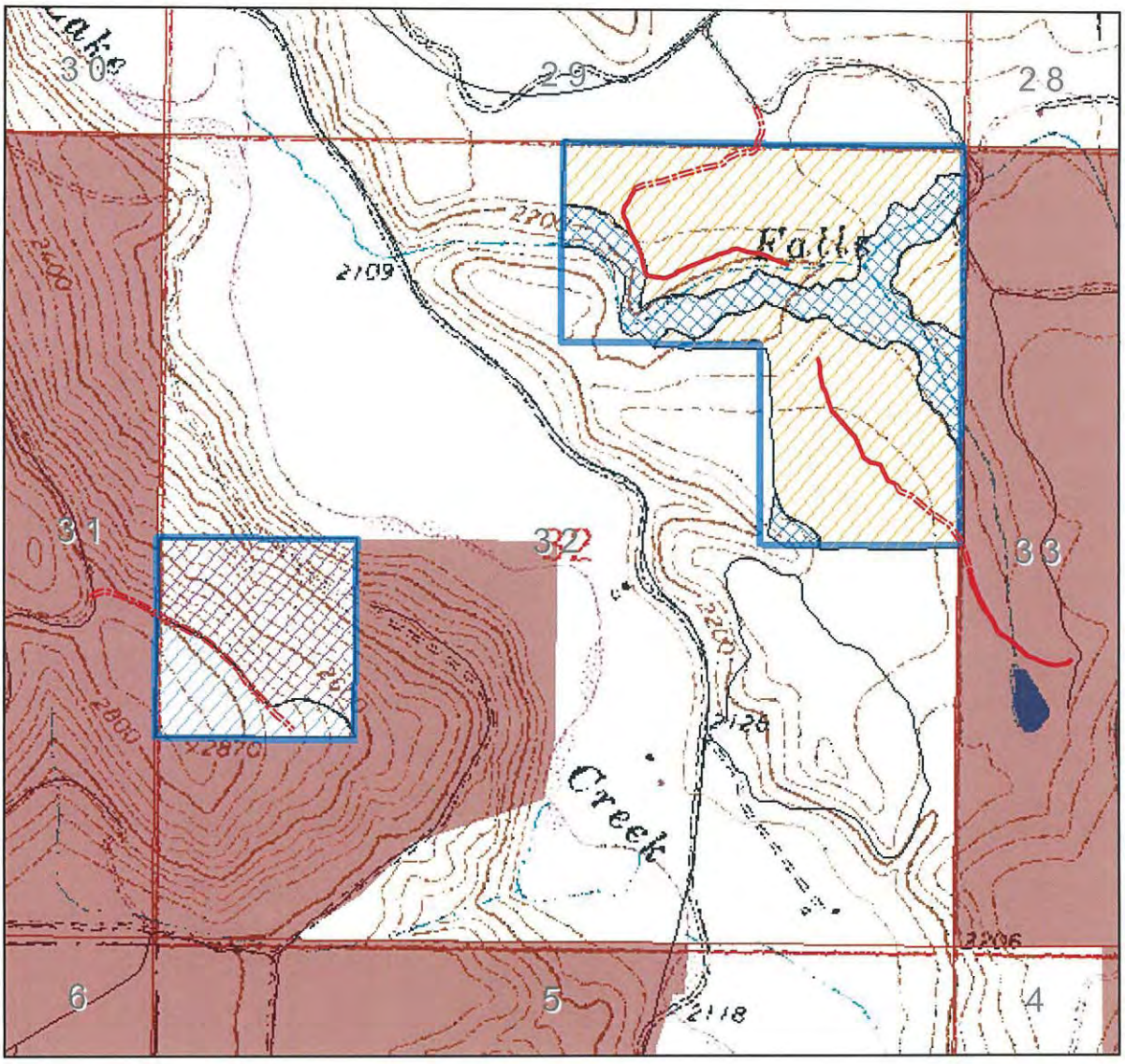
N W E S

1 inch equals 0.22 miles

Iron Schoolhouse Timber Sale

Environmental Asessment

N1/2 NE1/4, SE 1/4, NE1/4, NW1/4, SW1/4, Sec. 32, T31N, R33W



Legend

- Unit 32-1(11.9 Ac.)
- Unit 32-2 (27.1 Ac.)
- Unit 32-3 (87.3 Ac.)
- Unit 32-4 (26.2 Ac.)
- New Construction
- Re-construction

Ownership

- MT DNRC
- Stimson Lumber Co
- USFS

N
W E
S

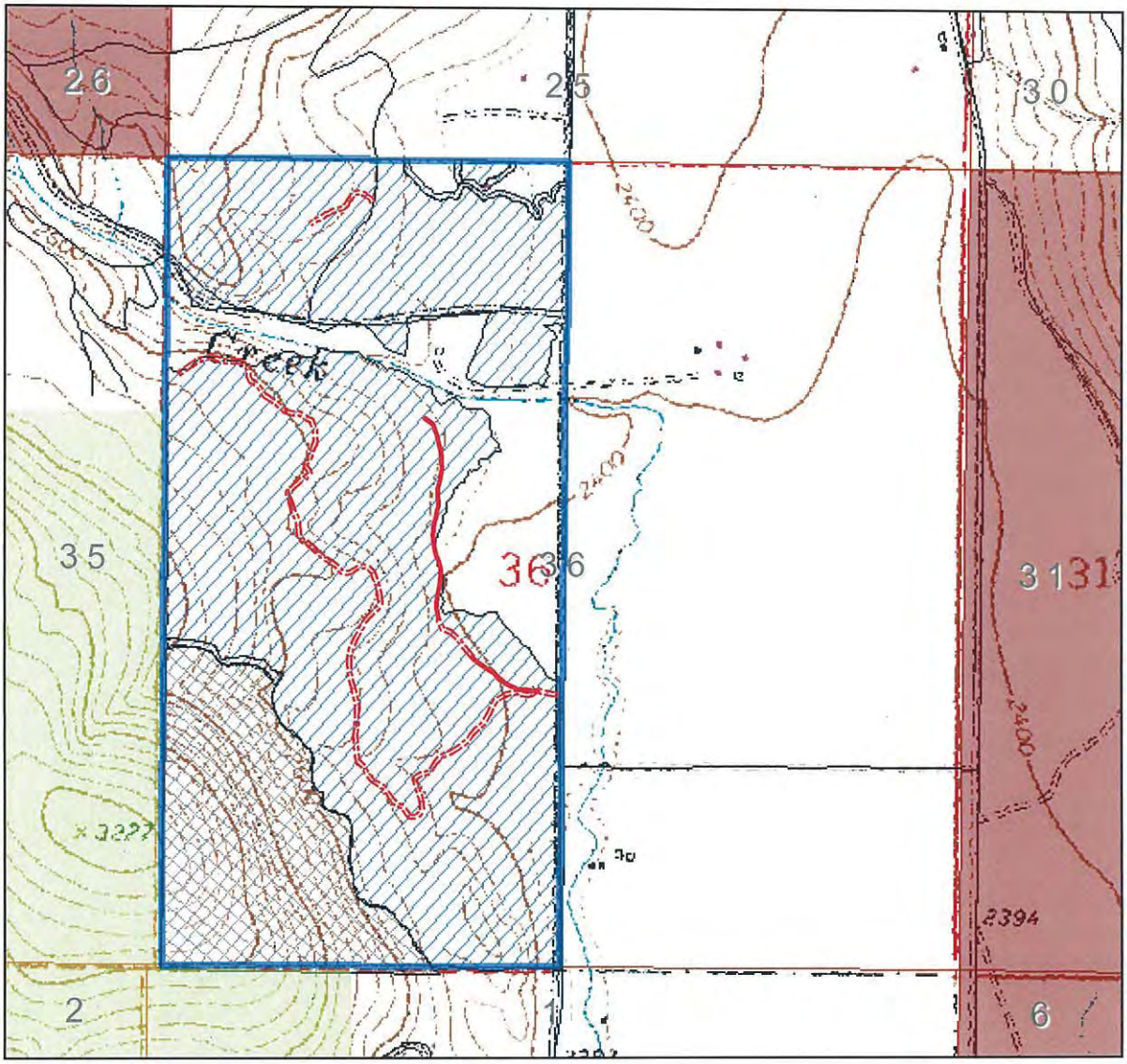
1 inch equals 0.22 miles

Attachment A

Iron Schoolhouse Timber Sale

Environmental Asessment

W 1/2 Sec. 36, T31N, R34W



Legend

- Unit 36-1(221.2 Ac.)
- Unit 36-2 (54 Ac.)
- New Construction
- Re-construction

Ownership

- MT DNRC
- Stimson Lumber Co
- USFS

N W E S

1 inch equals 0.22 miles

WATER RESOURCES ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the hydrologic and fisheries resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, issues were identified regarding water quality, water quantity, and fisheries resources. After reviewing the public and internal comments, DNRC developed the following issue statements regarding the potential effects of the proposed timber harvesting:

- *Timber harvesting and road construction has the potential to increase water yield, which, in turn, may affect erosive power, sediment production and stream channel stability.*
- *Timber harvesting and road construction activities may increase sediment delivery into streams and affect water quality.*
- *Timber harvesting activities may affect water quality and fisheries habitat by reducing shade and increasing stream temperatures.*

These issues can best be evaluated by analyzing the anticipated effects of sediment delivery and water yield on the water quality of streams in the project area and also evaluate the potential effects of reducing forest canopy near streams.

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.

The primary concerns relating to aquatic resources in the analysis area are potential impacts to water quality from sources outside the channel as well as inside the channel. In order to address these issues, the following parameters are analyzed by alternative:

- miles of new road construction and road improvements
- potential for sediment delivery to streams
- increases in the Equivalent Clearcut Acre (ECA) and annual water yield
- increases or decreases in stream shading, woody debris recruitment and fish passage

ANALYSIS METHOD

Sediment Delivery

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

Annual water yield will be disclosed as a cumulative effect in the *EXISTING CONDITIONS* portion of this report because the existing condition is a result of all past harvesting and associated activities. Annual water yield refers to the gross volume of water in a watershed that is contributed to a stream or other surface water feature. In the *ENVIRONMENTAL EFFECTS* portion of this report, water yield increases as a result of this project will be disclosed as a direct effect. The cumulative water yield increase as predicted to include each alternative will be disclosed as a cumulative effect.

The annual water yield increase for watersheds in the project area was estimated using the ECA method as outlined in *Forest Hydrology, Part II (Haupt et al, 1976)*.

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. This method also estimates the recovery of these increases as new trees revegetate the site and move toward preharvest water use.

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 evaluating the acceptable risk level, resources value, and watershed sensitivity. Increased annual water yields above the threshold of concern result in an increased risk of in-channel erosion and degradation of fisheries habitat.

Fish Habitat Parameters

Expected effects to fisheries habitat will be addressed qualitatively using the current condition as a baseline, disclosing the expected changes due to the alternatives proposed. The analysis method for woody debris recruitment will evaluate the potential reduction in available woody debris due to timber-harvesting activities. Stream temperature will be addressed by evaluating the risk of stream temperature increases due to reduced shading from existing vegetation. Connectivity of habitat through road-stream crossings will be addressed by comparing the proposed actions with the current fish passage status.

ANALYSIS AREA

The majority of the project area is in the Lake Creek watershed. However, due to the size of the Lake Creek watershed compared to the project area, an analysis at this scale would result in substantially diluted potential impacts and no meaningful conclusions. Where possible, smaller watersheds will be used to quantitatively describe the potential impacts of the alternatives. The smaller watersheds include Iron Creek and Falls Creek; both are tributaries to Lake Creek. Any discussion of potential impacts outside of these watersheds will be qualitative.

Sediment Delivery

The analysis area for sediment delivery is limited to the proposed harvest units and all roads proposed for hauling products from the proposed timber sale. 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 discussed.

Water Yield and Cumulative Effects

The Iron Creek watershed will be the only water yield analysis area included in this project analysis. This is selected as the appropriate scale of analysis due to the size of the project versus the watershed size and the potential for impacts. Because DNRC manages less than 2 percent of the Falls Creek watershed and approximately half of the watershed is in the Cabinet Wilderness, no detailed analysis will be conducted. Smaller areas of harvest are proposed in Copper Creek, Lake Creek and the Kootenai River; however due to the small amount of proposed harvest compared to the watershed sizes, impacts would not likely be measurable and therefore will not be further addressed.

Fisheries Habitat Parameters

The analysis area for fisheries habitat parameters is the proposed harvest units immediately adjacent to fish-bearing streams. This includes proposed harvest units near Iron Creek, Falls Creek, and an unnamed tributary to Falls Creek. Fish passage will be addressed by reviewing the current status of passage potential along the haul route and comparing it to the changes from each alternative.

WATER USES AND REGULATORY FRAMEWORK

FOREST MANAGEMENT RULES

In 2003, DNRC drafted Administrative Rules for Forest Management. The portion of those rules applicable to watershed and hydrology resources include ARM 36.11.422 through 426. In December 2011, DNRC received an Incidental Take Permit from the USFWS and approval of its accompanying Habitat Conservation Plan (HCP). The HCP identifies specific mitigation requirements for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout. All applicable Forest Management Rules and HCP Commitments will be implemented if they are relevant to activities proposed with this project.

WATER QUALITY STANDARDS

This portion of the Kootenai River Basin, including Lake Creek and its tributaries is classified as B-1 by the State of Montana Department of Environmental Quality (DEQ), as stated in the *Administrative Rules of Montana (ARM 17.30.609)*. The water quality standards for protecting beneficial uses in B-1 classified watersheds are located in *ARM 17.30.623*. Water in B-1 classified waterways is suitable for drinking, culinary and food processing purposes after conventional treatment, bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply. State water quality regulations limit any increase in sediment above the naturally occurring concentration in water classified B-1. Naturally occurring means condition or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil, and water conservation practices have been applied (*ARM 17.30.602 [17]*).

Reasonable land, soil, and water conservation practices include "methods, measures or practices that protect present and reasonably anticipated beneficial uses…" (*ARM 17.30.602 [21]*). The State of Montana has adopted Best Management Practices (BMPs) through its non-point source management plan as the principle means of meeting the *Water Quality Standards*.

WATER QUALITY LIMITED WATERBODIES

Neither Iron Creek nor Falls Creek are listed as a water quality limited waterbody in the *2010 303(d)* list. However, Lake Creek, which is the receiving waters for both streams, is listed *2010 303(d)* list for partial support of aquatic life and cold-water fishery, and non-support of drinking water beneficial uses. The listed probable causes for not fully supporting these uses include metals, sedimentation/siltation, nitrate/nitrite, and mercury. Forest roads are listed as a probable source of sedimentation/siltation. The *303(d)* list is compiled by DEQ as required by *Section 303(d)* of the *Federal Clean Water Act* and the *EPA Water Quality Planning and Management Regulations (40 CFR, Part 130)*. Under these laws, DEQ is required to identify waterbodies 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 will be followed. An SMZ width of 100 feet is required on Class I and II streams when the slope is greater than 35 percent. An SMZ width of 50 feet is required when the slope is less than 35 percent.

WATER RIGHTS AND BENEFICIAL USES

Surface water rights exist within three miles downstream of the project area for irrigation, stock watering, and domestic use and power generation. Beneficial uses include swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers.

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 (*Administrative Rule of Montana (ARM) 36.11.436*).

Bull trout are also listed as a Montana Animal Species of Concern, with the same ranking as westslope cutthroat trout; however bull trout are also listed as"threatened" by the US Fish and Wildlife Service under the Endangered Species Act. DNRC is a signatory to the 2000 (interagency) Restoration Plan for Bull Trout in the Clark Fork River Basin and Kootenai River Basin, Montana.

Bull trout are found in Lake Creek; westslope cutthroat trout are present in Lake, Falls and Iron creeks and several unnamed streams adjacent to the project area.

EXISTING CONDITION

GENERAL DESCRIPTION

- ***Iron Creek***

  The Iron Creek watershed is approximately 5,500 acres and includes several unnamed tributaries. Precipitation ranges from 26 to 55 (34 inches average) inches per year, mostly in the form of snow. Iron Creek flows in a general west-to-east direction before turning south to its confluence with Lake Creek. This stream is generally perennial in the headwaters, but flows intermittently subsurface in the lower portion of the watershed across private lands. A large adjacent wetland can be found on the DNRC managed parcel immediately above private ownership. Springs are found around the wetlands that contribute surface and subsurface flow to the riparian vegetation. Elevations in this watershed range from 2,150 feet above sea level at its confluence with Lake Creek to approximately 5,415 feet above sea level on Goat Mountain. Ownership within the watershed is comprised of private land (24 percent), DNRC-managed lands (5 percent), Stimson (18 percent) and USFS-managed lands (53 percent).

  A data search of the Montana Fisheries Information System indicates that westslope cutthroat trout and eastern brook trout inhabit Iron Creek. Genetic analysis in 2009 suggests that the westslope cutthroat trout above the DNRC-managed parcel are not hybridized.

- ***Falls Creek***

  The Falls Creek watershed is approximately 6,730 acres and includes several unnamed first- and second-order tributaries and Swanson Creek. Precipitation ranges from 26 to 70 (50 inches average) inches per year, mostly in the form of snow. Falls Creek flows in a general east-to-west direction from the Cabinet Mountain Wilderness to its confluence with Lake Creek. Elevations in this watershed range from 2,100 feet above sea level at its confluence with Lake Creek to approximately 7,380 feet above sea level on Grambauer Mountain. Ownership within the watershed is comprised of private land (24.5 percent), DNRC-managed lands (1.7 percent), Stimson lands (11.1 percent) and USFS-managed lands (62.7 percent).

  A review of available fisheries information indicates that westslope cutthroat trout and eastern brook trout occur in Falls Creek. Eastern brook trout are known to displace westslope cutthroat trout, while rainbow trout may hybridize with the native species. Electrofishing was conducted in the DNRC-managed parcel during 2010 to verify species presence. While the large majority of the fish found were eastern brook trout, a rainbow trout and some sculpins were also identified. During field

reconnaissance, barriers were found to migrating fish on the county road downstream of the state parcel, and also immediately upstream of the state parcel on Stimson land.

SEDIMENT DELIVERY

- **Iron Creek**

  During field review, sediment sources were identified on the proposed haul roads in the Iron Creek watershed within and below the DNRC-managed parcel. The main sediment source identified is located where the county road crosses Iron Creek. Recent drainage upgrades were installed, however, sediment from winter sanding and snow plowing is being deposited directly into the stream. No other sediment sources from roads were identified within the state parcel even though the Iron Grouse road is within the SMZ for a portion of its length. Sediment sources from roads above the state parcel have been discussed in the Sparring Bulls Draft Environmental Impact Statement which can be located on the Kootenai National Forest website.

  Varying levels of sediment from in-channel sources is present throughout Iron Creek. Historic removal of woody debris upstream of the state parcel has resulted in reduced sediment storage. A field review in March 2010, noted several locations without adequate levels of woody debris. Impacts of inadequate woody debris can include higher stream velocities and rates of erosion. No evidence of woody debris removal was found within the state parcel boundary although erosion at outcurves was identified. No mass-wasting sites were identified during field reconnaissance.

- **Falls Creek**

  During field review, no sediment sources were identified on haul roads to the Falls Creek parcels. Immediately upstream of the state parcel, an undersized CMP on private land was identified as a sediment source; however this crossing is not part of the haul route. No stream crossings are located along the roads proposed for hauling; therefore the existing risk of sediment delivery to streams is very low.

  In-channel sediment is prevalent throughout the state parcel. Although the source of the sediment is unknown, field review did not identify substantial sources of natural or human-caused sediment from within the state parcel. In-channel erosion was identified at channel constrictions and outcurves. No mass-wasting sites were identified on the state parcel during field reconnaissance. This channel is relatively confined through to the state parcel with banks that are generally stable although individual windthrown trees on the stream banks likely contributes minor amounts of sediment.

FISH HABITAT PARAMETERS

- **Woody Debris**

  Woody debris recruitment to streams is important to maintain channel form and function and as a component of fish habitat. According to *ARM 36.11.425*, DNRC will establish a Riparian Management Zone (RMZ) *'…when forest management activities are*

proposed …on sites that are adjacent to fish bearing streams and lakes.' One reason for the RMZs is to retain adequate levels of large woody debris recruitment to the stream channel. Site potential tree height (SPTH) is the method used to identify RMZ width according to *ARM 36.11.425 (5).* Data collection for site potential tree height in the Falls Creek parcel has resulted in SPTH of 115 feet; the SPTH for Iron Creek was 100 feet.

Iron Creek has approximately 171 acres of RMZ on all ownerships along perennial stream class I stream channel. The current condition of the impacted RMZ varies from a fully forested condition to clearcut and converted to grazing land. Of the 171 acres of RMZ, DNRC has approximately 14 (8%) acres under management. While stumps are present within the state parcel RMZ, the area is fully stocked with sawtimber size trees. No data was collected regarding the existing amount of woody debris in Iron Creek.

Falls Creek has approximately 150 acres of RMZ on all ownerships along continuous perennial stream class I stream channel. The current condition of the impacted RMZ varies from a fully forested condition to clearcut and converted to grazing land or homesites. Of the 150 acres of RMZ, DNRC has approximately 24 (16%) acres under management. In May 2011, woody debris in Falls Creek was sampled by DNRC. The results of the sampling show approximately 83 pieces of wood are present per 1000 feet of stream channel. While this number is below the average, it is within the range of variation of reference sites on the Kootenai National Forest (Bower 2008).

Stream Temperature

No long-term temperature monitoring by DNRC has occurred in any of the streams in the project area. Falls Creek had a spot temperature of 9.5 degrees Celsius during July 2010. This temperature coupled with no indication of an unusually cold or warm thermograph would be expected to provide favorable conditions for salmonids (Bower, 2010). No data on stream temperature for Iron Creek is available.

Fish Passage

Fish passage on the Iron Creek parcel is not impacted by stream crossings on forest roads, however the Iron Creek county road may present a partial barrier to fish. Fish passage on the state parcel is affected during the summer months due to a dewatered channel. The dewatering is a natural event, not caused by man-made diversions.

Falls Creek has at least two fish passage barriers. One is located immediately upstream of the state parcel on a private road, and the other is located downstream of the state parcel on a county road. No crossings are present within the state parcel.

WATER YIELD AND CUMULATIVE EFFECTS

After reviewing the beneficial uses, existing channel conditions, and existing watershed condition per *ARM 36.11.423*, the threshold of concern for the Iron Creek watershed was set at 12% over a fully forested condition. These threshold values expect a low to moderate degree of risk of adverse impacts to beneficial uses due to water yield increases as described in *ARM 36.11.423(f)(iv)*. A review of past and current activities on all ownerships resulted in a modeled estimate of the current annual water yield increase to be approximately 6.7% in the Iron Creek watershed.

ENVIRONMENTAL EFFECTS

DESCRIPTION OF ALTERNATIVES

- ***No-Action Alternative***

  No timber harvesting or associated activities would occur under this alternative. Existing activities such as recreational use, individual Christmas tree harvesting, and firewood gathering would continue.

- ***Action Alternative***

  - Eight units totaling approximately 471 acres would be commercially harvested under this alternative. Four units (349 acres) would be harvested using conventional ground-based equipment; three units (68 acres) would require standard cable yarding methods; and one unit (54 acres) would require downhill cable yarding or helipcopter yarding. The harvest season would not be restricted as long as soil moisture conditions are less than 20 percent. In addition to the proposed timber harvest, up to 3.6 miles of new road would be constructed including up to 0.7 miles of new temporary road; approximately 1 mile of road would be reconstructed; and, approximately 5.9 miles of road would be maintained or have minor drainage improvements installed as necessary to protect water quality. Mechanical site preparation for stand regeneration would occur on approximately 349 acres.

    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. The existing direct sediment-delivery sources would continue until repaired by another project or funding source. In-channel sources of sediment would continue to exist and erode.

  Fish Habitat Parameters

  – ***Woody Debris Recruitment***

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

– ***Stream Temperature***

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

- ***Fish Passage***

No changes to fish passage would occur.

Water Yield

No increase in water yield would be associated with this alternative.

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

Sediment Delivery

Past monitoring of DNRC timber harvests has shown erosion on approximately 6 percent of the sites monitored, although no water quality impacts from the erosion were found (*DNRC 2004*). These sites were harvested during the summer period, and the erosion was attributed to inadequate skid trail drainage. Monitoring of soil impacts from past DNRC timber sales have found that "winter logging resulted in minimal soil displacement. Displacement was limited to main skid trails that occupy less than 2% of the harvest units." (*DNRC 2004*). By minimizing displacement, less erosion would likely occur compared to other harvest methods with more extensive disturbance (*Clayton 1987 in DNRC 2004*).

No harvesting would occur within the 50 feet of Class I streams on the Iron Creek parcel; some SMZ and RMZ harvest is proposed in the Falls Creek parcel. As per administrative rules (*ARM 36.11.304*), no equipment would be operated within the 50- or 100-foot SMZ except for in adjacent wetlands under frozen or snow-covered conditions per the SMZ Law (ARM 36.11.304) and Forest Management Rules (ARM 36.11.426 parts 1c, 2 and 6a. Under frozen or snow-covered conditions, the risk of soil displacement or compaction is reduced.

During a review of BMP effectiveness, including stream buffer effectiveness, *Raskin et al* found that 95 percent of erosion features (disturbed soil) greater than 10 meters (approximately 33 feet) from the stream did not deliver sediment. His 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*).

All new and temporary road construction would occur away from streams on soils that are suitable for road construction (*Kuennen and Nielsen–Gerhardt, 1995*). Because revegetation may be difficult on the road fill, erosion may occur, but because BMPs would be implemented, sediment delivery and subsequent water quality impacts would not likely occur.

Existing roads would have drainage improvements and BMP upgrades implemented under this alternative. Minor drainage improvements include reshaping drain dips, cleaning ditch-relief culvert catchbasins, as well as installing ditch-relief culverts. Current maintenance activities would continue to provide drainage to area roads.

In the Iron Creek watershed, because postharvest annual water yield level under this alternative (7.7%) would remain below the threshold (12%) where adverse impacts would be expected, only a low risk of increased in-channel sediment would result from this alternative. In-channel sources of sediment would be expected to continue to contribute sediment at the current rate because the water yield increase would remain below the recommended threshold.

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

Fish Habitat Parameters

– ***Large Woody Debris Recruitment***

Along Iron Creek, the RMZ width is 100 feet from the stream. While no harvest would occur in the 50 feet nearest the stream, approximately 50 percent of the merchantable trees in the outer 50 feet of the RMZ would be harvested. Approximately 4.4 acres of RMZ (2.5% of total RMZ for Iron Creek) would have reduced recruitable woody debris although sub-merchantable trees would be retained to the extent feasible. This level of retention would be expected to provide adequate levels of recruitable trees to provide fisheries habitat complexity and maintain stream form and function with a low degree of risk of detectable impacts to water resources.

Along Falls Creek, the RMZ is 115 feet from the stream. Approximately 50 percent of the merchantable trees in the SMZ and RMZ would be harvested. Approximately 21.4 acres of RMZ (14.3 percent of total RMZ for Falls Creek) would have reduced recruitable woody debris. This level of retention for Falls Creek stream would be expected to provide for future recruitment into the channels to provide fisheries habitat complexity with a moderate degree of risk of detectable impacts to water resources.

- ***Stream Temperature***

The RMZ buffer for Iron Creek proposed under this alternative is 100 feet based on SPTH. The proposed RMZ harvest would maintain all of the trees within the first 50 feet adjacent to the stream and remove a maximum of 50 percent of the merchantable trees in the remaining 50 feet. Shrubs and submechantable trees would be retained to the extent possible. As discussed in the Montana DNRC Forested Trust Lands Habitat Conservation Plan Final EIS (DNRC 2010), this level

of post-project stream shading retention would be expected to maintain a low risk of increasing stream temperatures due to timber harvesting.

In the Falls Creek the risk of temperature increases due to timber harvest would be higher than if a 50 foot no harvest buffer remained. Some studies in western Montana found that the SMZ law adequately protected streams from temperature increase (Sugden and Steiner 2003). In contrast other studies recommend a buffer of at least 30 feet to fully protect streams from temperature increase (Johnson and Ryba 1992). Because at least 50 percent of the trees in the RMZ would remain, increases in stream temperatures due to timber harvesting would have a moderate risk of occurring and the potential impacts would be low and not likely detrimental to water resources.

- **Fish Passage**

  No changes to fish passage along the haul route are proposed. Therefore, no direct or indirect affects would result to fish passage or connectivity.

Water Yield

If this alternative were selected, approximately 471 acres would be harvested using a variety of harvest methods. Approximately 435 ECA would be generated from the entire project. Most of the ECA would be generated in the Iron Creek watershed (196 ECA). The annual water yield in the Iron Creek watershed would increase by approximately 1.1 percent.

CUMULATIVE EFFECTS

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

Sediment Delivery

The potential for sediment contribution from the proposed haul route would still exist, as would the in-channel sediment sources described in *EXISTING CONDITION*. The existing direct sediment-delivery sources would continue until repaired by another project or funding source. In-channel sources of sediment would continue to exist and erode as natural events dictate.

Fish Habitat Parameters

- ***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.

- ***Stream Temperature***

  No increases in stream temperature from a reduction in stream shading would be expected under this alternative because no harvesting would occur. Natural stream temperatures would be maintained with a low degree of risk.

- **Fish Passage**

  No changes to fish passage would occur under this alternative.

Water Yield

No increase in water yield would be associated with this alternative. As vegetation continues toward preharvest conditions, annual water-yield increases would gradually reduce to preharvest levels.

Cumulative Effects Summary

Because no timber harvesting or associated activities would occur under this alternative, cumulative effects would be limited to the natural progression of the existing condition. Sediment sources would continue unless repaired under a separate project. Conditions would continue to support fish habitat parameters and provide adequate levels of large woody debris and shade to maintain channel form and function and also support a natural range of water temperatures. Under this alternative, fisheries habitat quality would be maintained at its current level with a low degree of risk of change due to anthropogenic sources.

Cumulative Effects of the Action Alternative to Water Resources

Sediment Delivery

The proposed timber harvesting and road construction activities would occur. No reduction in sediment delivery would likely result from any road improvements because no current delivery is occurring. A cumulative increase in sediment delivery as a result of timber harvesting would have a low risk of occurring because of the BMP application and adequate stream buffers to filter potential displaced soil. In-channel sources of sediment would continue to exist and erode with a low risk of increasing enough to adversely affect beneficial uses.

Fish Habitat Parameters

- **Large woody debris recruitment**

  While a reduction in available woody debris would result from the implementation of this alternative, the scope of the reduction is very minor in relation to the watershed sizes. The risk of a cumulative impact that differs from the existing condition would be low.

- **Stream temperature**

  Due to the limited amount of canopy removed in the RMZ of class I streams, no measureable increases in stream temperature would be expected from the cumulative decrease in shading in Iron Creek compared to the existing condition. A low to moderate risk of a measureable increase in water temperature in Falls Creek may result.

- **Fish Passage**

  No changes to fish passage or connectivity are part of this alternative. Existing fish passage issues on other ownerships would remain.

Water Yield

The cumulative water-yield increase (7.7 %) in the Iron Creek watershed would be below the recommended threshold of 12 % if this alternative were selected. Therefore, while the cumulative water yield would increase, because the levels would remain below the threshold set in accordance with *ARM 36.11.425(g)*, a low degree of risk to water quality would result from the implementation of this alternative.

Cumulative Effects Summary

Because all timber harvesting activities would follow BMPs as required by *ARM 36.11.422* and the direct and indirect effects would have a low or moderate risk of impacts, a low-to-moderate risk of additional adverse cumulative effects would be expected to occur under this alternative. This expectation includes the results of (1) a decrease in the recruitable large woody debris in the RMZ along fish-bearing streams; (2) a risk of increased stream temperature in Falls Creek and (3) a minor increase in modeled annual water-yield estimates. Conditions would be expected to continue to support fish-habitat parameters and provide large woody debris and shade to maintain channel form and function and also support a natural range of water temperatures. Under this alternative, fisheries habitat quality would also be maintained at its current level, with a low to moderate degree of risk of change due to anthropogenic sources.

Because the annual water-yield increases would remain below the thresholds of concern and BMPs would be implemented during timber-harvesting and road-construction operations, the risk of adverse cumulative impacts to water quality and beneficial uses, including fisheries habitat, would be low.

REFERENCES

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.

DNRC, 2004. DNRC compiled soils monitoring report on timber harvest projects. Missoula, MT

Haupt, H.F., et al. 1974. Forest hydrology part II: hydrologic effects of vegetation manipulation. USDA Forest Service, Region 1. Missoula, Montana.

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

Bower, J. 2010. Report to NWLO on fisheries recommendations for the Iron Schoolhouse Timber Sale. August 6, 2010.

Bower, J. 2008. Large woody debris (LWD) recruitment trends in five physiographic regions of western Montana. Unpublished. Department of Natural Resources and Conservation, Missoula, MT.

Harrelson, C.C., C.L. Rawlins, J.P. Potyondy. 1994. Stream channel reference sites: an illustrated guide to field technique. General Technical Report RM-245. U.S.

Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Johnson, A. W. and D. M Ryba. 1992. Literature review of recommended buffer widths to maintain various functions of stream riparian areas. Water and Land Resources Division, King County Department of Natural Resources, Seattle, Washington.

Edward B. Raskin, Casey J. Clishe, Andrew T. Loch, Johanna M. Bell (2006). Effectiveness of timber harvest practices for controlling sediment related water quality impacts. Journal of the American Water Resources Association 42 (5), 1307–1327.

USFS, 2010. Sparring Bulls Draft Environmental Impact Statement. Kootenai National Forest, Three Rivers Ranger District.

MDEQ, 2010. Montana Department of Environmental Quality Water Quality Standards Attainment Record. Record No. MT76D004_020. Clean Water Act Information Center Website: http://cwaic.mt.gov/wqrep/2010/assmtrec/MT76D004_020.pdf

Sugden, B. D. and R. L. Steiner. 2003. Effects of current and historic forest practices on stream temperature. Pages 198-203 *in* Total maxium daily load (TMDL) environmental regulations-II, proceedings of the 8-12 November 2003 Conference, Albuquerque, New Mexico.

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 initial scoping, issues regarding soil impacts were identified by DNRC personnel and by the public. The following issue statements were compiled from comments regarding the effects of the proposed timber harvesting:

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

- *Reduced infiltration capacity of an impacted soil can result in overland flow and off site erosion, typically localized to main skid trails and log landing sites.*

- *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 AREA

The project area for this proposal includes approximately 525 acres. The project area contains 6 individual landtype which include proposed timber harvesting and/or road construction/reconstruction. The analysis area for soil impacts will be the area within harvest units and where proposed road activities would take place. This analysis area will adequately allow for disclosure of existing conditions and direct, indirect, and cumulative impacts.

ANALYSIS METHODS

Methods for disclosing impacts include using general soil descriptions and the management limitations for each landtype. *Landtype* refers to a unit of land with similar designated soil, vegetation, geology, topography, climate, and drainage. 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 70 DNRC postharvest monitoring projects. (DNRC, 2005).

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).

While the anticipated impacts from each alternative will disclose the direct/indirect effects, the cumulative impacts will be the result of previous and proposed activities.

EXISTING CONDITIONS

GENERAL 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. Six landtypes were identified in the project area. *TABLE ST-1 - PROJECT AREA LANDTYPE DESCRIPTIONS* provides a brief description of the landtypes within the project area while *FIGURES SF-1– LANDTYPES IN THE PROJECT AREA* provides a visual depiction of the landtype locations.

The Kootenai National Forest Area, like much of northwest Montana, is dominated by bedrock consisting of metasedimentary rocks from the Proterozoic age. Rocks in this formation are generally comprised of argillites, quartzites, and siltites. Surface deposits of glacial till, outwash, and lacustrine sediments can be found throughout the area. Overlying these sediments is a layer of loess that has been influenced by volcanic ash deposited and redeposited from Mount Mazama approximately 6,700 to 6,800 years ago. (*Martinson and Basko, 1998; Kuennen and Nielsen –Gerhardt, 1995*). The volcanic ash deposits are more widespread and deeper in the western portion of the Kootenai National Forest Area, including this project area.

TABLE ST-1 - PROJECT AREA LANDTYPE DESCRIPTIONS displays the dominant slopes, soils and vegetation characteristics in the project and analysis area.

EXISTING CONDITIONS DUE TO PAST FOREST MANAGEMENT

Physical Soil Properties

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.

Past monitoring on DNRC timber sales from 1988 to 2005 has shown an average of 13.9 percent soil impacts across all parent materials. Stratifying the results by soil texture that are similar to the majority of the proposed harvesting shows an average of approximately 10.7 percent of the harvest areas impacted from erosion, displacement or severe compaction (*DNRC 2005*).

The DNRC soil monitoring report (DNRC 2005) noted that ground-based operations that used dozers for site preparation and piling had the largest areas of compaction. Of the 14 sites with similar soils (silt loam and gravelly silt loam), three were dozer piled and had an average 23.2 percent moderate or higher impact from erosion, displacement or severe compaction. The nine sites with similar soil but were not scarified or piled with a dozer showed moderate or higher impacts from erosion, displacement or severe compaction of 6.5 percent. In the case of these sites, it is not conclusive that the dozer piling/scarification was the sole cause of the higher impacts because the season of operation for the dozer piling sites was different than the

majority of the sites without dozer piling. Regardless, this practice has substantially been changed as a result of the monitoring.

Harvesting under winter conditions can result in lower impacts because the ground is frozen and less susceptible to compaction and displacement. Ground-based harvesting on similar soils under winter conditions resulted in average moderate-or-higher impacts from erosion, displacement or severe compaction of 6.3 percent, while summer (dry) activities exhibited 19.4 percent impacts. Cable yarding impacts averaged 6.2 percent, primarily from displacement.

Cumulative effects from past and current forest management in the proposed harvest units are generally limited to a few skid trails and landings generally from the 1940's or the last entry of 1988. Through the freeze-thaw cycles and root mass penetrating the soil, impacts from past entries are substantially reduced. Most impacts have been ameliorated over time, so that skid trails are very difficult to depict. Pace transects in the Iron Creek parcel and Falls Creek parcel indicate past skid trails cover approximately 11 percent of the harvested area. No substantial erosion was observed along transects; compaction was the most viewed impact, primarily from a combination of past management activities current recreational uses.

Past harvesting operations in the project area and analysis area include harvests in the 1920's through the 1970's, although the majority of harvesting occurred in the 1928, 1939-1940 and 1953. A list of harvesting in the project area can be found in the project file. Other forest product removals include fence posts and rails, firewood, and individual and commercial Christmas tree harvests throughout the last 85 years. Due to homesteading, some historic roads are present in the west half of T31N, R34W, Section 36. Hunters, ATV riders and firewood cutters among others have continued to use the roads. Some of these roads are steep and need surface drainage or reclaimation.

Nutrient Cycling

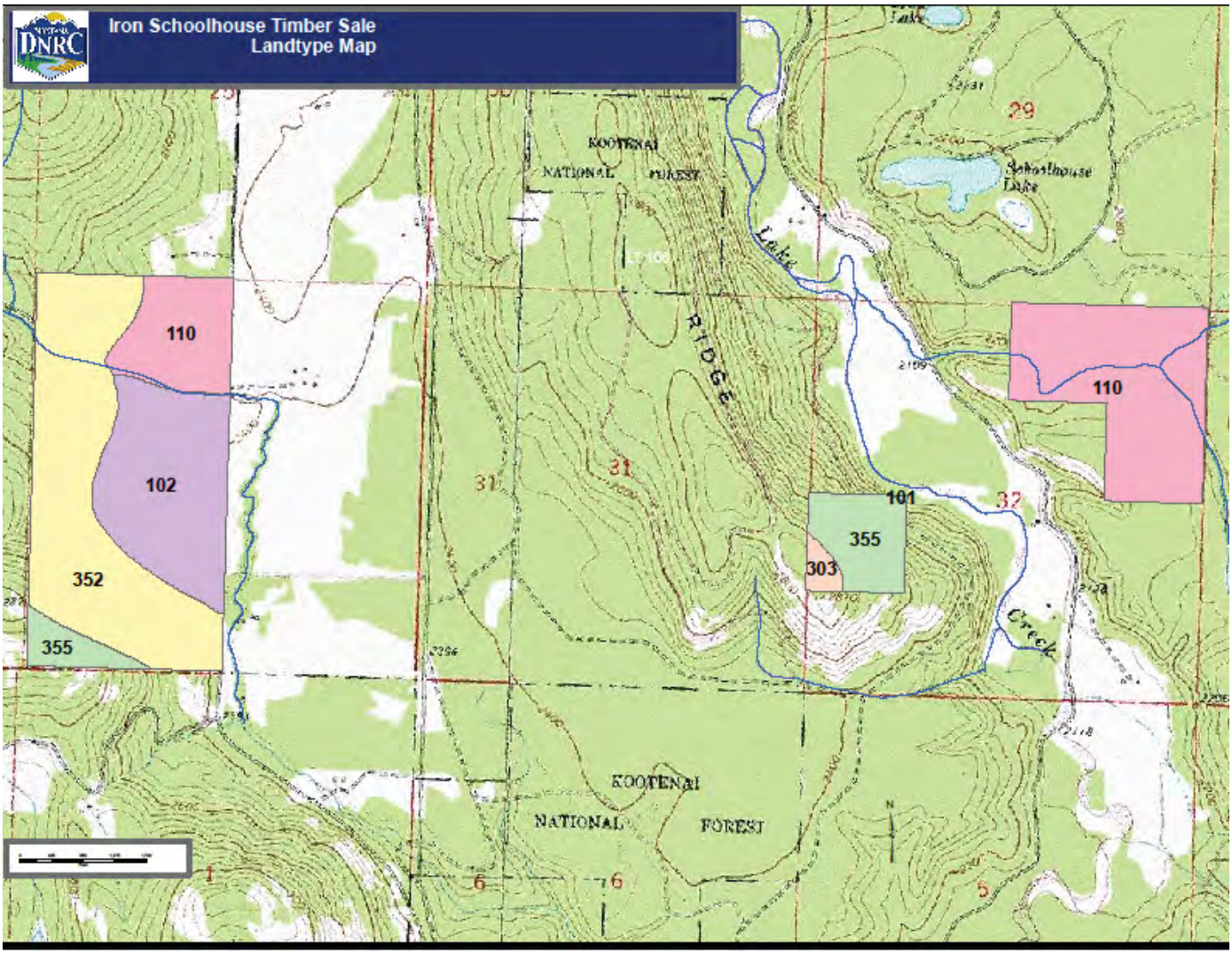
Coarse and fine woody debris provide a crucial component in forested environments through nutrient cycling, microbial habitat, moisture retention and protection from mineral soil erosion. (Harmon et al 1986). While coarse woody debris decays at various rates due to local climatic conditions, the advanced 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.

During field reconnaissance, 12 transects were used to estimate coarse woody debris in the project area, with emphasis on proposed unit locations. The method for quantifying the coarse woody debris is described in the *Handbook for Inventorying Downed Woody Material* (Brown, 1974). The average tonnage per acre was 9.9 with a wide range of 0 to 18.9 tons per acre. The median—which is the point with half the transects showing more and half of the transects showing less—was 9.8 tons per acre.

These results from within to below the recommendations in *Managing Coarse Woody Debris in Forests of the Rocky Mountains* (Graham et al, 1994) for similar habitat types post timber harvest. Recommendations for CWD range from 5 to 13 tons per acre for Ponderosa pine habitat types; 5 to 25 tons per acre for Douglas-fir habitat types; 3 to 14 tons per acre for grand fir habitat types;

and 17 to 33 tons per acre for western hemlock habitat types. For most of this project area, a range of 10 to 20 tons per acre would adequately meet recommendations; the ponderosa pine habitat types would be less, with 5 to 10 tons per acre.

FIGURE SF-1: LANDTYPES IN THE PROJECT AREA



Landtype	Name	Soil & Vegetation Descriptions	Management Considerations			
			Erosion potential**	Timber	Roads	Comments
102	Lacustrine Terraces 0-15% slopes Elev: 2,000-3,700 ft above sea level	Soils have a surface layer of loess influenced by volcanic ash 4-14 inches thick overlying silt loam and silty clay loam glacial lake deposits. Rock content is generally less than 15 percent. Vegetation is characteristic of a moist, mixed forest with western red cedar, western hemlock, grand fir and Douglas-fir over a forest understory dominated by shrubs and forbs.	0.28 for whole soil 0.28 for <2mm fraction	Potential Prod: Mod - High Equipment: Tractor unless wet areas are identified. Regen: Can be limited by frost pockets or frost heaving.	Roadcuts along terraces prone to slumping. Ruts form readily during wet weather on unsurfaced roads. Crusted surface soils may limit revegetation after construction.	Sediment delivery efficiency is low due to the gentle topography. Fine silt material can be damaging to fish spawning gravels. Drainage on the terraces consists of short, deeply incised draws or streams.
106	Glacial Outwash Terraces 0-15% slopes Elev:2,500 - 4,500ft above sea level	These terraces are located at the highest elevation of valleys; adjacent to mountain slopes. Soils have a surface layer of loess influenced by volcanic ash gravelly silt loam/very gravelly very fine sandy loam 4-14 inches thick. Vegetation is characteristic of a mixed forest with western red cedar, western hemlock, grand fir, Douglas-fir and lodgepole pine over a forest understory dominated by shrubs and forbs.	Erosion potential for surface soil is moderate. No K factor in Web Soil Survey.	Potential Prod: High Equipment: Tractor unless wet areas are identified. Regen: cobbles in soil can make planting somewhat difficult	Tread erosion of fine material will leave a rough cobbly surface	Erosion is moderate along skid trails and fire lines. Material exposed during road construction can be easily eroded until vegetation is established.
110	Glacial Outwash Terraces 0 - 15% slopes Elev: 2,000–3,500ft above sea level	Surface soils of loess influenced by volcanic ash. The surface soil layer is 4-14 inches thick. Subsoils are calcareous with rounded rock fragments (up to 15%) typical of glacial outwash. Vegetation is western red cedar, western hemlock, grand fir, western larch, lodgepole pine and Douglas-fir over a forest understory dominated by shrubs and forbs.		Potential Prod: High Equipment: Tractor unless wet areas are identified. Regen: Can be limited by compaction.	Ruts form readily during wet weather on unsurfaced roads	Sediment delivery efficiency is low due to the gentle slopes. Material exposed by road construction has a severe erosion hazard. Due to the fine sediment in the soils, this material is damaging to spawning habitat of fish.
303	Glaciated mountain ridges 15-35% slopes Elev: 3,500-4,700 ft above sea level	Soils in this landtype are formed mostly in material weathered from metasedimentary rocks with some glacial till overlying bedrock in some locations. Rock outcroppings are common. Very cobbly sandy loam surface soils are shallow in this landtype with bedrock typically present within 24 inches of the surface. Vegetation is typically Douglas-fir and lodgepole pine interspersed with grasslands	0.05 for Whole soil 0.20 for <2mm	Potential Prod: very low Equipment: Tractor, although rock outcroppings limits operability. Regen: Can be limited by shallow soils and droughtiness.	Roads are difficult due to hard rock. Cut and fill material is extremely stony. Roads are rough due to the large stones and cobbles. Droughtiness limits revegetation.	Due to the amount of rock in this landtype, sediment delivery efficiency and erosion is limited. Surface drainage systems are very rare to non-existent.
352	Glaciated mountain slopes 20-60% slopes Elev: 2,200-5,600 ft above sea level	Compacted glacial till underlies a volcanic-ash influence loess surface layer up to 14 inches thick. The lower surface soils may have rock fragments that comprise up to 50% of the content. Vegetation is a mixed forest of western larch, Douglas-fir, lodgepole pine and grand fir. The understory is dominated by forbs and low-growing shrubs.	0.15 for whole soil 0.28 for <2mm	Potential Prod: High Equipment: Tractor and cable systems dependent upon slope.	Cutbanks can slough if too steep. Tread erosion of fine material will leave a rough cobbly surface. Crusted surface soils may limit revegetation after construction	Erosion hazard and sediment delivery efficiency is moderate. Trees are susceptible to windthrow due to the restricted root penetration into the compacted glacial till subsoils. Surface drainage features are widely spaced
355	Glaciated mountain slopes 20-50% slopes Elev: 3,000-5,500 ft above sea level	Soils in this landtype are very similar to Landtype 352, except for rock outcrops may occupy up to 20% of this landtype. Vegetation is a mixed forest of western larch, Douglas-fir, lodgepole pine and grand fir. The understory is dominated by forbs and shrubs.	0.15 for whole soil 0.28 for <2mm	Potential Prod: High except in areas of rock outcrops Equipment: Tractor, although rock outcroppings limits operability	Roads are difficult due to hard rock. Cutbanks can slough if too steep. Tread erosion of fine material will leave a rough cobbly surface. Droughtiness limits revegetation.	Erosion hazard and sediment delivery efficiency is moderate. Trees are susceptible to windthrow due to the restricted root penetration into the compacted glacial till subsoils. Surface drainage features are widely spaced

*Note: For the table above, * Erosion Potential is based on slope and soil erosion factor K**. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 70 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight (low), moderate, severe, or very severe. A rating of slight indicates that erosion is unlikely under ordinary climatic conditions; moderate indicates that some erosion is likely and that erosion-control measures may be needed; severe indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and very severe indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion–control measures are costly and generally impractical. (NRCS, 1996)*

***Erosion Factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. (NRCS, 1996)*

ENVIRONMENTAL EFFECTS

DESCRIPTION OF ALTERNATIVES

- ***No-Action Alternative***

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

- ***Action Alternative***

  Eight units totaling approximately 471 acres would be commercially harvested under this alternative. Four units (349 acres) would be harvested using conventional ground-based equipment; three units (68 acres) would require standard cable yarding methods; and one unit (54 acres) would require downhill cable yarding or helipcopter yarding. Harvest season would not be restricted as long as soil moisture conditions are favorable. In addition to the proposed timber harvest, up to 3.6 miles of new road would be constructed including up to 0.7 miles of new temporary road; approximately 1 mile of road would be reconstructed; and, approximately 5.9 miles of road would be maintained or have minor drainage improvements installed as necessary to protect water quality. Mechanical site preparation for stand regeneration would occur on approximately 349 acres.

ENVIRONMENTAL EFFECTS ON SOILS

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

  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.

- ***Direct and Indirect Effects of the Action Alternative on Soils***

  To provide an adequate analysis of potential impacts to soils, a brief description of implementation requirements is necessary. *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 in most areas; less than 18% in units 32-3 and portions of 36-1), 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 general 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 above incised draws may require a combination of mitigation measures, such as adverse skidding to a ridge or winchline, and skidding from more moderate slopes of less than 40 percent.

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

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

6) Retain 5 to 20 tons of large woody debris (dependent upon 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.

Physical Soil Properties

Considering data from the *DNRC SOIL MONITORING REPORT (DNRC, 2005)*, the implementation of Forestry BMPs has resulted in less risk of detrimental soil impacts from erosion, displacement, and severe compaction. While the report noted that the impacts were more likely on the fine-textured soils and steep slopes, reduced soil productivity due to compaction and displacement can occur on coarser parent materials. Also, the greatest impacts occurred where harvesting implementation departed from BMP's by ground-base skidding on slopes of greater than 40 percent.

Comparing 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 under this alternative. The extent of expected impacts would likely be similar to the range reported in the *DNRC SOIL MONITORING REPORT (DNRC, 2005)*, or 6.3 percent for winter operations to 19.4 percent of the harvest area for ground-based operations during summer conditions. Cable yarding would have an estimated 6.2 percent impacts. *TABLE ST-2 – EXPECTED ACRES OF IMPACT TO SOIL FROM COMPACTION AND DISPLACEMENT* summarizes the expected impacts to soils within harvest units.

TABLE ST-2 - EXPECTED ACRES OF IMPACT TO SOIL FROM COMPACTION AND DISPLACEMENT

HARVEST METHOD AND SEASON	NO-ACTION ALTERNATIVE	ACTION ALTERNATIVE
Ground based – 349 acres with a seasonal range of 6.3 to 19.4 percent	0	22 to 68acres
Cable/helicopter harvest (122 acres with impacts up to 6.2 percent of the harvest area)	0	8 acres
Total area of impacts	0	30 to 76 acres
Total harvest	0	473 acres
Percent of area impacted in harvest units	0	6.3 to 16.0 percent

In addition to the potential impacts from harvesting, approximately 13 acres would be impacted by new roads assuming an average 30-foot footprint including cutslopes and fill slopes. While the use of these roads would be temporary/restricted, the road prism (approximately 6 acres) would effectively be removed from forest production. Road construction would likely result in more erosion than native topography; however, minimal ground disturbance due to gentle terrain in many areas coupled with BMP implementation would minimize the risk of erosion by stabilizing soils quickly and protecting against sediment delivery to water bodies. Although the risk of erosion would increase from this alternative—mostly associated with road construction— the magnitude, area and duration of erosion and other adverse impacts such as compaction and displacement would remain acceptable, although near the maximum recommended level.

Nutrient Cycling

As required in the DNRC Timber Sale Contract, both fine and coarse woody debris would be retained to reduce potential impacts to forest productivity. Although, fine woody debris would be left on-site for nutrient retention, a moderate reduction in annual fine material contribution would result from this alternative for up to 20 years. Coarse woody debris would be left on-site to in volumes recommended to help maintain soil moisture and forest productivity, generally in the 5 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 removal would be maintain as much as practicable, the risk of measureable adverse direct or indirect impacts to nutrient cycling would be low.

- ***Cumulative Effects of the No-Action Alternative to Soils***

No additional adverse cumulative effects would be expected from the implementation of the No-Action Alternative. Because harvesting would not be implemented, compaction, displacement and erosion rates above natural levels would not be expected. Coarse woody debris levels and nutrient cycling would continue without anthropogenic alteration.

- ***Cumulative Effects of the Action Alternative to Soils***

  Cumulative effects would be governed by striving to limit the area of adverse soil impacts to less than 15 percent of the harvest units (as recommended by the SFLMP) through implementation of BMPs, skid trail planning on tractor units, and limiting operations to dry or frozen conditions. Existing skid trails would be utilized in locations where BMPs can be met; 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.

  Both fine and large woody debris would be retained for nutrient cycling for long-term soil productivity. By following research recommendations on the levels of coarse and fine material left on site, the risk of cumulative impacts to forest productivity from nutrient pool loss would be low.

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

DNRC, 2005. DNRC Compiled Soils Monitoring Report on Timber Harvest Projects, 1988-2004. Prepared by J. Collins, Forest Management Bureau. Missoula, MT.

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

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

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.

Larson, M.J., M.F. Jurgensen, and A. E. Harvey. 1978, N_2 fixation associated with wood decayed by some common fungi in western Montana. Canadian Journal of Forestry Research. 8:341-345

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

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

WILDLIFE ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the wildlife resources and display the anticipated effects that may result from each alternative of this proposal. The DNRC *Forest Management Rules* and comments received during initial scoping led to the following list of issues:

- The proposed activities could alter mature forested habitats and landscape connectivity, which could affect those species that rely on these mature forested habitats and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape.
- The proposed activities could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependent on these resources, which could alter their survival and/or reproductive ability.
- The proposed activities could alter cover, increase human access, and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing risk to bears of human-caused mortality.
- The proposed activities could change stand conditions, which could reduce or modify lynx foraging habitats, denning habitats, and suitable habitats, rendering them unsuitable for supporting lynx.
- The proposed activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.
- The proposed activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.
- The proposed activities could enhance flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.
- The proposed activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace pileated woodpeckers from active nests, resulting increased mortality to pileated woodpecker chicks.
- The proposed activities could alter northern goshawk habitats and/or displace nesting goshawks from active nests, resulting in increased mortality to goshawk chicks.
- The proposed activities could alter a great blue heron rookery and/or displace nesting great blue herons from active nests, resulting in increased mortality to great blue herons and their chicks.
- The proposed activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range.

ANALYSIS AREAS

Existing conditions and environmental effects are described at two different scales: (1) the ’project area‘, which consists of state-managed portions of sections 20 and 32 in T31N, R33W, and section 36, in T31N, R34W, and (2) the ’cumulative effects analysis area‘ which is the broader, surrounding landscape used for assessing cumulative effects to wildlife species and their habitats. The scales of the cumulative effects analysis areas vary according to the species, but generally approximate the size of the home range for the particular species.

ANALYSIS METHODS

DNRC attempts to promote biodiversity by taking a ‘coarse-filter approach’, which favors an appropriate mix of stand structures and compositions on state lands (*ARM 36.11.404*). Appropriate stand structures are based on ecological characteristics (e.g., landtype, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist and biodiversity would be maintained. This coarse-filter approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a ’fine-filter‘ approach for threatened, endangered, and sensitive species (*ARM 36.11.406*). The fine-filter approach focuses on a single species’ habitat requirements.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, Montana Natural Heritage Program (MNHP) data, and consultations with other professionals provided information for the following discussion and effects analysis. Specialized methodologies are discussed under the species in which they occur. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by any alternative. Past and current activities on all ownerships in each analysis area, as well as planned future agency actions, have been taken into account for the cumulative-effects analysis.

RELEVANT AGREEMENTS, LAWS, PLANS, RULES, AND REGULATIONS

Various legal documents dictate management criteria for the management of wildlife and their habitats on state lands. The documents most pertinent to this project include: *DNRC Forest Management Rule*s, the recently adopted Montana DNRC Forested State Trust Lands Habitat Conservation Plan, the *Endangered Species Act*, the *Migratory Bird Treaty Act*, and the *Bald and Golden Eagle Protection Act.*

COARSE FILTER WILDLIFE ANALYSIS

Of the 108 mammal species found in Montana, 62 are suspected or known to occur in Lincoln County (*Foresman 2001*). The majority of terrestrial vertebrates that were present at the time of European settlement likely still occur in the vicinity of the proposed project area. Eight amphibian and eight reptile species have also been documented in Lincoln County (*Maxell et al. 2003*) and at least 118 species of birds have been documented in the vicinity between 1993 and 2003 (*Lenard et al. 2003*). Terrestrial species that rely on special habitat elements, such as white bark pine (*Pinus albicaulis*), western white pine (*Pinus monticola*), or burned areas, may not be present or may occur in lower abundance due to the decline of these elements across the landscape.

Since the early1900's fire suppression has increased tree densities, and the prevalence of shade-tolerant species, such as Douglas-fir and grand fir. These changes probably benefit wildlife species that rely on shade-tolerant tree species and/or closed-canopy habitats, while negatively affecting species that rely on shade-intolerant tree species and/or open habitats. However, in the vicinity of the project area, the forests are a mosaic of mature and regenerating stands, to the benefit of species relying on mature forests as well as species that use early seral stages either exclusively or seasonally.

MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY

Issue: The proposed activities could alter mature forested habitats and landscape connectivity, which could affect those species that rely on these mature forested habitats and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape.

Introduction

A variety of wildlife species rely on mature to old stands for some or all life requirements. A partial list of these species includes pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*). Wildlife species that require connectivity of forest habitat types between patches or those species that are dependent upon interior forest conditions can be sensitive to the amount and spatial configuration of appropriate habitats. Some species are adapted to thrive near patch edges, while others are adversely affected by the presence of edge or the other animals that prosper in edge habitats. Connectivity of forested habitats facilitates movements of those species that avoid non-forested areas and other openings; connectivity under historical fire regimes likely remained relatively high as fire differentially burned various habitats across the landscape.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 18 sections surrounding the state parcels as well as the remaining portions of the 3 sections that include the project area (total area approximately 13,400 acres). This scale of analysis would be large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats.

Analysis Methods

Mature forested habitats and landscape connectivity were assessed using field evaluations, aerial-photograph interpretation, and Geographical Information System (GIS) analysis. Factors considered in the analysis include the level of timber harvesting, amount of densely forested habitats, and connectivity.

Existing Environment

The project area currently contains approximately 434 acres of mature stands (100-plus years in age) of Douglas-fir/western larch and mixed-conifer stands that have a reasonably closed canopy. One stand in the project area (in section 32, T31N, R33W) meets the definition of old-growth (*Green et al. 1992;* see *VEGETATIVE ANALYSIS-OLD GROWTH*). Currently, forested areas cover the majority of the project area, facilitating some use by those species requiring connected forested conditions and/or forested interior habitats. Connectivity of mature forested habitats in the project area is relatively intact, but the based on the sizes of the parcels and the presence of open roads in portions of the project area, connectivity for some species may still be somewhat limited.

Presently, roughly 57 percent of the cumulative effects analysis area is not in mature, forested conditions due to residential clearing, human development, agriculture, and other past harvesting. The network of open roads in the cumulative-effects analysis area, coupled with timber management and land clearing has reduced some of the landscape-level connectivity. Similarly, forested, interior habitats are also somewhat limited based on these same factors. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area would continue altering continuously forested habitats and altering connectivity; proposed harvesting associated with the USFS Sparring Bulls Project would likely reduce forested habitats and altering connectivity as well.

Environmental Effects

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

Forest conditions would continue to age, and denser stands of shade-tolerant tree species with high amounts of canopy cover would gradually develop. Largely, no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated. No changes in wildlife use would be expected; wildlife favoring dense stands of shade-tolerant tree species would benefit, while those requiring conditions likely found under natural disturbance regimes would continue to be underrepresented. Habitat for forested interior species and old-stand-associated species, such as American marten, northern goshawk, and pileated woodpecker, would likely persist with this alternative; however, western larch, ponderosa pine, and western white pine, the preferred snag species, could decline in abundance over time. Thus, no direct or indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area since: 1) no changes to existing stands would occur; 2) no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

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

Approximately 471 acres of Douglas-fir/western larch, ponderosa pine, and mixed-conifer stands would be harvested, including roughly 384 acres of mature stands with a closed canopy. In general, the majority of the proposed units would be regenerated, which would reduce habitat for those species relying on mature, closed-canopy forested habitats. Overall, the resultant changes in stand age and density would reduce habitats for species associated with older stands, such as American marten and pileated woodpecker, which benefited from the increasing stand ages and densities caused, in part, by modern fire suppression. In general, under this alternative, habitat conditions would improve for species adapted to the more-open forest conditions, while reducing habitat quality for species that prefer dense, mature forest conditions. The proposed activities in the 36-acre stand meeting the definition of old-growth (see *VEGETATIVE ANALYSIS-OLD GROWTH*) would reduce stocking across roughly 26 acres and would move approximately 9.6 acres out of the old-growth category; collectively habitats for those species that use those habitats would be reduced. The proposed activities would further eliminate much of the connected mature habitats; some limited connectivity across 2 of the parcels could still exist following proposed activities where retention would be a little heavier along existing riparian areas. Thus, moderate adverse direct and indirect effects to mature forested habitats and connectivity would be expected since: 1) harvesting would revert succession on roughly 384 acres of mature forested stands, reducing stand age and the amount of forested cover, while reducing canopy closure on another 87 acres; 2) minor-moderate changes to landscape connectivity would occur; and 3) some changes to wildlife use would be expected.

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

Habitats in the cumulative-effects analysis area are a mosaic of habitat types and age classes. Past harvesting, human development, and agricultural clearing has reduced the amount of mature, forested habitats; however, continued successional advances in the cumulative-effects analysis area is advancing stands towards mature forests. This alternative would continue to contribute to the mature forested stands in the cumulative-effects analysis area. Losses of individuals and pockets of trees would not likely alter the overall age or landscape connectivity. Ongoing activities would continue reducing forested habitats and/or altering connectivity; any proposed harvesting associated with the USFS Sparring Bulls Project could also reduce forested habitats and/or alter connectivity. Any use of the analysis area by species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests would be expected to continue at present levels. Habitats for forested-interior species and old-stand-associated species, such as the American marten, northern goshawk, and pileated woodpecker, would not be reduced. Thus, no cumulative effects to mature forested habitats and connectivity would be expected since: 1) no changes to existing stands would occur; 2) no further changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

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

Past harvesting, human development, and agricultural clearing has reduced the amount of mature, forested habitats available in the cumulative effects analysis area; reductions in mature, forested habitats associated with this alternative would be additive to past losses (reducing the amount of the cumulative effects analysis area in closed-canopied forested habitats from 43% to approximately 40%), as well as any ongoing activities, including any potential harvesting that may occur with the proposed USFS Sparring Bulls Project. Across the cumulative-effects analysis area, some forested habitats would still exist, but landscape connectivity would be further reduced. Habitats for forested interior species and old-stand-associated species, such as the American marten, northern goshawk, and pileated woodpecker, would be expected to be reduced; however, some continued use of the analysis area by these species could be expected. Wildlife species favoring earlier seral stage habitats would see another increase in available habitats. Thus, moderate adverse cumulative effects to mature forested habitats and connectivity would be expected since: 1) harvesting would remove mature stands, further reducing the amount of forested cover in the cumulative-effects analysis area; 2) minor reductions to landscape connectivity would occur; and 3) some changes to wildlife use would be expected.

SNAGS AND COARSE WOODY DEBRIS

Issue: The proposed activities could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependent on these resources, which could alter their survival and/or reproductive ability.

Introduction

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

Snags and defective trees (e.g. partially dead, spike top, broken top) are used by a wide variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags and defective trees may be the most valuable individual component of Northern Rocky Mountain forests for wildlife species (*Hejl and Woods 1991*). The quantity, quality, and distribution of snags affect the presence and population size of many of these wildlife species relying on these resources. Snags provide foraging sites for insectivorous species and offer opportunities for primary cavity-nesting species to excavate nests. The cavities created by primary excavators (i.e. woodpeckers) also provide habitat for secondary cavity users, including other birds and small and mid-sized mammals. Snags and defective trees can also provide nesting sites for secondary cavity users where cavities are formed by broken tops and fallen limbs. Larger, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites (*Bull et al. 1997*). Many species that use smaller-diameter snags will also use large snags; however, the opposite is not true. Typically, older-aged stands will have greater numbers of large snags. Finally, snag densities are another important aspect of habitat value for cavity-nesting birds, as many of these species tend to nest in areas where snag densities are high, using one snag for nesting, but having others nearby for foraging or roosting opportunities.

Meanwhile, coarse woody debris provides food sources, areas with stable temperatures and moisture, shelter from the environment, lookout areas, and food-storage sites for several wildlife species. Several mammals rely on deadwood for survival and reproduction. The size, length, decay, and distribution of woody debris affect their capacity to meet these life requisites. Logs less than 6 feet in length tend to dry out and provide limited habitat for wildlife species. Single, scattered downed trees could provide lookout and travel sites for squirrels or access under the snow for small mammals and weasels, while log piles provide foraging sites for weasels and denning sites for lynx.

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 18 sections surrounding the state parcels as well as the remaining portions of the 3 sections that include the project area (total area approximately 13,400 acres). This scale of analysis would be large enough to support a diversity of species that use coarse woody debris resources, from birds to small mammals and meso-carnivores.

Analysis Methods

Snags and coarse woody debris were assessed during site visits and while reviewing past DNRC harvesting information. Factors considered in the analysis include the level of harvesting, number of snags and coarse woody debris, and the risk level of firewood harvesting.

Existing Environment

During field visits to the project area, an average of 1.2 large (>21” dbh) snags per acre were observed (range 0-6.6 per acre), which were largely dominated by western larch and Douglas-fir. Large snags (greater than 21 inches dbh) were more abundant in the older stands and away from open roads and property boundaries where firewood cutting often occurs. Likewise, coarse woody debris is typically abundant in these older stands, with much of the volume coming from larger pieces of downed wood (greater than 10 inches dbh). Medium-sized snags were also variable within the project area, with an average of 4.8 snags (15-21” dbh) per acre, with a similar species mixture. Generally evidence of snag use for feeding and/or cavity building was observed across the project area. Coarse woody debris levels were also variable across the project area, with an average of 9.9 tons per acre (range 0-18.9 tons per acre). The open roads and access from adjacent landowners in portions of the project area have facilitated some firewood gathering, which has affected snag and coarse woody debris levels in the vicinity of those open roads.

Within the cumulative effects analysis area, the ownership pattern is a mosaic of small private owners, corporate timber lands, and USFS-managed lands. Past harvesting in the cumulative-effects analysis area has reduced the availability of snags, snag recruits, and coarse woody debris. Any ongoing harvesting that may be occurring on other ownerships in the cumulative effects analysis area as well as any harvesting that could occur with the Sparring Bulls Project on USFS-managed lands could continue to alter snags, snag recruits, and coarse woody debris levels. Snags and coarse woody debris are frequently collected for firewood, especially near open roads, and considerable firewood gathering occurs in the cumulative-effects analysis area. Snags and coarse woody debris are largely absent from those portions of the cumulative effects analysis area that are non-forested, including a variety of human developments.

Environmental Effects

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

No direct changes in the deadwood resources would be expected. Existing snags would continue to provide wildlife habitats, and new snags would be recruited as trees die. However, in the long-term, densities of shade-intolerant trees and resulting snags could decline as these species are replaced by increasing numbers of shade-tolerant species. Shade-intolerant species tend to provide important habitats, such as nesting structures and foraging habitats, for cavity-nesting birds. Coarse woody debris would persist without other disturbances influencing its distribution and quality. Continued decay and decline in existing snags and trees would continue to contribute to the coarse woody debris in the project area. Thus, negligible direct and indirect effects would be anticipated to snags and coarse woody debris would be anticipated that would affect wildlife species requiring these habitat attributes since: 1) no harvesting would occur that would alter present or future snag or coarse woody debris concentrations; and 2) no changes to human access for firewood gathering would occur.

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

Present and future snags and coarse woody debris would be reduced due to timber harvesting on 471 acres in the project area. Portions of the project area adjacent to open roads or in stands that lack larger snags would not see appreciable changes in the availability of large snags and/or coarse woody debris since these attributes are currently somewhat limited in those areas. Prescriptions call for a minimum of 2 large snags per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class; additional large-diameter recruitment trees may be left if sufficient large snags are not present), and 10-20 tons of coarse woody debris per acre (emphasizing retention of downed logs 15-inch diameter and larger) would be planned for retention in the proposed harvest areas. However, some snags and/or recruit trees could be lost due to safety and operational concerns, but replacements would be identified in order to stay in compliance with *ARM 36.11.411*. Future snag quality in the harvested areas would be enhanced with proposed silvicultural prescriptions that should lead to the reestablishment of shade-intolerant species that tend to provide important habitats, such as long-lasting nesting structures and foraging habitats for cavity nesting birds. Given the amounts, range of variability in sizes, and decay classes of snags and coarse woody debris present in the project area, prescriptions aiming to maintain a variety of these resources would benefit the suite of species that rely on these habitat components. No changes in human access would occur and, therefore, no changes to the potential risk for snag and coarse woody debris loss due to firewood gathering would occur. Thus, minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect wildlife species requiring these habitat attributes since: 1) harvesting would reduce snags, snag recruitment trees, and coarse woody debris; and 2) no changes to human access for firewood gathering would occur.

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

Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered with changing species composition in the stands due to advances in succession. Snags have been retained during some of the past harvesting on adjacent ownerships. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area, including USFS-managed lands included in the proposed Sparring Bulls Project, could continue to alter snag and coarse woody debris densities. Firewood and other forest-product gathering have reduced deadwood resources in the vicinity of the open roads. Snags and coarse woody debris are largely absent from the non-forested habitats in the cumulative effects analysis area and would not be expected to develop in the future. Wildlife species in the cumulative-effects analysis area that rely on snags and coarse woody debris would be expected to persist. Thus, no cumulative effects to snags and coarse woody debris would be anticipated since: 1) no further harvesting would occur, 2) changes in the numbers of snags would be negligible, and 3) no change in the level of firewood gathering would be expected.

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

Some snags and coarse woody debris could be removed from the project area, while others may be recruited. Surrounding lands have experienced different management regimes by the differing owners through time, and within each of these management regimes, snags and coarse woody debris have received different levels of consideration; however, harvesting on all ownerships in the vicinity has reduced these deadwood resources. The losses of snags and coarse woody debris associated with this alternative would be additive to the losses associated with past harvesting, ongoing harvesting, land clearing, as well as ongoing firewood gathering. However, the project requirements to retain a minimum of 2 large snags per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), and 10-20 tons of coarse woody debris per acre (emphasizing retention of downed logs 15-inch diameter and larger) would offset some of the losses associated with this project. Due to a lack of snags or the risk of firewood gathering, some areas would not meet these requirements. A slight reduction in motorized human access would be anticipated with the closing of unauthorized human access points; thus, negligible positive changes to the potential loss of snags and coarse woody debris to firewood gathering would occur. Wildlife species that rely on snags and coarse woody debris in the cumulative-effects analysis area would be expected to persist at similar levels, albeit slightly lower numbers in proposed units following treatment. Thus, minor adverse effects to wildlife species requiring snags and coarse woody debris would be anticipated in the cumulative-effects analysis area since: 1) a cumulative amount of the cumulative-effects analysis area would be harvested, reducing snags and snag-recruit trees while increasing coarse woody debris levels, 2) slight reductions in general public access and associated

firewood gathering would be anticipated, and 3) the slightly increased representation of shade-intolerant species that could become snags in the long term.

FINE-FILTER ANALYSIS

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species listed as threatened or endangered under the *Endangered Species Act of 1973*, species listed as sensitive by DNRC, and species managed as big game by DFWP. ***TABLE W-1 – FINE FILTER*** summarizes how each species considered was included in the following analysis or removed from further analysis because suitable habitat does not occur within the project area or proposed activities would not affect their required habitat components.

TABLE W-1 – FINE FILTER. *Status of species considered in the fine-filter analysis for this proposed project.*

SPECIES/HABITAT	DETERMINATION – BASIS
THREATENED AND ENDANGERED SPECIES	
Grizzly bear (*Ursus arctos*) Habitat: Recovery areas, security from human activity	The project area is in the "occupied habitat" area as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (Wittinger, 2002).
Canada lynx (*Felis lynx*) Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zone	The project area contains 261 acres of forested travel/other and mature foraging habitats.
SENSITIVE SPECIES	
Bald eagle (*Haliaeetus leucocephalus*) Habitat: Late-successional forest more than 1 mile from open water	A portion of the project area is in the home range of the Throops Lake Bald Eagle territory.
Black-backed woodpecker (*Picoides arcticus*) Habitat: Mature to old burned or beetle-infested forest	No recently (less than 5 years) burned areas are in 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 salamander (*Plethodon idahoensis*) Habitat: Waterfall spray zones, talus near cascading streams	No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*) Habitat: Grassland, shrubland, riparian, agriculture	No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
Common loon (*Gavia immer*) Habitat: Cold mountain lakes, nest in emergent vegetation	No suitable lake habitats occur within the project area. Thus, no direct, indirect or cumulative effects to common loons would be expected to occur as a result of either alternative.
Fisher (*Martes pennanti*) Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	Potential fisher habitats occur in the project area.
Flammulated owl (*Otus flammeolus*) Habitat: Late-successional ponderosa pine and Douglas-fir forest	Some suitable dry ponderosa pine and Douglas-fir stands exist in the project area.
Gray Wolf (*Canis lupus*) Habitat: Ample big game populations, security from human activities	The project area is 0.5 miles from the area used by the O'Brien wolf pack and 2 other suspected wolf packs are in the vicinity of the project area. The project area includes big game winter range.

Harlequin duck (*Histrionicus histrionicus*) Habitat: White-water streams, boulder and cobble substrates	No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
Northern bog lemming (*Synaptomys borealis*) Habitat: Sphagnum meadows, bogs, fens with thick moss mats	No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
Peregrine falcon (*Falco peregrinus*) Habitat: Cliff features near open foraging areas and/or wetlands	No suitable cliffs/rock outcrops occur in the project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
Pileated woodpecker (*Dryocopus pileatus*) Habitat: Late-successional ponderosa pine and larch-fir forest	Mature ponderosa pine, western larch/Douglas-fir and mixed conifer habitats exist in the project area.
Townsend's big-eared bat (*Plecotus townsendii*) Habitat: Caves, caverns, old mines	No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats are anticipated as a result of either alternative.
BIG GAME SPECIES	
Big game winter range	White-tailed deer, mule deer, and elk winter range exists in the project area.
Elk security habitat	No elk security habitat exists in the project area and no large blocks of security habitat exist that contribute to a larger block of elk security habitat outside of the project area. Thus, no direct, indirect, or cumulative effects to elk security habitat would be anticipated as a result of either alternative.

THREATENED AND ENDANGERED SPECIES

GRIZZLY BEAR

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

Introduction

Grizzly bears are native generalist omnivores that use a diversity of habitats found in western Montana. Preferred grizzly bear habitats are meadows, riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. Primary habitat components in the project area include meadows, riparian areas, and big game winter ranges. Primary threats to grizzly bears are related to human-bear conflicts, habituation to unnatural foods near high-risk areas, and long-term habitat loss associated with human development (*Mace and Waller 1997*). Forest-management activities may affect grizzly bears by altering cover and/or by increasing access to humans into secure areas by creating roads (*Mace et al. 1997*). These actions could lead to the displacement of grizzly bears from preferred areas and/or result in an increased risk of human-caused mortality by bringing humans and bears closer together and/or making bears more detectable, which can increase their risk of being shot illegally. Displacing bears from preferred areas may increase their energetic costs, which may, in turn, lower their ability to survive and/or reproduce successfully.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on a 31,472-acre area that includes the portion of the “occupied habitat” South of Highway 2 and between the Cedar, Spar, and Callahan subunits of the Cabinet-Yaak Ecosystem. This area approximates the home range size of a female grizzly bear.

Analysis Methods

Field evaluations, aerial photograph interpretation, and GIS analysis were the basis for this analysis. Open road densities in the cumulative effects analysis area were calculated using a simple linear calculation method and areas that are free of motorized human access that could contribute to security habitats were determined using GIS. Security habitats are areas that are > 0.3 miles (500 meters) from any open road, restricted road, or high use roads and trails and meet a minimum size of 2,500 acres. Factors considered in the analysis include amount of the area with open road densities greater than 1 mile per square mile, the amount of available security habitat, and availability of timbered stands for hiding cover.

Existing Environment

The project area is in "occupied habitat" as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (*Wittinger, 2002*). The project area is approximately 1 mile from the Spar and Callahan subunits and 1.5 miles from the Cedar subunit of the Cabinet-Yaak Recovery Area. Grizzly bears have not been documented in the project area, but use of the project area is possible. Grizzly bears generally use different habitats relative to season. The project area primarily provides habitat for grizzly bears in the spring, due to the lower elevations and the presence of riparian areas in which vegetation greens up earlier in the spring. Summer or autumn habitat values are fairly low in the area.

Managing human access is a major factor in management for grizzly bear habitat. Open road densities in the cumulative effects analysis area are fairly high with at least 3.44 miles/square mile (simple linear calculation). No security habitat exists in the project area, and no security habitat exists in the cumulative effects analysis area due to the existing network of open roads. Hiding cover exists within both the project area and cumulative effects analysis area. Additionally, timber harvesting and human development that is occurring or has occurred on other ownerships likely altered grizzly bear habitats and/or human disturbance levels; proposed activities associated with the USFS Sparring Bulls Project could also alter grizzly bear habitats and/or human disturbance levels.

Environmental Effects

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

No direct effects to grizzly bears would be expected. No changes to the level of disturbance to grizzly bears would be anticipated. Foraging opportunities might decline due to the lack of diversity in habitat such as forest edge and younger age-class stands. No changes in security core, open-road density, or hiding cover would be anticipated. Thus, no direct or indirect effects to grizzly bears would be anticipated since: 1) no disturbance or displacement would be expected, 2) no changes in hiding cover would occur, 3) security habitat would not be altered, and 4) no changes in long-term open-road densities would be anticipated.

Direct and Indirect Effects of the Action Alternative on Grizzly Bears

This alternative might affect grizzly bears directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources. Activities in grizzly bear habitats reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance or to move from the area. These disturbances would only be present during harvesting operations; therefore, the season of disturbance is important in addressing impacts to grizzly bears. The proposed harvesting would likely occur during the non-denning period, which would likely have minor direct effects to grizzly bears; no direct effects to grizzly bears would be anticipated if harvesting occurred during the denning period. Use of the project area by grizzly bears would likely be the greatest during the spring, and mitigations to avoid harvesting during the spring period (April 1 –June 15) on in the Iron Creek (units 36-1, 36-2 in section 36, T31N, R34W) and Freeman Ridge (units 32-1 and 32-2 in section 32. T31N, R33W) parcels would further reduce the likelihood of disturbing and displacing grizzly bears. No seasonal restrictions, outside of soil moisture constraints, would apply to the other units (units 32-3 and 32-4 in section 32, and 20-1 and 20-2 in section 20, T31N, R33W) and should activities occur during the spring period, grizzly bears could be disturbed or displaced. Overall, the proposed activities would occur in areas where low levels of grizzly bear use would be anticipated or would occur during the time periods when grizzly bears would not be expected to be using the area, leading to negligible disturbance and displacement of grizzly bears.

Hiding cover, defined as vegetation that will hide 90 percent of a grizzly bear at a distance of 200 feet, would be reduced on much of the 471 acres proposed for harvesting. Some hiding cover in the form of brush, shrubs, and sub-merchantable trees would persist in many of the units, albeit at a reduced level from the existing condition; hiding cover would increase through time as young trees and shrub regeneration proceeds over the next 5 to 10 years. Several patches of cover would be retained in the Iron Creek (units 36-1, 36-2 in section 36, T31N, R34W) and Freeman Ridge (units 32-1 and 32-2 in section 32. T31N, R33W) parcels, which would lower the risk of grizzly bear mortality caused by mistaken identity or malicious activity while maintaining some structural diversity in the project area. Security habitat would not be entered or altered with this alternative.

Up to 3.6 miles of new roads would be constructed with the proposed activities that would be closed to the general public following potential use associated with this alternative. All existing roads would revert to the existing status after proposed harvesting, thus no changes to long-term open road densities and public motorized access would be anticipated. Some increases in non-motorized human access could occur on the newly constructed roads. Thus, minor adverse direct or indirect effects to grizzly bears would be anticipated since: 1) negligible disturbance and displacement would be anticipated; 2) hiding cover would be reduced in much of the project area, but would remain in portions of the project area, and would be expected to recover in the short-term; 3) no changes to security habitats would be expected; and 4) no changes to long-term open road density would be anticipated.

Cumulative Effects of the No-Action Alternative on Grizzly Bears

Motorized access to the area and open road density would remain unchanged. Existing forested stands throughout the cumulative effects analysis area would be expected to persist in to the future; regenerating stands are either presently providing hiding cover and forage resources, or would be expected to do so in the near future. Any alterations to potential grizzly bear habitats and/or disturbance to grizzly bears that may be occurring in the cumulative effects analysis area would continue influencing grizzly bears as presently influencing grizzly bears; any potential harvesting associated with the proposed USFS Sparring Bulls Project could alter grizzly bear habitats and/or disturb grizzly bears. Human development and associated disturbance in much of the cumulative effects analysis area limits the likelihood of grizzly bear use; continued moderately high levels of human disturbance in the cumulative effects analysis area would be anticipated. Thus, no further adverse cumulative effects to grizzly bears would be anticipated since: 1) no changes in human disturbance levels would be expected; 2) no changes to open road density would occur; 3) no further losses of hiding cover would occur; and 4) no changes to security habitats would be expected.

Cumulative Effects of the Action Alternative on Grizzly Bears

The increased use of road systems during the proposed project could temporarily increase human disturbance to grizzly bears within a portion of the cumulative effects analysis area. Proposed activities would occur in the portions of the cumulative effects analysis area already experiencing moderate levels of human disturbance, largely associated with open roads and private ownerships, and would be away from the more remote portions of the cumulative effects analysis area that are more likely to be used by grizzly bears. Collectively, minor short-term (2-4 years) increases in human disturbance would be anticipated in the cumulative effects analysis area. Continued use of the cumulative effects analysis area by grizzly bears would be anticipated at levels similar to present. Reductions in hiding cover would be additive to the reductions from past timber harvesting, ongoing harvesting, including any potential USFS harvesting associated with the Sparring Bulls Project, as well as more permanent land-cover changes in the cumulative effects analysis area; however, appreciable amounts of the cumulative effects analysis area are currently providing hiding cover. Early successional stages of vegetation occurring in harvest units could provide foraging opportunities that do not exist in some mature stands. Open road density would increase in the short-term, but no changes in long-term open-road density would be anticipated. The fairly extensive road system would persist and would continue to facilitate human access within the cumulative effects analysis area; a slight increase in non-motorized access to a small amount of the cumulative effects analysis area would occur. Thus, minor adverse cumulative effects to grizzly bears would be anticipated since: 1) minor increases in human disturbance levels would be expected within the cumulative effects analysis area in the short-term; 2) hiding cover would be removed in the short-term on a small portion of the cumulative effects analysis area, but would be expected to recovery fairly rapidly; 3) no changes in long-term open road density would occur, and 4) no changes to security habitats would be expected.

CANADA LYNX

Issue: The proposed activities could change stand conditions, which could reduce or modify lynx foraging habitats, denning habitats, and suitable habitats, rendering them unsuitable for supporting lynx.

Introduction

Canada lynx are associated with subalpine fir forests, generally between 4,000 and 7,000 feet in elevation in western Montana (*Ruediger et al. 2000*). Lynx habitats in western Montana consist primarily of stands that provide habitat for snowshoe hares—either dense young coniferous stands or dense mature forested stands—as well as mature subalpine fir types with abundant coarse woody debris for denning and cover for kittens, and densely forested cover for travel and security. These conditions are found in a variety of habitat types, particularly within the subalpine fir series (*Pfister et al. 1977*). Historically, high intensity, stand-replacing fires of long fire intervals (150 to 300 years) within continuous dense forests of lodgepole pine, subalpine fir, and Engelmann spruce created extensive even-aged patches of regenerating forest intermixed with quite old stands that maintained a mosaic of snowshoe hare and lynx habitat.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the 31,472-acre cumulative effects analysis area described in the grizzly bear section above. The scale of each of these analysis areas approximates the home range size of an individual lynx (*Ruediger et al. 2000*).

Analysis Methods

To assess lynx habitat, DNRC SLI data were used to map specific habitat classes used by lynx. Lynx habitat (*ARM 36.11.403[40]*) was assigned to a stand if the SLI data indicated habitat types (*Pfister et al. 1977*) that are consistent with those reportedly used by lynx (*Ruediger et al. 2000*). Other parameters (stand age, canopy cover, and amount of coarse woody debris) were used in modeling the availability of the following 5 specific lynx habitat elements:
1) denning,
2) young foraging,
3) mature foraging,
4) forested travel/other habitat, and
5) temporary non-lynx habitats.

Denning habitat provides important vegetative and woody structure needed to provide denning sites and security for juvenile lynx, while foraging habitat is critical for the survival of both adult and juvenile lynx. 'Forested travel/other habitat' is a general habitat category that provides for secondary prey items and contains modest levels of forest structure usable by lynx. Temporary non-lynx habitat consists of non-forest and open forested stands that are not expected to be used by lynx until adequate horizontal cover re-establishes. Factors considered in the analysis include landscape connectivity and the amount of the cumulative-effects analysis area in denning, foraging, and temporary non-lynx habitats.

Existing Environment

The proposed project area ranges from approximately 2,080 to 2,280 feet in elevation; on DNRC ownership, the project area is dominated by mixed conifer with appreciable acreage in Douglas-fir/western larch and ponderosa pine types. Approximately 261 acres in the Iron Creek parcel (section 36, T31N, R34W) was identified as lynx habitats. Much of this habitat was considered forested travel/other habitats (197 acres) with lesser amounts of mature-foraging (63 acres) habitats. Connectivity of forested habitats within the project area is relatively intact (see *WILDLIFE ANALYSIS—MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY*). In general, the project area appears to contain marginal lynx habitats and extensive use of the project area would not be anticipated. The project area is not within the area recently designated as Critical Habitat by the USFWS.

At the cumulative-effects analysis area scale, DNRC manages approximately 526 acres (1.7 percent) of the 31,472-acre cumulative effects analysis area, including roughly 261 acres of lynx habitats. *ARM 36.11.435* requires a minimum of 5 acres of lynx denning habitats and 10 percent of the lynx habitats on DNRC-managed lands to be in foraging habitats, which is only partially being met on DNRC-managed lands in the cumulative effects analysis area currently. The cumulative effects analysis area includes minor amounts of USFS lands, and is not within any of the

USFS Lynx Analysis Units (LAU), but is near the border of both the Keeler and Crowl LAUs for short distances. None of the USFS lands in the cumulative effects analysis area include any mapped lynx habitats (using USFS mapping protocols) and most of the USFS lands immediately adjacent to the cumulative effects analysis area are also identified as non-lynx habitats. The rest of the cumulative effects analysis area is largely privately-owned. Using remotely-sensed USDA Forest Service data, approximately 41 percent of the cumulative effects analysis area is in early regenerating forest and 36 percent is in mature forest with a reasonably closed (>40%) canopy. Without knowing dominant tree species, covertype, and understory structure in these mature stands, it is difficult to determine their suitability for lynx use. It is reasonable to assume that some of mature stands on these other ownerships within the cumulative effects analysis area would meet the guidelines as potential lynx denning and/or mature foraging habitats. Similarly, some portions of regenerating forest within the cumulative effects area could be suitable young foraging habitat for lynx. Forest type, stem density, and time since last disturbance play important roles in shaping the suitability of young foraging habitat for lynx. The distribution of lynx habitats across the cumulative effects analysis area is likely the result of fire suppression, past harvesting, agricultural clearing, and residential development. Similarly, landscape connectivity is somewhat limited due to many of these same factors. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue altering lynx habitats and landscape connectivity; proposed harvesting associated with the USFS Sparring Bulls Project could also alter landscape connectivity. None of the cumulative effects analysis area is within the area recently designated as Critical Habitat by the USFWS. In general, the cumulative effects analysis area appears to contain marginal lynx habitats at best and extensive use of the area would not be anticipated.

Environmental Effects

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

In the short-term, no changes in lynx habitat elements would be expected in the project area. In the longer-term, —barring a major natural disturbance—natural succession would advance several classes forward, improving lynx habitats, including potentially developing requisite denning habitats in the future; however, a net reduction in young foraging habitats would be expected over time, in the absence of any stand disturbance. Thus, habitat quality for snowshoe hares could decline, thereby reducing the availability of prey for lynx in the future. Mature foraging habitats would be expected to remain at similar levels, or increase in the future, as shade-tolerant trees develop in the understory and coarse woody debris accumulates through time due to natural events. Forested travel/other habitats would be expected to gradually transition into mature foraging habitats. Therefore, in the short-term, no effects to lynx would be expected and no young foraging habitats would exist in the project area. Landscape connectivity would not be altered in the near-term and could improve in the long-term. The existing stands of continuous forested habitats could facilitate lynx movement should they be using the area. Existing closed roads and skid trails would remain closed; no changes in human-disturbance levels would be expected. Thus, minor beneficial direct and indirect effects to lynx habitats would be expected since: 1) no denning habitats would exist, but could develop in the future; 2) sufficient mature foraging habitat would exist; 3) young foraging habitats would continue to be absent without disturbance; 4) no lynx habitats would be in the temporary non-lynx habitat category, meaning all of the lynx habitats would be in a usable state for lynx; and 5) landscape connectivity would not be altered.

Direct and Indirect Effects of the Action Alternative on Canada Lynx

Approximately 220 acres of potential lynx habitats would be harvested with regeneration-type treatments where canopy cover and horizontal cover would be removed to prepare for regenerating trees. These prescriptions would convert available mature foraging and forested travel/other habitats into temporary non-lynx habitats, until tree seedlings and shrubs recover and begin providing habitats for snowshoe hares. It could take up to 10 years for seedlings to provide snowshoe hare habitats, and then these ephemeral habitats would gradually outgrow usefulness to snowshoe hares in 10 to 20 years. The removal of mature foraging and forested travel/other habitats with this alternative would prevent these habitats from developing into denning habitats in the near-term. Retention of patches of advanced regeneration of shade-tolerant trees, where feasible, would break-up site distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx. In all proposed units, 10-20 tons of coarse woody debris would be retained to provide some horizontal cover and security structure for lynx. In the short-term, any lynx in the area would likely avoid proposed harvest units, resulting in habitat shifts away from the regeneration units. Retention of existing habitats along Iron Creek (section 36 in T31N, R34W), the existing cabin site lease, around the agricultural hay field, and the riparian bottomland would retain some potential lynx habitats (~37 acres) while affording some connectivity along Iron Creek. This area would also meet the

minimum requirements established in *ARM 36.11.435* for foraging habitats, but would continue to be deficient in the denning habitat requirements. Collectively, moderate adverse direct and indirect effects to lynx habitats would be expected since: 1) denning habitats would continue to be absent and development of these attributes would be further delayed; 2) mature foraging habitats would be reduced, but some mature foraging habitats would be retained; 3) young foraging habitats would develop in the next 20 to 30 years in the project area; 4) considerable amounts of lynx habitats would be in the temporary non-lynx habitat category, meaning most of the lynx habitats would not be in a usable state for lynx; and 5) connectivity along riparian areas would persist despite an overall reduction in landscape connectivity, particularly in the uplands.

Cumulative Effects of the No-Action Alternative on Canada Lynx

Within the cumulative effects analysis area, the mosaic of habitats would be expected to continue providing snowshoe hare habitats intermixed with mature forested stands that may facilitate some lynx use of the area. No appreciable change in existing lynx habitats would occur under this alternative, except the continued maturation of stands. Mature foraging and denning habitats would be expected to increase in the future, as shade-tolerant trees develop in the understory, and coarse woody debris accumulates through time due to natural events, and, in-general, stands continue maturing out of young foraging and forested travel/other habitats. Therefore, in the short-term, negligible negative effects to lynx would be expected. In the longer-term, without human or natural disturbance, young foraging opportunities could potentially decrease over time as stands mature toward mature foraging, denning, and forested travel/other habitats. On DNRC-managed lands in the cumulative effects analysis area, sufficient foraging habitats would persist to satisfy DNRC's commitment for foraging habitat requirements (*ARM 36.11.435*); however, denning habitats would continue to be absent from DNRC-managed lands in the cumulative effects analysis area, but could develop in the future as succession advances. No changes to landscape connectivity would be anticipated. Lynx habitats and landscape connectivity in the cumulative-effects analysis area could be altered with any ongoing harvesting in the cumulative effects analysis area. Thus, negligible adverse cumulative effects to lynx habitats would be expected since: 1) no changes to any potential denning or foraging habitats would occur; 2) young foraging habitats could continue developing in the near-term across the cumulative-effects analysis area; 3) longer-term availability of young foraging habitats would likely decline without disturbance; 4) no changes in the amount of lynx habitats in the temporary non-lynx habitat category would occur, meaning most of the lynx habitats would be in a usable state for lynx; and 5) landscape connectivity would not be altered.

Cumulative Effects of the Action Alternative on Canada Lynx

Within the cumulative effects analysis area, most of the existing lynx habitats would persist. Minor reductions in mature foraging and forested travel/other habitats in the proposed units would not be expected to appreciably alter the use by lynx of the cumulative-effects analysis area. Following harvesting, sufficient foraging habitats would be retained on DNRC-managed lands to satisfy DNRC's commitment for foraging habitat requirements (*ARM 36.11.435*) in the cumulative-effects analysis area; denning habitats would continue to be absent from DNRC-managed lands in the cumulative effects analysis area, and this alternative would move existing stands away from conditions where denning habitat attributes would be developing. Anticipated reductions in lynx habitats would be additive to past losses from timber harvesting, human developments, agricultural clearing, and other ongoing modifications in the cumulative-effects analysis areas; likewise, increases in temporary non-lynx habitats would be additive to previous modifications of lynx habitats due to timber harvesting and other land use changes in the cumulative-effects analysis areas. Most of the potential lynx habitats in the cumulative effects analysis area would be in the temporary non-lynx habitat category, meaning most of the available habitats would not be suitable for use by Canada lynx. Gradually, young foraging stands would develop on these temporary non-lynx habitats. Within the next 2 decades, some of the forested travel and temporary non-lynx habitats would be expected to develop into some of the other suitable lynx habitat categories. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area would continue altering potential lynx habitats. A relatively small amount of the cumulative-effects analysis area would be converted to the temporary non-lynx habitats, meaning minimal changes to the amount of suitable lynx habitats would be expected. Landscape connectivity would be further reduced with the proposed activities (see *WILDLIFE ANALYSIS—MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY*). Thus, minor adverse cumulative effects to lynx habitats would be expected since: 1) no changes to denning habitats would occur; 2) some foraging habitats would persist despite reductions in available habitats on DNRC-managed lands; 3) young foraging habitats would continue developing for the next 10 to 30 years; 4) limited additional amounts of lynx habitats would be in the temporary non-lynx habitat category, but large portions of the

existing lynx habitats on DNRC-managed lands would be in this category ; and 5) reductions in landscape connectivity would not prevent lynx movements through the cumulative-effects analysis area.

SENSITIVE SPECIES

BALD EAGLE

Issue: The proposed activities could reduce bald eagle nesting and perching habitats and/or disturb nesting bald eagles.

Introduction

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

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on the Throops Lake bald eagle territory home range. This cumulative effects analysis area likely includes the areas used by the pair of eagles using the territory.

Analysis Methods

Effects were analyzed using a combination of field evaluations and aerial photograph interpretation within the bald eagle home range. Factors considered within this analysis include disturbance levels and availability of large, emergent trees with stout horizontal limbs for nests and perches.

Existing Environment

The project area is partially included in the Throops Lake bald eagle territory and observations of eagles nesting in the vicinity have been recorded since 1996. This territory has produced at least 3 chicks in the last 5 years and there was a year during which the nesting success is unknown. The aquatic habitat associated with this bald eagle territory includes Throops Lake, Kootenai River, Savage Lake, Milnor Lake, Schoolhouse Lake, and several smaller lakes in the project area. These waterbodies may all be important components of the Throops Lake bald eagle territory. Aquatic and terrestrial prey species are fairly common in the home range. The terrestrial habitat incorporated by the Throops Lake Bald Eagle Territory is a coniferous/deciduous mixture along the lakeshores and riparian areas, with coniferous forests in the upland areas. Within the present home range, black cottonwood is the deciduous tree of primary importance to bald eagles, while large emergent conifers also provide important nesting, roosting, and perching habitats.

Bald eagle habitat is managed at three spatial scales, according to *ARM 36.11.429*—the nest area (area within a 0.25-mile radius of the active nest tree or nest sites that have been active within five years), the primary use area (an area 0.25-0.50-miles from the nest tree), and the home range (area within 2.5 miles of all nest sites that have been active within five years). Ownership in the nest-site and primary-use areas is entirely private, but the delineated home range incorporates 121 acres of DNRC-managed lands, 4,668 acres of Forest Service lands, 7,441 acres of private ownership, and 336 acres of water.

Human disturbance, including timber harvesting, residential development, agricultural clearing, and various forms of recreation are potential sources of disturbance to the nesting territory. Several large emergent trees are available across portions of the home range, but logging in the last 100 years has likely reduced some of these trees while others have experienced mortality and are declining in quality. Any harvesting that may be occurring on other ownerships in the home range could continue disturbing bald eagles or modifying their habitats; proposed harvesting associated with the USFS Sparring Bulls Project could also affect bald eagles and their habitats.

Environmental Effects

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

No direct or indirect effects to bald eagles would be expected. Human disturbance would continue at approximately the same levels. No changes in available nesting habitats would occur. Thus, since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees would be expected, negligible direct and indirect effects would be expected to affect bald eagles using the territory.

Direct and Indirect Effects of the Action Alternative on Bald Eagles

All of proposed units 20-1, 20-2, 32-4 and most of 32-3 are within the home range of the Throops Lake territory. Within these proposed units, proposed activities would alter forested canopy on approximately 138 acres. No seasonal restrictions exist on any of the proposed units in the home range and they could be harvested when appropriate soil conditions are met. Should those units in the home range be harvested when the eagles are not using the nest (August 16 – February 1), activities would be expected to have minimal effects to bald eagles and any harvesting during the nesting period (February 1 – August 15) would be expected to have minor effects to bald eagles, with a gradual decrease in effects as time progresses through the nesting period. Efforts to limit harvesting in the portions of these units within the home range to the non-nesting period would have the least risk of displacing the bald eagle pair and/or disrupting their breeding. The potential for displacement would only be expected to affect eagles during the activities and not beyond. Prescriptions for these units in the home range would be largely a regeneration-type treatment and the resultant stands would be fairly open after completion, which could slightly increase visibility and associated disturbance. Within the home range, prescriptions call for the retention of some large snags and emergent trees that could be used in the future as nest or perch trees as the stands develop around these resources. No changes to human access to the home range would occur, thus limiting potential for introducing additional human disturbance to this territory. Thus, minor direct and indirect effects to bald eagles would be anticipated since: 1) disturbance could be elevated within the territory during operations; 2) no change in human access within the project area would occur; and 3) negligible changes in the availability of large, emergent trees would be expected.

Cumulative Effects of the No-Action Alternative on Bald Eagles

Nesting bald eagles would continue to experience varying levels of disturbance from the ongoing recreational use as well as disturbance associated with the BNSF railroad and Highway 2. Additionally, human developments on private lands would continue to provide potential sources of disturbance to the territory. Emergent trees exist across portions of the home range. No further changes in human disturbance, development, recreation, timber harvesting, or firewood gathering within the home range area would be anticipated. Thus, no cumulative effects to bald eagles would be expected since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees would be expected.

Cumulative Effects of the Action Alternative on Bald Eagles

Nesting bald eagles would continue to experience varying levels of disturbance from the ongoing recreational use of the vicinity as well as disturbance associated with the BNSF railroad and Highway 2. Additionally, human developments on private lands would continue to provide potential sources of disturbance to the territory. Any potential disturbance and/or noise from the proposed harvesting would be additive to any of these other forms of disturbance, however no changes in bald eagle behavior would be anticipated. Emergent trees exist across ownerships in the home range. Thus, minor cumulative effects to affect bald eagles would be anticipated since: 1) disturbance would be elevated within the territory during harvesting operations; 2) no changes in human access within the territory would occur; and 3) negligible changes in the availability of large, emergent trees would be expected.

FISHER

Issue: The proposed activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.

Introduction

Fishers are a mid-sized forest carnivore whose prey includes small mammals such as voles, squirrels, snowshoe

hares, and porcupines, as well as birds (*Powell and Zielinski 1994*). They also take advantage of carrion and seasonally available fruits and berries (*Foresman 2001*). Fishers use a variety of successional stages, but are disproportionately found in stands with dense canopies (*Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994*) and avoid openings or young forested stands (*Buskirk and Powell 1994*). However, some use of openings may occur for short hunting forays or if sufficient overhead cover (shrubs, saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites and tend to use areas within 150 feet of water (*Jones 1991*). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining travel corridors.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the 31,472-acre cumulative effects analysis area described in the grizzly bear section above. This scale includes enough area to approximate overlapping home ranges of male and female fishers (*Heinemeyer and Jones 1994*).

Analysis Methods

To assess potential fisher habitat and travel cover on DNRC-managed lands in the cumulative-effects analysis area, sawtimber stands within preferred fisher covertypes (*ARM 36.11.403[60]*) below 6,000 feet in elevation with 40 percent or greater canopy closure were considered potential fisher habitat. Fisher habitat was further divided into upland and riparian-associated areas, depending on the proximity to streams and based on stream class. Effects were analyzed using field evaluations, GIS analysis of potential habitat, and aerial-photograph interpretation. Factors considered include the amount of suitable fisher habitats, landscape connectivity, and human access.

Existing Environment

The project area ranges from 2,080 to 2,280 feet in elevation, with approximately 1.7 miles of Class 1 and Class 2 streams. DNRC manages preferred fisher covertypes within 100 feet of Class 1 and 50 feet of Class 2 streams, so that 75 percent of the acreage (trust lands only) would be in the sawtimber size class in moderate to well-stocked density (*ARM 36.11.440[1][b][i]*). Approximately 39 acres are in these riparian areas in the project area along the 1.7 miles of Class 1 and Class 2 streams. Modeling fisher habitats using SLI data generated an estimate of 421 acres of fisher foraging, resting, denning, and travel habitats (382 upland acres and 39 riparian acres) in the project area (*Heinemeyer and Jones 1994*). Within the riparian areas, all of the preferred fisher covertypes (38 of 39 acres, or 97.4 percent) are moderately or well-stocked and likely support the structural features necessary for use as fisher resting and denning habitats in addition to serving as travel habitats and maintaining landscape connectivity.

Within the cumulative effects analysis area there are roughly 1,446 acres within 100 feet of the 40 miles of perennial streams and 50 feet of the 24 miles of intermittent streams. Within the riparian habitats on DNRC-managed lands in the cumulative effects analysis area, most (38 of 39 acres; 97.4 percent) of the area in preferred fisher covertypes presently provides structural features necessary for use as fisher resting and denning habitats, which exceeds the required threshold of 75 percent. Additionally, roughly 389 acres of upland fisher habitats exist on DNRC-managed lands in the cumulative effects analysis area. Preferred fisher covertypes occur across portions of the cumulative effects analysis area; suitable habitats likely occur on a smaller subset of those lands. The network of open roads in the cumulative effects analysis area coupled with timber management, human developments, and agricultural clearing in the past 40 years has reduced landscape-level connectivity. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area would continue altering fisher habitats; proposed harvesting associated with the USFS Sparring Bulls Project would likely alter fisher habitats in the cumulative effects analysis area as well. Human developments and agricultural clearing are common on some of the private ownerships in portions of the cumulative effects analysis area, limiting fisher habitats. Across the cumulative effects analysis area, landscape connectivity has been compromised by many of these same activities.

Environmental Effects

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

No effects to fishers would be expected under this alternative. Minimal changes to the stands providing fisher habitats would be expected. Habitats that are conducive to fisher denning and travel may improve in time due to

increases in tree growth and canopy closure; however, foraging opportunities may decline in future decades if disturbance is minimized, since habitats such as edges and younger age-class stands that support a variety of prey species would decline in abundance on the landscape. Human disturbance and potential trapping mortality would expect to remain similar to current levels. No changes in landscape connectivity would occur. Thus, no direct and indirect effects to fishers would be anticipated since: 1) no changes to existing habitats would be anticipated; 2) landscape connectivity would not be altered; 3) no appreciable changes to snags, snag recruits, and coarse woody debris levels would be anticipated; and 4) no changes to human access or potential for trapping mortality would be anticipated.

Direct and Indirect Effects of the Action Alternative on Fishers

Approximately 20 acres in the project area are within 50 feet of Class I streams, and the remaining 19 acres are between 50 and 100 feet from those same streams. Approximately 23 of the 39 acres of riparian fisher habitats (59 percent) in the project area would be included in proposed harvest units. Roughly 9 acres of potential fisher habitats within 50 feet of Falls Creek would be harvested, but retention would be heavier to meet the SMZ law. These areas would be expected to continue to be somewhat suitable for fisher following proposed treatments and should continue to meet the definitions of fisher habitats after the proposed treatments. The quality of these habitats would be reduced with the proposed harvesting and use of the area would likely decline from the existing condition. An additional 12 acres within proposed units (of the 19 acres in the project area) occurs between 50 and 100 feet of the Class I streams (Iron and Falls creeks) in the project area. The majority of this would be harvested with regeneration-type treatments (8.5 of the 12 acres), which would remove any potential fisher habitats from those acres for 40-90 years. Additionally, approximately 346 of the 389 acres (89 percent) of upland fisher habitats in the project area would receive regeneration-treatments, rendering these acres too open for appreciable fisher use following proposed treatments. No changes in open roads would be anticipated, which would not likely alter trapping pressure and the potential for fisher mortality. Moderate reductions in connectivity of mature forested habitats would be expected (*see WILDLIFE ANALYSIS-MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY*); some connectivity along riparian areas would persist as proposed activities would reduce habitat quality adjacent to the riparian areas and likely constrict movements within a narrow area. Thus, moderate adverse direct and indirect effects to fisher would be anticipated since: 1) harvesting would reduce potential habitat quality in much of the riparian areas; 2) harvesting would reduce upland fisher habitats; 3) moderate reductions in landscape connectivity would occur, facilitating some travel, but largely only in a fairly constricted area immediately adjacent to the streams; 4) harvesting would reduce snag and coarse woody debris levels; however, some of these resources would be retained; and 5) no appreciable changes in motorized human access levels would be anticipated.

Cumulative Effects of the No-Action Alternative on Fishers

Fisher denning and resting habitats would be retained. Suitable fisher foraging, denning, and resting habitats occur across portions of the cumulative effects analysis area. No changes in forest connectivity would be anticipated; however current landscape connectivity in the area has been compromised by past harvesting, land clearing, and human development. Ongoing harvesting, including any potential harvesting associated with the USFS Sparring Bulls Project, could continue altering fisher habitats. Road access within the cumulative effects analysis area would not change; therefore, fisher vulnerability to trapping would remain unchanged. Thus, no further cumulative effects to fishers would be anticipated since: 1) no changes to existing habitats on DNRC ownership would occur, 2) landscape connectivity afforded by the stands on DNRC ownership would not appreciably change, 3) no changes to snags, snag recruits, or coarse woody debris levels would be expected, and 4) no changes to human access or potential for trapping mortality would be anticipated.

Cumulative Effects of the Action Alternative on Fishers

Approximately 21 acres of the 39 acres of potential riparian fisher habitats on DNRC-managed lands in the cumulative effects analysis area would be harvested. Proposed activities would reduce the amount of the preferred fisher covertypes meeting structural requirements for fishers on DNRC-managed lands in the cumulative-effects analysis area from 97.4 to 75%, which would meet the minimum threshold established in *ARM 36.11.440(1)(b)(i)*. Roughly 346 acres of the 389 acres of potential upland fisher foraging and travel habitats on DNRC-managed lands would be harvested. These reductions would be additive to the losses associated with past timber harvesting, ongoing harvesting, including any potential USFS harvesting associated with the Sparring Bulls Project, as well as more permanent land-cover changes in the cumulative effects analysis area. Minor changes in landscape

connectivity in the cumulative-effects analysis area would be anticipated. No appreciable changes in human disturbance and potential trapping mortality would be anticipated. Thus, minor-moderate adverse cumulative effects to fisher would be anticipated since: 1) harvesting would remove upland fisher habitats, but some upland habitats would persist in the cumulative effects analysis area; 2) roughly 22% of the fisher habitats associated with the riparian areas on DNRC-managed lands would be removed, which would be additive to past losses across all ownerships; 3) minor changes in landscape connectivity in the cumulative effects analysis area would be anticipated; 4) harvesting in a relatively small portion of the cumulative effects analysis area would partially reduce snags and snag recruits, while increasing the coarse woody debris levels, largely in the smaller-sized pieces; and 5) no appreciable changes to motorized human access would occur.

FLAMMULATED OWL

Issue: The proposed activities could enhance flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.

INTRODUCTION

Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and are secondary cavity nesters. They usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12-25" dbh aspen, ponderosa pine, or Douglas-fir. Without disturbance, Douglas-fir encroach upon ponderosa pine stands, increasing stand density and resulting in decreased habitat quality for flammulated owls.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 18 sections surrounding the state parcels as well as the remaining portions of the 3 sections that include the project area (total area approximately 13,400 acres). This area includes enough area to support several pairs of flammulated owls (*McCallum 1994*).

Analysis Methods

To assess potential flammulated owl habitats on the project area, SLI data were used to identify stands in preferred habitat types (*ARM 36.11.403(28)*). Direct and indirect effects as well as cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and a GIS analysis of available habitats. Factors considered within the cumulative effects analysis area included the degree of harvesting and the amount of continuous forest within the cumulative effects analysis area.

Existing Environment

The stands in the project area are largely mixed conifers with lesser amounts of Douglas-fir/western larch and ponderosa pine, and these stands are largely ponderosa pine and western larch/Douglas-fir appropriate types. Within the project area there are approximately 109 acres of potential flammulated owl habitats. The current conditions may be partially a result of the encroachment by Douglas-fir in the past. During field visits, 1.2 large snags >21” dbh per acre (*see WILDLIFE ANALYSIS-SNAGS AND COARSE WOODY DEBRIS*) were observed in the project area.

Presently, roughly 57 percent of the cumulative effects analysis area is not in mature, forested conditions due to residential clearing, human development, agriculture, and other past harvesting. Existing and regenerating forested stands are largely dominated by western larch/Douglas-fir, ponderosa pine and mixed conifers. Some of the stands harvested in the recent past may be suitable foraging habitats for flammulated owls. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area would continue altering flammulated owl habitats; proposed harvesting associated with the USFS Sparring Bulls Project would likely alter flammulated owl habitats in the cumulative effects analysis area as well. Human developments and agricultural clearing are common on some of the private ownerships in portions of the cumulative effects analysis area, limiting flammulated owl habitats. Meanwhile modern fire suppression has allowed Douglas-fir in-growth to create denser stands of ponderosa pine, Douglas-fir, and mixed conifers in portions of the cumulative effects analysis area, which has reduced habitat quality for flammulated owls. Collectively, the flammulated owl habitats in the cumulative effects analysis area are somewhat limited.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on flammulated owls

Existing flammulated nesting habitats within the project area would continue maturing; likewise younger stands from the past harvesting would also mature and becoming denser, which would reduce the quality of this area for foraging. In the long term, stands once dominated by ponderosa pine could continue to be converted to Douglas-fir stands through succession, become densely stocked, and exist at high risk to insects, disease and stand-replacement fire. Therefore, habitat sustainability and quality for flammulated owls would continue to decline. Thus, negligible adverse direct and indirect effects to flammulated owls would be anticipated since: 1) no harvesting would occur; 2) no changes to potential nesting habitats would be anticipated; and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession leading to denser stands.

Direct and Indirect Effects of the Action Alternative on flammulated owls

Flammulated owls are tolerant of human disturbance (*McCallum 1994*), however the elevated disturbance levels associated with harvesting could negatively affect flammulated owls should they be using existing habitats. Proposed timber harvest would open the canopy on approximately 471 acres, including approximately 108 acres of potential flammulated owl habitats, while favoring ponderosa pine, Douglas-fir, western white pine, and western larch. Elements of the forest structure important for nesting flammulated owls, including snags (a minimum of 2 snags per acre > 21 in. dbh where they exist, otherwise the next largest size class), coarse woody debris (10-20 tons per acre, emphasizing retention of downed logs 15-inch diameter and larger), numerous leave trees, and snag recruits (> 21 in. dbh where they exist, otherwise the next largest size class) would be retained in the proposed units. Realistically, however, some snags would likely be removed due to safety and/or logistical concerns (*see WILDLIFE ANALYSIS-SNAGS AND COARSE WOODY DEBRIS*), which further affects flammulated owls now and into the future. The more open stand conditions, the retention of fire adapted tree species, and the maintenance of snags would move the proposed project area toward historical conditions, which is preferred flammulated owl habitat. Thus, minor positive direct and indirect effects to flammulated owls would be anticipated since: 1) harvesting would open denser stands up; 2) elements of forest structure (snags, snag recruits, and coarse woody debris) used for foraging and nesting by flammulated owl would be retained; 3) prescriptions would lead to more open stands with scattered mature ponderosa pine; and 4) prescriptions could promote future development of ponderosa pine within the units.

Cumulative Effects of the No-Action Alternative on flammulated owls

Flammulated owl habitats would persist in the state parcels where it presently exists. Portions of the cumulative effects analysis area has been harvested in the recent past, potentially improving flammulated owl habitats by creating foraging habitats and reversing a portion of the Douglas-fir encroachment, however retention of large ponderosa pine was not necessarily a consideration in many of these harvest units; thereby minimizing the benefits to flammulated owls. Ongoing harvesting in the cumulative effects analysis area could continue to alter flammulated owl habitats; additionally, flammulated owl habitats could be further altered with the proposed USFS Sparring Bulls Project. Other portions of the cumulative effects analysis area that are in non-forested habitats and not currently providing flammulated owl habitats are not expected to change any time in the future. Collectively, existing stands across the cumulative effects analysis area would continue maturing and becoming more densely stocked, which would reduce habitat quality for flammulated owls. Thus, negligible adverse cumulative effects to flammulated owls would be anticipated since: 1) no harvesting would occur; 2) no changes to potential nesting habitats would be anticipated; and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession leading to denser stands.

Cumulative Effects of the Action Alternative on flammulated owls

Proposed harvesting would add to the amount of the cumulative effects analysis area that has been recently harvested, which would add to the amount of foraging habitats available, but possibly at the expense of nesting habitats. Collectively, stands across the cumulative effects analysis area would continue maturing and becoming more densely stocked, which would reduce habitat quality for flammulated owls. Some of the stands that have been harvested in the recent past would continue providing potential foraging habitats in the short-term. Ongoing harvesting in the cumulative effects analysis area could continue to alter flammulated owl habitats; additionally, flammulated owl habitats could be further altered with the proposed USFS Sparring Bulls Project. The portions of

the cumulative effects analysis area that are in non-forested types and not currently providing flammulated owl habitats would not be expected to change. Thus, negligible beneficial cumulative effects to flammulated owls would be anticipated since: 1) harvesting would reduce flammulated owl nesting habitats while potentially increasing foraging habitats; and 2) an increase in the amount of the cumulative effects analysis area would be more representative of historic conditions.

GRAY WOLF

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

Introduction

The gray wolf was listed as 'endangered' under the *Endangered Species Act* in the northern portion of Montana, which includes the project area. The gray wolf was de-listed on March 28, 2008; however, a preliminary injunction (July 18, 2008) led to the re-listing of wolves in this area as "endangered." Following the injunction, the USFWS requested the Court allow them to voluntarily withdraw its decision to delist wolves and re-evaluate information and make a new decision, which was granted (October 14, 2008). The USFWS then de-listed the gray wolf (May 4, 2009), and a recent federal ruling (August 8, 2010) re-instated the Endangered classification for gray wolves under the Endangered Species Act. In April 2011, a Congressional measure associated with the budget bill funding the federal government removed gray wolves from the list of threatened and endangered species in Montana, Idaho and parts of Washington, Oregon, and Utah. To meet the delisting criteria for wolf recovery, the 3 recovery areas need to support a minimum of 30 breeding pairs for 3 consecutive years (USFWS 1987). The 3 recovery zones have met the recovery objectives for breeding pairs since 2000. In 2010, 111 of the 244 documented packs in the Northern Rocky Mountain Distinct Population Segment (Idaho, Montana, Wyoming, eastern one-third of Washington and Oregon, and a small part of north central Utah) met the definition of a `breeding pair'(*USFWS et al. 2011*). Of those 111 packs, 35 occurred in Montana, with 21 of those found in the northern Montana portion of the recovery area, along with 47 additional packs that did not meet the requirements to be considered a 'breeding pair' (*Sime et al. 2011*).

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

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

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the 31,472-acre cumulative effects analysis area described in the grizzly bear section above. This area would be large enough to support a pack of wolves and approximates the size of the 2010 annual home range of the O'Brien wolf pack and likely includes a portion of the home ranges of the uncollared Twilight and/or Preacher wolf packs.

Analysis Methods

Since changes in winter range could have a sizable effect on the availability of prey for wolves, portions of the analysis are tied to the big game winter range section. Meanwhile, disturbance at den and rendezvous sites are

important during certain portions of the year, and the timing of proposed activities in relation to these sites is also important. Direct and indirect, as well as cumulative effects, were analyzed using field evaluations, aerial-photograph interpretation, and a GIS analysis of habitat components. Factors considered in the analysis include the amount of winter range modified, and the level of human disturbance in relation to any known wolf dens or rendezvous sites.

Existing Environment

Big game species are abundant in the project area year-round. The entire project area was identified as deer, elk, and moose winter range. Some landscape features commonly associated with denning and rendezvous sites occur in the project area, such as areas with gentle terrain near a water source (valley bottoms), openings, and proximity to big game wintering areas. The O'Brien wolf pack has been in the vicinity for probably 2 years, and originated with a dispersing female from the Candy Mountain pack. The O'Brien pack looked to be a new pack with 3 pups in 2010, but due to a variety of situations was not counted as one of the breeding packs in Montana in 2010 (*K. Laudon, DFWP, personal communication, May 17, 2011*). The home range for this fairly new pack is not well defined, but generally has been adjacent to the project area and the 2010 annual home range is within 0.5 miles of the project area (*USFWS et al. 2010*). Additionally, the Twilight wolf pack has been documented in the vicinity of the project area in the recent past, and quite recently may have been in one of the state parcels included in the project area. The Twilight pack included a minimum of 3 adults and 2 pups at the end of 2010 and was counted as one of the breeding packs in Montana for 2010. Finally, the Preacher wolf pack is also in the vicinity of the project area and was counted as one of the breeding packs in Montana with a minimum of 2 adults and 5 pups at the end of 2010. Neither the Twilight pack nor the Preacher packs include collared wolves (*K. Laudon, DFWP, personal communication, May 17, 2011*), so there is no documented home range associated with either of those packs, but some use of the project area is possible. No known den or rendezvous sites for any of these packs occur in the project area, but due to a variety of situations, including the newness of some of these packs, the uncertainty associated with pack locations, and the recent harsh winters, the possibility of den or rendezvous sites occurring in the project area exists. Wolves may be using the vicinity of the project area for hunting, breeding, and other life requirements.

Within the larger, cumulative-effects analysis area, big game species are somewhat abundant, as is big game winter range. Numerous landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water and in gentle terrain, occur in the cumulative-effects analysis area. The suspected den site and rendezvous sites for the O'Brien wolf pack, occurs outside of the cumulative effects analysis area (*K. Laudon, DFWP, personal communication, May 17, 2011).* Additionally, the den site and pup rearing areas associated with the Twilight wolf pack is likely outside of the cumulative effects analysis area as well and the den site and rendezvous sites associated with the Preacher wolf pack is also unknown, but likely outside of the cumulative effects analysis area (*K. Laudon, DFWP, personal communication, May 17, 2011*). However, the newness of some of these packs, the uncertainty associated with pack locations, and the recent harsh winters, the possibility of den or rendezvous sites occurring in the cumulative effects analysis area exists. Past harvesting, human development, and agricultural clearing has altered big game and wolf habitats. No other ongoing harvesting is occurring on DNRC-managed lands; proposed harvesting associated with the USFS Sparring Bulls Project could alter wolf and/or big game habitats.

Environmental Effects

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

Disturbance to wolves would not increase. No changes in big game habitats, including no changes to big game winter ranges, would be expected during the short-term; therefore, no changes in wolf prey availability would be anticipated. Wolf use of the project area would be expected to continue at current levels. Thus, no direct and indirect effects would be expected to affect gray wolves in the project area since: 1) no changes in human disturbance levels would occur; and 2) no changes to big game winter range would occur.

Direct and Indirect Effects of the Action Alternative on Gray Wolves

Wolves using the area could be disturbed by the proposed activities and are most sensitive at den and rendezvous sites, which are not known to occur in the project area. After proposed activities, human disturbance levels would likely revert to pre-harvest levels, and no changes in motorized human access or open-road densities would be

anticipated. Likewise, wolf use of the project area for denning and rendezvous sites would likely revert to pre-harvest levels. Should a den or rendezvous site become known in the vicinity of the project area, standard stipulations in the timber sale contract would call for additional mitigations to prevent further disturbance to these sensitive locations. In the short-term, the proposed harvesting could lead to shifts in big game use, which could lead to a shift in wolf use of the project area. Harvesting on 471 acres of winter range would remove most of the existing winter range in the project area. Collectively, the modifications to summer and winter range would likely alter big game use of the project area, and subsequently alter the use of the project area by wolves. Thus, minor direct and indirect effects would be expected to affect gray wolves since: 1) minor short-term increases and negligible long-term changes in human disturbance levels would occur, with no increases near known wolf den and/or rendezvous sites anticipated; and 2) changes to summer and winter big game habitats would alter big game use of the project area.

Cumulative Effects of the Action Alternative on Gray Wolves

White-tailed deer, mule deer, and elk winter ranges would not be affected and substantive changes in big game populations, distribution, or habitat use would be not anticipated. Levels of human disturbance would be expected to remain similar to present levels. No other ongoing harvesting is occurring on DNRC-managed lands in the cumulative-effects analysis area that is altering wolf habitats or big game habitats; ongoing harvesting and any harvesting that may occur with the proposed Sparring Bulls Project on USFS-managed lands could alter wolf and/or big game habitats. No changes in the level of gray wolf use of the cumulative-effects analysis area would be anticipated. No changes in human access would be anticipated. Thus, no further cumulative effects would be expected to affect gray wolves since: 1) no changes in human disturbance levels would occur, particularly near known wolf den and/or rendezvous sites; and 2) no changes to big game winter ranges would occur.

Cumulative Effects of the No-Action Alternative on Gray Wolves

Reductions in big game winter range in a small portion of the cumulative effects analysis area would be anticipated to cause shifts in big game use of a portion of the cumulative effects analysis area. Similarly, reductions in cover may cause slight decreases in use by deer and elk during the non-winter period; however, no appreciable changes would be expected within the cumulative-effects analysis area. These reductions in cover would be additive to losses from past timber-harvesting activities, human development, agricultural clearing, any ongoing harvesting in the cumulative-effects analysis area, as well as any harvesting that may occur with the proposed Sparring Bulls Project on USFS-managed lands. Human-disturbance levels would be elevated during proposed activities and would be expected to revert to levels similar to current levels after the proposed harvesting has been completed and roads would again be closed. No changes in motorized human access would be anticipated. No substantive change in wolf use of the cumulative-effects analysis area would be expected; wolves would be expected to continue using the area in the long-term. Thus, negligible further cumulative effects would be expected to affect gray wolves since: 1) negligible short-term and long-term changes in human disturbance levels would occur with no increases near known wolf den and/or rendezvous sites anticipated; and 2) alterations to big game habitats would occur that would cause some shifts in big game use of a small portion of the cumulative effects analysis area.

PILEATED WOODPECKER

Issue: The proposed activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace pileated woodpeckers from active nests, resulting increased mortality to pileated woodpecker chicks.

Introduction

Pileated woodpeckers play an important ecological role by excavating cavities that are used in subsequent years by many other species of birds and mammals. Pileated woodpeckers excavate the largest cavities of any woodpecker. Preferred nest trees are western larch, ponderosa pine, cottonwood, and quaking aspen, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat carpenter ants, which inhabit large downed logs, stumps, and snags. *Aney and McClelland (1985)* described pileated nesting habitat as..."stands of 50 to 100 contiguous acres, generally below 5,000 feet in elevation with basal areas of 100 to 125 square feet per acre and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and downed wood for feeding, closely tie these woodpeckers to mature forests with late-successional characteristics. The density of

pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*).

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the 18 sections surrounding the state parcels as well as the remaining portions of the 3 sections that include the project area (total area approximately 13,400 acres). This scale includes enough area to support a couple of pairs of pileated woodpeckers (*Bull and Jackson 1995*).

Analysis Methods

To assess potential pileated woodpecker nesting habitats on DNRC-managed lands in the cumulative-effects analysis area, SLI data were used to identify sawtimber stands with more than 100 square feet basal area per acre, older than 100 years, had greater than 40-percent canopy closure, and occurring below 5,000 feet in elevation. Foraging habitats are areas that do not meet the definition above, but include the remaining sawtimber stands below 5,000 feet in elevation with greater than 40-percent canopy cover. Direct and indirect effects, as well as cumulative effects, were analyzed using a combination of field evaluation, aerial-photograph interpretation, and these mapped potential habitats. Factors considered included the amount of potential habitat, degree of harvesting, and amount of continuous forested habitat.

Existing Environment

In the project area, potential pileated woodpecker nesting habitat exists on approximately 366 acres that are dominated by Douglas-fir/western larch and mixed conifers. Additionally, 153 acres of sawtimber stands dominated by mixed conifers and western larch/Douglas-fir exist in the project area that may be lower-quality foraging stands. Although nesting habitat is defined differently than foraging habitat, nesting habitat also provides foraging opportunities for pileated woodpeckers. Removal of large western larch, ponderosa pine, and western white pine by past timber-harvesting activity has reduced the quality of habitat for pileated woodpeckers. Large live and dead trees are less common than would occur naturally due to these past timber-harvesting activities in portions of the project area. Black cottonwood occurs in some riparian areas in the project area. During field visits, numerous feeding sites and approximately 1.2 large (>21 in dbh) snags per acre were observed; these provide foraging and nesting opportunities for pileated woodpeckers. Additionally, roughly 5 medium-sized snags (15-21 in dbh) per acre were observed, which are likely suitable foraging habitats. Pileated woodpeckers and associated large cavities were detected in the project area.

Presently, roughly 57 percent of the cumulative effects analysis area is not in mature, forested conditions due to residential clearing, human development, agriculture, and other past harvesting, and thus is not likely providing pileated woodpecker habitats. Any ongoing harvesting that may be occurring on other ownerships in the cumulative effects analysis area, including any harvesting that may occur with the proposed USFS Sparring Bulls Project, could continue altering pileated woodpecker habitats. Collectively, moderate amounts of potential pileated woodpecker habitats exist in the cumulative effects analysis area.

Environmental Effects

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

No disturbance of pileated woodpeckers would occur. Forest succession and natural disturbance agents would continue to bring about changes in existing stands. Trees would continue to grow, mature, and die, thus providing potential nesting and foraging structure for pileated woodpeckers. Continual conversion to shade-tolerant species would reduce the quality of habitat for pileated woodpeckers over time. Therefore, a reduction in suitable nesting trees would be likely over time, which could lead to decreased reproduction in the project area. Thus, negligible adverse indirect effects to pileated woodpeckers in the project area would be expected until some other disturbance reverses stand succession since: 1) no further harvesting would occur; 2) no changes in the amount of continuously forested habitats would be anticipated; 3) no appreciable changes to existing pileated woodpecker habitats would be anticipated; and 4) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would be anticipated.

Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers

Pileated woodpeckers tend to be tolerant of human activities (*Bull and Jackson 1995*), but might be temporarily displaced by the proposed harvesting. Harvesting 471 acres (~90% of the project area) would reduce continuously forested habitats for pileated woodpeckers. Roughly 322 acres of potential nesting habitat would be altered, with most of that receiving a regeneration treatment and would be too open to be considered pileated woodpecker habitats following treatment. Similarly, much of the remaining 152 acres would likely be too open for use by pileated woodpeckers. Where regeneration harvests are proposed, potential pileated nesting and foraging habitats would be removed for 30 to 100 years, depending on the density of trees retained. Elements of the forest structure important for nesting pileated woodpeckers, including snags (a minimum of 2 snags greater than 21 inches dbh per acre where they exist and would be expected to persist if they are not lost due to firewood gathering), coarse woody debris (10-20 tons per acre), numerous leave trees, and snag recruits (a minimum of 2 trees per acre greater than 21 inch dbh where they exist) would be retained in the proposed harvest areas. Some areas currently lack sufficient large snags, while other areas are either close to open roads, where snag loss could continue due to legal and illegal firewood and forest-product gathering. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*), pileated woodpecker densities in the project area would be expected to be reduced on 471 acres, and most of those acres would be too open to be considered pileated woodpecker habitats following proposed treatments. The silvicultural prescriptions would retain healthy ponderosa pine, western larch, western white-pine, and Douglas-fir while promoting the regeneration of many of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Thus, moderate direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area since: 1) harvesting would reduce the amount of continuous forested habitats available in the project area; 2) potential nesting and foraging habitats would be reduced; 3) several snags and snag recruits per acre would be removed; however, mitigation measures to retain a minimum of 2 snags per acre and 2 snag recruits per acre in most of the harvest areas would be included; and 4) harvest prescriptions would retain and promote seral species in the proposed harvest areas.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers

No disturbance of pileated woodpeckers would occur. Trees would continue to grow, mature, and die, thus providing potential nesting and foraging structure for pileated woodpeckers. Continued use of the cumulative-effects analysis area by pileated woodpeckers would be expected. Ongoing harvesting and proposed harvesting associated with the USFS Sparring Bulls Project, could continue to remove potential pileated woodpecker habitats while reducing the amount of the cumulative-effects analysis area that would be in mature, forested covertypes. Thus, negligible adverse cumulative effects to pileated woodpeckers in the cumulative-effects analysis area would be expected since: 1) no further changes to existing habitats would occur; 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated; and 3) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would occur.

Cumulative Effects of the Action Alternative on Pileated Woodpeckers

Under this alternative, reductions in pileated woodpecker habitats in the project area would be expected. Several snags, coarse woody debris, and potential nesting trees would be retained in the project area; however, future recruitment of these attributes may be reduced in a portion of the area by the proposed activities. Most of the 471 acres proposed for treatment would receive a regeneration-type treatment, which would likely be too open for appreciable pileated woodpecker use. Use of the remaining portions of the project area by pileated woodpeckers would likely be reduced due to increasing openness of the stands. Recently harvested stands, ongoing harvesting, and land clearing associated with the various human developments in the cumulative effects analysis area have reduced pileated woodpecker habitats; reductions associated with this alternative would be additive to those reductions. The proposed reductions in forested habitats would reduce the amount of the cumulative effects analysis area in closed-canopied forested habitats from 43% to approximately 40%. Additionally, any harvesting that may occur on USFS-managed lands in the cumulative effects analysis area could further alter pileated woodpecker habitats. Continued maturation of stands across the cumulative-effects analysis area is increasing suitable pileated woodpecker habitats. Thus, moderate cumulative effects would be anticipated that would affect pileated woodpeckers since: 1) harvesting would further reduce the amount of continuous forested habitats available in the cumulative-effects analysis area, but some forested habitats would persist; 2) potential nesting and foraging habitats

would be reduced; 3) several snags and snag recruits per acre would be removed in the proposed harvest areas; however, mitigation measures would retain some of these attributes in several of the harvest areas; and 4) harvest prescriptions would promote seral species in the proposed harvest areas.

NORTHERN GOSHAWK

Issue: The proposed activities could alter northern goshawk habitats and/or displace nesting goshawks from active nests, resulting in increased mortality to goshawk chicks.

Introduction

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

Analysis Area

Direct and indirect effects were analyzed on the portion of the project area within 8,680 feet of the approximate location of the potential nest area. Cumulative effects were analyzed on a 5,434-acre (8,680 foot radius) circle centered on the approximate location of the potential nest. This scale includes enough area to support a pair of goshawks while approximating the home range size for northern goshawks (*Reynolds et al. 1992*).

Analysis Methods

Effects were evaluated using a combination of field evaluation, aerial photograph interpretation, and GIS analysis. Factors considered within this cumulative effects analysis area include acres of stand-initiation stage of stand development, amount of continuously forested habitats for possible nesting areas, and availability of foraging habitats.

Existing Environment

A pair of goshawks was observed in the project area in the central portion of section 36, T31N R34W in the recent past during field visits, but no nest site was identified. Continued monitoring is planned to determine if a nest is in the vicinity. Roughly 320 acres of the project area exist within 8,680 feet of the potential nest site. Within this area, approximately 314 acres of mixed conifers and Douglas-fir dominated stands could be potentially suitable nesting habitats (crown cover $\geq$50%, pole or mature forest) for northern goshawks. The remaining 6 acres are part of a wet meadow/hay field that would not be used by nesting northern goshawks, but could serve to provide some diversity for prey species.

Of the 5,434-acre cumulative effects analysis area, there are roughly 320 acres of DNRC-managed lands, approximately 1,542 acres of USFS-managed lands, and the remaining 3,564 acres is privately managed (which includes roughly 1,368 of industrial timberland). Within the analysis area, at least 2,886 acres exists as potential goshawk nesting habitat (crown cover $\geq$50%, pole or mature forest), and additionally some portion of the 1,990

acres of thinned forest in the analysis area could also be suitable nesting or foraging habitats. Approximately 314 the 2,886 acres of potential nesting habitats occur in the project area. Previous land management activities by adjacent private land owners have reduced the capacity of the analysis area for potential nest sites. Ongoing harvesting on other ownerships, including the proposed USFS Sparring Bulls Project, could continue reducing potential northern goshawk nesting and foraging habitats. Collectively, moderate amounts of potential northern goshawk habitats exist in the cumulative effects analysis area.

Environmental Effects

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

No disturbance of northern goshawks would occur. Forest succession and natural disturbance agents would continue to bring about changes in existing stands. Trees would continue to grow and mature, thus continuing to provide potential nesting and foraging habitats; no changes in the amounts of the project area in the stand-initiation phase of stand development would occur. Potential nest areas would improve with continued maturation in the stands in the project area. Goshawk foraging habitats consist of stands with large trees and relatively open understories and small openings and patches of dense mid-aged forests with high canopy cover. Large trees provide goshawks with hunting perches and the openness affords goshawks the opportunity to detect and capture prey species. Habitats for some prey species would improve with the increases in tree size, canopy closure, and availability of coarse woody debris, but habitats for those prey species that rely on small openings would continually be reduced with advances in succession. Thus, no adverse direct and negligible indirect effects to northern goshawks in the project area would be anticipated since: 1) no further harvesting would occur that would increase the amount of the project area in the stand-initiation (seedling/sapling) stage of stand development; 2) no changes in the amount of continuously forested habitats or existing northern goshawk nesting habitats would be anticipated; and 3) availability of mature stands with large trees, snags, coarse woody debris, high canopy closure, and a relatively open understory would provide habitats for a host of goshawk prey species, but those prey species that rely on small openings and would gradually be reduced in the project area with continued advances in succession.

Direct and Indirect Effects of the Action Alternative on Northern Goshawks

Continued monitoring would attempt to locate any active nests in the parcel. Approximately 280 of the 314 acres of potentially suitable nesting stands within 8,680 feet of the potential nest area would receive regeneration-type treatments as parts of units 36-1 and 36-2. Proposed shelterwood treatments on those acres would reduce potential nesting habitats, and continued use by nesting goshawks would be questionable. However, should a nest be verified in the project area, mitigations to retain a 300-foot no-harvest buffer around the nest site along with limiting harvesting in units 36-1 and 36-2 to the non-nesting period (August 15- April 1) would reduce some of the potential disturbance to nesting goshawks while retaining habitats adjacent to the existing nest. In general, the resultant stands would be more open, contain fewer large trees, fewer snags, more coarse woody debris, fewer areas of dense mid-aged forest, but would perpetuate some small openings for additional prey species; overall a reduction in prey availability would be anticipated, but use by goshawks for foraging could continue. Thus, moderate adverse direct and indirect effects to northern goshawks in the project area would be anticipated since: 1) much of the area would be transformed to the stand-initiation (seedling/sapling) stage of stand development; 2) reductions in the amount of continuously forested habitats and potentially suitable nesting habitats would be anticipated; and 3) goshawk prey availability would be altered with the proposed habitat modifications, including reducing habitats for those prey relying on mature trees, large snags, small patches of dense mid-aged stands, and closed canopied stands, while increasing potential habitat for those prey species relying on small openings and coarse woody debris.

Cumulative Effects of the No-Action Alternative on Northern Goshawks

No further disturbance to northern goshawks would occur. Nest area and post-fledging family area attributes provided by the habitats in the project area would persist. Ongoing harvesting, as well as any potential harvesting associated with the proposed USFS Sparring Bulls Project, could continue to alter goshawk habitats and the amount of the cumulative effects analysis area in the stand-initiation phase of stand development. Potential nest areas on the DNRC-managed parcel would improve with continued maturation in the stands in the project area. Habitats for some prey species would improve with the increases in tree size and canopy closure in the project area and across much of the analysis area, but habitats for those prey species that rely on small openings would gradually see slight declines with advances in succession, however additional openings are being created with the ongoing harvesting along with deposition of coarse woody debris. Thus, no adverse cumulative effects to northern goshawks would be

anticipated since: 1) no further harvesting would occur that would increase the amount of the cumulative effects analysis area in the stand-initiation (seedling/sapling) stage of stand development; 2) no further changes in the amount of continuously forested habitats or existing northern goshawk nesting habitats would be anticipated; and 3) availability of mature stands with large trees, snags, coarse woody debris, high canopy closure, and a relatively open understory as well as a diversity of stand structures could provide an array of potential prey species.

Cumulative Effects of the Action Alternative on Northern Goshawks

Reductions in northern goshawk nesting and foraging habitats would be anticipated in the project area. Recently harvested stands in the cumulative-effects analysis area reduced goshawk nesting habitats while altering foraging habitats. Ongoing harvesting could continue to alter potential goshawk habitats while reducing the amount of the cumulative-effects analysis area that would be in mature, forested covertypes and increasing the amount of stand-initiation stage of stand development within the cumulative effects analysis area. Proposed harvesting associated with the USFS Sparring Bulls Project could also affect goshawk habitats, the amount of the cumulative effects analysis area in mature forested habitats, and the amount of the cumulative effects analysis area in the stand-initiation phase of stand development. The removal of nesting habitats on 314 acres would reduce the availability of nesting habitats in the cumulative effects analysis area from roughly 53% to approximately 44%. Overall, modifications to nesting and foraging habitats under this alternative would be additive to habitat losses associated with past harvesting; continued use of the cumulative-effects analysis area by nesting goshawks could occur. Additionally, continued maturation of stands across the cumulative-effects analysis area is increasing suitable goshawk nesting habitats while providing additional foraging areas. Thus, moderate adverse cumulative effects to northern goshawks in the cumulative effects analysis area would be anticipated since: 1) an additional 314 acres would be converted to the stand-initiation (seedling/sapling) stage of stand development; 2) reductions in the amount of continuously forested habitats and potentially suitable nesting habitats would be anticipated; and 3) goshawk prey availability would be altered with the proposed habitat modifications, including reducing habitats for those prey relying on mature trees, large snags, small patches of dense mid-aged stands, and closed canopied stands, while increasing potential habitat for those prey species relying on small openings and coarse woody debris.

GREAT BLUE HERON

Issue: The proposed activities could alter a great blue heron rookery and/or displace nesting great blue herons from active nests, resulting in increased mortality to great blue herons and their chicks.

Introduction

Great blue heron is a widespread wading bird that uses most types of aquatic habitats. Great blue herons largely prey on fish, but will also consume amphibians, invertebrates, reptiles, mammals, and birds (*Vennesland and. Butler 2011*). Great blue herons generally travel 1.4 to 4.0 miles (*Vennesland and Butler 2011*) between the nest colony and their principal feeding sites. Great blue herons do not have sensitive, Threatened or Endangered status, but trends indicate that populations may have been declining in Montana for 40 years or more (*Waltee and Rauscher 2010*). Herons often nest in trees and nesting sites can include lowland swamps, upland forests, on islands, and riparian woodlands. Great blue herons build stick nests near the tops of the tallest trees available (*Gray et al. 1980*). Nests are typically 50-100 feet above the ground. Great blue herons select trees with the largest diameter trunks (*Stabins 2001*) and greatest lateral strengths for nesting. Nests are built in clusters known as rookeries and can range from 2 – 500 nests. Rookery size positively correlates with the amount of suitable foraging habitat within 9 miles. Herons normally lay 2-6 eggs and their incubation period is about 25-29 days (*Vennesland and. Butler 2011*). Young will take their first flight about 7-8 weeks after hatching and start becoming independent from their parents a few weeks after their first flight (*Vennesland and. Butler 2011*). In Montana, there is relatively high variability among individual herons regarding when they lay eggs and fledge young. Most young fledge by the end of July during most years.

Although heron nest sites occur in a wide range of locations that are subject to varying degrees of human activity, generally great blue herons have demonstrated sensitivity towards disturbances near nesting sites (*Vennesland and. Butler 2011*). Disturbances created by human activity, predators, climate and disease have been linked to rookery abandonment (*Waltee and Rauscher 2010)* and/or reduced nesting productivity (*Vennesland and. Butler 2011*). Several rookeries occur in western Montana within several-hundred feet of major interstate highways.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area since the entire project area is within 3 miles of the rookery. Cumulative effects were analyzed on the 18 sections surrounding the state parcels as well as the remaining portions of the 3 sections that include the project area (total area approximately 13,400 acres). This scale includes more than enough area to include likely foraging areas surrounding the colony of great blue herons.

Analysis Methods

Effects were evaluated using a combination of field evaluation, aerial photograph interpretation, and GIS analysis. Factors considered within this cumulative effects analysis area include availability of large trees with stout limbs for nesting, the availability of foraging habitats, and the level of human disturbance in relation to the existing rookery.

Existing Environment

A great blue heron rookery comprised of at least 7 nest trees was observed in the project area during field visits. Nest trees were generally some of the larger trees (avg. 23 inches dbh) in the vicinity. The entire 525-acre project area exists within 3 miles of the rookery. Most of the project area includes potentially suitable nesting areas, including coniferous uplands and riparian woodlands, many of which include large trees with stout limbs potentially suitable for nesting. Within the project area, potential foraging sites are limited to riparian areas associated with Iron Creek and Falls Creek with its tributaries. Additionally, wet meadows and lowlands in the Iron Creek parcel (section 36, T31N, R34W) could also provide some foraging habitats. Human disturbance levels vary across the project area, with considerable disturbance near existing roads and human developments and less disturbance in those areas away from human access points. Disturbance at the rookery is likely fairly limited without any motorized human access and limited non-motorized access near the rookery, likely by adjoining landowners.

In the cumulative effects analysis area, foraging habitats exist in the vicinity of Throops Lake, Savage Lake, Milnor Lake, Schoolhouse Lake, and several smaller lakes in the project area as well as riparian habitats associated with the Kootenai River, as well as Falls, Lake, Iron, O'Brien, Felix, and Cooper creeks. Some combination of these riparian areas and the assorted upland habitats compromises the principal feeding areas for this rookery. Other potentially suitable nest sites appear to exist in some portions of the cumulative effects analysis area. The network of open roads in the cumulative-effects analysis area, coupled with the various human developments and agricultural clearing provides a variety of human disturbance that could be affecting great blue herons. Additionally, any proposed activities associated with the USFS Sparring Bulls Project could affect great blue heron foraging and nesting habitats, but would be fairly distant from the existing rookery.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Great Blue Herons

Existing foraging habitats would persist and would not be altered. No changes to the mature trees would occur and existing nest sites associated with the rookery would not be altered. Greatest opportunities for rookery expansion would be retained. No additional disturbance to nesting great blue herons would occur. Thus, no adverse direct and indirect effects to great blue herons would be anticipated since: 1) no changes in the availability of large trees with stout limbs capable of supporting nesting herons would occur; 2) no changes to potential foraging habitats would occur; and 3) no changes in human disturbance levels would occur.

Direct and Indirect Effects of the Action Alternative on Great Blue Herons

Negligible changes to foraging habitats would occur where activities could occur near Falls Creek (units 32-3 and 32-4), but activities minimal amounts of high quality foraging habitats associated with riparian areas exist in the project area. The proposed 200-foot no harvest buffer on the center of the rookery, would maintain: 1) all existing nest trees, 2) protection of existing nest trees from potential windthrow caused by typical wind events, 3) the structural and visible integrity of the rookery vicinity, and 4) an ample amount of potential nesting trees surrounding the rookery that would provide for some, albeit limited expansion. Some reductions in the availability of large trees with stout limbs that would be suitable for nesting could occur, but would be away from the central point in the rookery. Similarly, limiting activities within 0.5 miles of the rookery (units 32-3 and 32-4) between March 15 and August 1 would minimize the degree of disturbance to nesting herons during seasonally important periods. While

care has been taken to develop treatments that would not cause abandonment of the rookery, or displacement of individuals during project-related activities, some minor risk of nest tree loss to wind-throw and abandonment still exists. It is possible that herons could abandon the rookery in the near future due to project-related activities or unrelated causes, which could result in reduced recruitment. Over the short-term, some nesting herons could be displaced during harvest activities that would have otherwise been undisturbed had the activities not occurred. Thus, moderate adverse direct and indirect effects to great blue herons would be anticipated since: 1) reductions in the availability of large trees with stout limbs capable of supporting nesting herons would occur, but would not occur in the vicinity of the existing rookery; 2) negligible changes to potential foraging habitats would occur; and 3) increases in human disturbance would occur, but would avoid the majority of the nesting season when herons would be dependent upon the rookery habitats.

Cumulative Effects of the No-Action Alternative on Great Blue Herons

Existing foraging habitats in the cumulative effects analysis area would persist and would not be altered with this alternative. No changes to the existing rookery would be anticipated, including availability of large trees with stout limbs suitable for nesting habitats. No changes to human disturbance at the rookery would occur. Existing disturbances in the cumulative effects analysis area would be expected to continue influencing heron use of the cumulative effects analysis area. Past, as well as any ongoing timber harvesting, human development, agricultural clearing, and other activities could continue to alter great blue heron habitats in the cumulative effects analysis area. Additionally, proposed activities associated with the proposed USFS Sparring Bulls Project could affect great blue heron foraging and nesting habitats, but would be fairly distant from the existing rookery. Thus, no adverse cumulative effects to great blue herons would be anticipated since: 1) no further changes in the availability of large trees with stout limbs capable of supporting nesting herons would occur; 2) no changes to potential foraging habitats would occur; and 3) no changes in human disturbance levels would occur.

Cumulative Effects of the Action Alternative on Great Blue Herons

Existing foraging habitats in the cumulative effects analysis area would persist and would be negligibly altered with this alternative where harvesting could affect marginal habitats near Falls Creek (units 32-3 and 32-4). The existing rookery would be expected to persist with minimal disturbance; limited activities in the vicinity of the rookery during the nesting season would be anticipated. Existing disturbances in the cumulative effects analysis area would be expected to continue influencing heron use of the cumulative effects analysis area, including a host of potential disturbance factors within 0.5 mile of the rookery. No project activities would contribute to that disturbance level near the rookery during the nesting season, but activities across the project area that are further away than 0.5 mile could add to the disturbance levels that the herons experience during the nesting season. Past and ongoing timber harvesting, human development, agricultural clearing, and other activities could continue to alter great blue heron habitats in the cumulative effects analysis area. Additionally, any proposed activities associated with the USFS Sparring Bulls Project could affect great blue heron foraging and nesting habitats, but would be fairly distant from the existing rookery. Thus, minor adverse cumulative effects to great blue herons would be anticipated since: 1) reductions in the availability of large trees with stout limbs capable of supporting nesting herons would occur across the project area, but would not occur in the area immediately around the existing rookery; 2) negligible changes to potential foraging habitats would occur; and 3) elevated human disturbance levels would occur, but would be limited within 0.5 miles of the rookery during the seasonally important nesting season.

BIG GAME WINTER RANGE

Issue: The proposed activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range.

Introduction

Winter ranges enable big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be relatively small areas that support large numbers of big game, which are widely distributed during the remainder of the year. These winter ranges have adequate midstory and overstory to reduce wind velocity and intercept snow. The effect is that temperatures are moderated and snow depths are lowered, which enables big game movement and access to forage with less energy expenditure than in areas with deeper snow and colder temperatures. Snow depths differentially affect big game; white-tailed deer are most affected, followed by mule deer, elk, and then moose.

Analysis Area

Direct and indirect effects were analyzed on the winter range in the project area. Cumulative effects were analyzed on the 171,859-acre portion of the elk winter range found in the Bull River drainage that is part of the larger winter range and includes the project area. This scale includes enough area to support hundreds of elk.

Analysis Methods

Effects were evaluated using a combination of field evaluation, aerial photograph interpretation, and GIS analysis. Factors considered within this cumulative effects analysis area include acres of winter range harvested and level of human disturbance and development.

Existing Environment

Montana Department of Fish, Wildlife, and Parks identified the entire project area as white-tailed deer, mule deer, elk, and moose winter ranges. These winter ranges are part of much larger white-tailed deer (3,798,066 acres), mule deer (1,075,969 acres), elk (2,314,459 acres), and moose (211,845 acres) winter ranges, respectively. Winter snow depths and suitable microclimates influence big game distribution and use within the vicinity. Mature ponderosa pine, Douglas-fir/western larch, and mixed conifer stands in the project area are providing attributes facilitating use by wintering big game. Evidence of use by deer and elk was noted throughout the project area during field visits.

Presently, a variety of stands across the winter range in the cumulative effects analysis area are providing thermal cover and snow intercept for big game. In the past decade, roughly 358 acres of white-tailed deer winter range and 472 acres of mule deer, elk, and moose winter range has been removed from DNRC-managed parcels and much of it is not yet providing winter range attributes; an additional 230 acres of white-tailed deer and 558 acres of mule deer, elk, and moose winter range has been modified on DNRC-managed parcels and is may only be affording big game marginal winter range attributes. Portions of the cumulative effects analysis area on other ownerships have also been harvested in the last 30 years, likely limiting the usefulness of these acres for wintering big game. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area, including the proposed USFS Sparring Bulls Project, could continue altering big game winter range. Human disturbance within the winter range is largely associated with the Town of Troy, other residential developments, timber management, recreational snowmobile use, and numerous open roads, which combined, likely influences wintering big game populations and their habitats.

Environmental Effects

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

No disturbance or displacement of big game would be anticipated within the project area and no further changes to the winter range would be anticipated. In the longer-term, continued succession could reduce forage production while increasing thermal cover in these stands. No appreciable changes to winter carrying capacity would be anticipated. Thus, no direct or indirect effects to big game winter range would be anticipated since: 1) subtle changes in thermal cover due to mortality and successional advances increasing canopy densities would be anticipated; 2) the amount of mature forested habitats on the winter range would not further change; and 3) the levels of human disturbance would remain similar.

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

Some displacement would be expected as a result of the proposed harvesting operations, particularly if any of the units were harvested during the winter. However, winter logging provides felled tree tops, limbs, and slash piles that could concentrate feeding big game during nighttime and quiet periods when logging operations are shut down. Increasing short-term forage availability in this manner could partially offset some of the effects associated with temporary displacement caused by logging disturbance. All of the stands in the proposed units are providing big game thermal cover and these attributes would be largely removed from the 471 acres (90% of the project area) in the proposed units. Limited thermal cover and snow intercept would exist in the project area following proposed treatments. Thermal cover and snow intercept would be expected to develop in these stands over the next 30-70 years when suitable sized trees (>40 ft. tall) start to provide these attributes again. Proposed timber harvesting would not prevent big game movement through the project area appreciably in winter and could stimulate browse production in the units. Thus, moderate adverse direct or indirect effects to big game would be expected since: 1)

the relatively short-term that logging activities could create disturbance in this area; 2) limited areas of thermal cover and snow intercept exist in the project area outside of the proposed units following proposed treatments; and 3) harvesting would remove much of the mature forested habitats that are providing thermal cover and snow intercept habitats for big game species.

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

No further changes would be anticipated in elk winter range attributes during the short-term. Stands that are providing thermal cover would be expected to continue providing this resource. Those portions of the winter range where timber harvesting occurred in the last 30 years could start developing thermal cover and snow intercept in the next 10-30 years. Harvesting on other ownerships, including any potential harvesting associated with the USFS Sparring Bulls Project, could continue to displace wintering big game and reduce available winter range habitats. Human disturbance levels would be anticipated to continue at similar levels. Continued winter use of the larger winter range would be expected. Thus, negligible beneficial cumulative effects to big game and big game winter range would be anticipated since: 1) subtle changes in thermal cover due to advances in succession that would increase canopy densities would be anticipated over time; 2) the amount of mature forested habitats on the winter range would not change; and 3) the levels of human disturbance would remain similar.

Cumulative Effects of the Action Alternative on Big Game Winter Range

Displacement associated with this alternative would be additive to any displacement associated with ongoing timber harvesting in the cumulative effects analysis area and any other disturbances that may be affecting wintering big game. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area, including the proposed USFS Sparring Bulls Project, could continue altering big game winter range and/or disturbing big game. Reductions in thermal cover and snow intercept in the project area would further reduce the amount of the larger winter range providing these attributes for big game. Those portions of the winter range where timber harvesting occurred in the last 30 years could start developing thermal cover and snow intercept in the next 10-30 years. Thus, minor adverse cumulative effects to big game would be anticipated since 1) the relatively short-term that logging activities would create disturbance in a small portion of the cumulative effects analysis area; 2) a small percentage of the winter range in the cumulative effects analysis area would be altered; 3) areas of high quality thermal cover and snow intercept would be removed from areas in the cumulative effects analysis area, which would further reduce the amount of these attributes available for big game; and 4) availability of lower-quality cover on surrounding ownerships that provides some opportunity for big game should they be displaced.

Wildlife Mitigations associated with the Action Alternative

- A DNRC biologist will be consulted if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*) are needed.
- Public access would be restricted at all times on restricted roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.).
- Roads and skid trails that are opened with the proposed activities will be reclosed to reduce the potential for unauthorized motor vehicle use.
- Use a combination of topography, group retention, and roadside vegetation to reduce views into harvest units along open roads.
- Snags, snag recruits, and coarse woody debris will be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch, ponderosa pine, and western white pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.
- Contractors and purchasers conducting contract operations will be prohibited from carrying firearms while operating on restricted roads.

- Portions of the proposed units (units 32-1, 32-2, 36-1, and 36-2) would be conducted to limit disturbance to potential spring grizzly bear habitats by restricting harvesting between April 1 and June 15.
- Retention of visual screening adjacent to riparian management zones would reduce detection of grizzly bears near these important habitats.
- Retention of patches of advanced regeneration of shade-tolerant trees, where feasible, would provide some break-up site distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx.
- Provide connectivity for fisher, Canada lynx, grizzly bears, and a host of other species by maintaining corridors of unharvested and/or lighter harvested areas along riparian areas, ridgetops, and saddles.
- Project activities would be conducted to limit disturbance to nesting goshawks by avoiding the nesting period (April 1- August 15) in the vicinity of any verified nest. A no-harvest buffer of 300-feet radius around any active goshawk nests would further reduce potential disturbance while retaining important habitat attributes in the goshawk nest area.
- Project activities would be conducted to limit disturbance to the existing great blue heron rookery by avoiding the nesting period (March 15- August 1). A no-harvest buffer of 200-feet radius around the central point in the rookery would retain important habitat attributes while buffering the rookery from windthrow and potential disturbance vectors.

Literature Cited:

Aney, W. and R. McClelland. 1985. Pileated Woodpecker Habitat Relationships (revised). Pages 10-17 in Warren, N. eds. 1990. Old Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. USFS, Northern Region, Wildlife Habitat Relationships Program R1-90-42. 47pp.

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

Beier, P. and J. E. Drennan. 1997. Forest structure and prey abundance in foraging areas of northern goshawks. Ecological Applications 7:564-571.

Boal, C. W. and R. W. Mannan. 1996. Prey sizes of male and female northern goshawks. Southwestern Naturalist 41:355-358.

Bull, E. L., and J. A. Jackson. 1995. Pileated woodpecker: Dryocopus pileatus. American Ornithologists' Union. Washington DC. 24pp.

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

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

Clough, L. T. 2000. Nesting habitat selection and productivity of northern goshawks in west-central Montana. University of Montana, Missoula, Montana.

Cutler, T. L., R. J. Steidl, and S. DeStefano. 1996. Diets of northern goshawks in Oregon. Arizona Cooperative Fish and Wildlife Research Unit, Tucson, Arizona.

Finn, S. P., J. M. Marzluff, and D. E. Varland. 2002. Effects of landscape and local habitat attributes on northern goshawk site occupancy in western Washington. Pages 249-258 *in* S. DeStefano and R. G. Haight, eds. Forest Wildlife-Habitat Relationships. Society of American Foresters, Bethesda, Maryland, USA.

Foresman, K.R.. 2001. The wild mammals of Montana. Special Publication 12. American Society of Mammalogists. Allen Press, Kansas. 278pp.

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

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

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

Gray, P.A., J. W. Grier, G. D. Hamlton and D. P. Edwards. 1980. Great Blue Heron colonies in northwestern Ontario. Canadian Field Naturalist 94: 182-184

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

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

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

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

Kunkel, K., T.K. Ruth, D.H. Pletscher, and M.G. Hornocker. 1999. Winter Prey Selection by Wolves and Cougars in and near Glacier National Park, Montana. Journal of Wildlife Management 63:901-910.

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

Lenard, S; J. Carlson, J. Ellis, C. Jones, and C. Tilly. 2003. P.D. Skaar's Montana Bird Distribution, 6th Edition. Montana Audubon, Helena, Montana.

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

Mace, R.D., J.S. Waller, T.L. Manley, L.J. Lyon, and H. Zuuring. 1997. Relationships among grizzly bears, roads, and habitat in the Swan Mountains, Montana. Pages 64-80 *in* Mace, R.D., and J.S. Waller. 1997. Final Report: Grizzly bear ecology in the Swan Mountains, Montana. Montana Fish, Wildlife and Parks, Helena, Montana. 191pp

Maxell, B. A., J.K Werner, P. Hendricks, D.L. Flath. 2003. Herpetology in Montana: a history, status summary, checklists, dichotomous keys, accounts for native, potentially native, and exotic species, and indexed bibliography. Northwest Fauna Number 5. Society for Northwestern Vertebrate Biology. Olympia, Washington. 138pp.

McCallum, D. A. 1994. Review of technical knowledge: flammulated owls. Pages 14-46 *in* G. D. Hayward and J. Verner, tech eds. Flammulated, boreal, and great gray owls in the United States: a technical conservation assessment. USDA Forest Service Gen. Tech. Rep. RM-253. Fort Collins, Colorado.

McClelland, B.R. 1979. The pileated woodpecker in forests of the Northern Rocky Mountains. Pages 283-299 *in* Role of insectivorous birds in forest ecosystems. Academic Press.

McGrath, M. T., S. DeStefano, R. A. Riggs, L. L. Irwin, and G. J. Roloff. 2003. Spatially explicit influences on northern goshawk nesting habitat in the interior Pacific Northwest. Wildlife Monographs 154:1-63.

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

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

Pfister, R., B. Kovalchik, S. Arno, and R. Presby. 1977. Forest Habitat Types of Montana. USDA Forest Service General Technical Report INT-34. Intermountain Forest and Range Experiment Station Ogden, UT. 174pp.

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

Powell, R. A. and W. J. Zielinski. 1994. Fisher. Pages 38-73 in Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, tech eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. USDA Forest Service Gen. Tech. Rep. RM-254. Fort Collins CO.

Reynolds, R. T., R. T. Graham, M. H. Reiser, R. L. Bassett, P. L. Kennedy, D. A. Boyce Jr., G. Goodwin, R. Smith, and E. L. Fisher. 1992. Management recommendations for the northern goshawk in the Southwestern United States. Management recommendations for the northern goshawk in the Southwestern United States. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, General Technical Report RM-217.

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

Sime, C. A., V. Asher, L. Bradley, N. Lance, K. Laudon, M. Ross, A. Nelson, and J. Steuber. 2011. Montana gray wolf conservation and management 2010 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 168 pp.

Squires, J. R. 2000. Food habits of northern goshawks nesting in south central Wyoming. Wilson Bulletin 112:536-539.

Squires, J. R. and R. T. Reynolds. 1997. Northern goshawk. Pages Pp. 1-32 *in* A. Poole and F. B. Gill, The Birds of North America. The Academy of Natural Sciences, Philadelphia, PA.

Stabins, A. 2001. Great Blue Herons in King County, Washington. Master's Thesis, University ofWashington, USA. 76pp.

U.S. Fish and Wildlife Service, Montana Fish, Wildlife & Parks, Nez Perce Tribe, National Park Service, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Washington Department of Wildlife, Oregon Department of Wildlife, Utah Department of Natural Resources, and USDA Wildlife Services. 2011. Rocky Mountain Wolf Recovery 2010 Interagency Annual Report. C.A. Sime and E. E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601.

Waltee, D. J. and R. L. Rauscher. 2010. The status of nesting Great Blue Herons (*Ardea herodias*) within the Lower Yellowstone River Basin, Montana (2008-2009). Montana Fish, Wildlife, and Parks, Helena MT. 41pp.

Watson, J. W., D. W. Hays, S. P. Finn, and P. Meehan-Martin. 1998. Prey of breeding northern goshawks in Washington. Journal of Raptor Research 32:297-305.

Wittinger, W.T. 2002. Grizzly bear distribution outside of recovery zones. Unpublished memorandum on file at USDA Forest Service, Region 1. Missoula, Montana.2pp.

Vennesland, R. and R.W. Butler. 2011. Great Blue Heron (Ardea herodias), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/025doi:10.2173/bna.25

VEGETATIVE ANALYSIS
FOR THE
IRON SCHOOLHOUSE TIMBER SALE

INTRODUCTION

This analysis is designed to disclose the existing condition of the vegetative resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, the following vegetative issues were identified from internal and external comments regarding the effects of proposed timber harvesting:

- Timber harvesting could rectify the imbalance of species composition, age distribution and stand health.
- Timber harvesting could adversely affect any identified sensitive, threatened, or endangered species.
- Timber harvesting and associated activities could increase the spread of noxious weeds.

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

ANALYSIS AREA

In this section the discussions will focus on 2 areas of different scale. The first will be the "project area", which consists of the state managed portion of section 36 in T31N R34W, and sections 20 and 32 in T31N, R33W. The parcels range from1,960 to 3,200 feet in elevation and are largely on north to east aspects with slopes of varying steepness to flat. The parcels are dominated by mixed conifer and Western larch / Douglas-fir habitats with lesser amounts cottonwood, ponderosa pine and Western white pine. The second scale or the "analysis area" relates to the surrounding landscape of the Libby Unit for assessing cumulative effects.

ANALYSIS METHODS

DNRC attempts to promote biodiversity by taking a 'coarse-filter approach', which favors an appropriate mix of stand structures and compositions on State lands (ARM 36.11.404). Appropriate stand structures are based on ecological characteristics (e.g., land type, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist and biodiversity would be maintained. This coarse-filter approach supports diverse vegetation populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. As part of its application of this coarse filter approach, DNRC analyzes changes in forest composition, age class distribution, cover type, and stand structure in determining the potential impacts to vegetation resulting from a timber sale project. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a

"fine-filter" approach for threatened, endangered, and sensitive species (ARM 36.11.406). The fine-filter approach focuses on a single species' habitat requirements.
To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, Stand Level Inventory (SLI) data, aerial photographs, Montana Natural Heritage Program data, and consultations with other professionals provided information for the following discussion and effects analysis.

A. Existing Forest Conditions

The State Forest Land Management Plan (SFLMP) directs DNRC to promote biodiversity by taking a coarse filter approach thereby favoring an appropriate mix of stand structures and compositions on State land. Components used to describe an appropriate mix of stand conditions at the landscape level include cover type proportions, age class distributions, stand structural characteristics.

1. Libby Unit (landscape level) Cover Types

Estimates of current and desired future conditions were determined at the Landscape level for the entire Libby Unit in 2010. Desired future conditions are based on the historically occurring cover types in Montana described by Losensky (1997) and are determined for each stand identified in the DNRC's SLI by the site-specific model described in ARM 36.11.405. The Libby Unit's Inventory (SLI) was used to compare present (current) conditions to desired future conditions for this landscape in regards to amount and distribution of cover types. Table 1 displays this information:

Table 1: Current and Desired Future Conditions for the Libby Unit

Cover Type	Current Cover Type (Acres)	Desired Future Conditions (Acres)	Current Type Minus (–) Desired Future Cond.
DF	1,358	260	1,098 acre surplus
HW	228	219	9 acre surplus
LP	686	182	504 acre surplus
MC	3,984	376	3,608 acre surplus
PP	13,720	18,882	5,162 acre deficit
SUBALP	472	52	420 acre surplus
WL/DF	9,117	8,463	654 acre surplus
WWP	604	1,735	1,131 acre deficit
NONFOR	246	246	No change
TOTAL	30,415	30,415	

DF=Douglas-fir, HW=hardwood, LP=Lodgepole, MC=Mixed conifer, PP=Ponderosa pine, WL/DF=Western larch/Douglas-fir, WWP=Western white pine, SUB/ALP=subalpine fir, NONFOR=non-forested. The Current Type minus Desired Future Conditions above lists the excess and deficit (-) acres for each cover type.

The PP and WWP cover types are not as well represented within the Libby Landscape compared to desired future conditions. Most notable, is the conversion of over 5,162

acres from the PP cover type, over the last 100 years, to the present over abundance of the MC, LP, WL/DF and DF cover types.

This cover type shift is typical for Northwest Montana and it does represent a change in stand conditions. Active fire suppression initiated in the early 1900's has interrupted wildfire frequencies and intensities in conjunction with 50 years or more of logging practices that favored the removal of commercially valuable western larch (*Larix occidentalis*), ponderosa pine (*Pinus ponderosa*), western white pine (*Pinus monticola*) and Douglas-fir (*Pseudotsuga menziesii*) for railroad ties, mining timbers, and construction lumber. Many open, mature stands dominated by western larch and other seral species with even-aged patches of immature seral trees in the understory have been replaced with more densely stocked stands in both the overstory and understory that includes a higher percentage of more shade tolerant trees such as, grand fir (*Abies grandis*), Engelmann spruce (*Picea engelmannii*) and western hemlock (*Tsuga heterophylla*).

2. Iron Schoolhouse Timber Sale (project area) Cover Types

The Iron Schoolhouse Timber Sale project area comprises 525.9 acres (~2%) of the Libby Unit landscape. Stand level inventory (SLI) data specific to project area in state owned portions of sec. 36 in T31N R34W, and sections 20 and 32 in T31N, R33W are summarized below for cover types and age class distribution. Site review observations and stand measurements were used to update, confirm or refine the SLI data for this section.

Table 2 displays current and appropriate cover types for the Iron Schoolhouse Timber Sale project area. The project area reflects the forest cover type shift similar to the landscape level, as species compositions are trending towards shade tolerant species dominating the composition of theses timber stands.

Table 2: Current and Desired Future Conditions for the Iron Schoolhouse Timber Sale Project Area (State owned portions of Section 36 in T31N, R34W, and Sections 20 and 32 in T31N, R33W)

Cover Type	Current Cover Type (Acres)	Desired Future Conditions (Acres)	Current – DFC (Acres)
DF	—	—	—
HW	—	24	24 acre deficit
LP	—	—	—
MC	317	36	281 acre surplus
PP	45	139	94 acre deficit
SUB/ALP	—	—	—
WL/DF	93	202	109 acre deficit
WWP	63	117	54 acre deficit
NONFOR	6	6	—

TOTAL	524	524	
DF=Douglas-fir, HW=hardwood, LP=Lodgepole, MC=Mixed conifer, PP=Ponderosa pine, WL/DF=Western larch/Douglas-fir, WWP=Western white pine, SUB/ALP=subalpine fir, Other=nonstocked. The Current Type minus Desired Future Conditions above lists the excess and deficit (-) acres for each cover type.			

3. Iron Schoolhouse Timber Sale Stand History

Records show that there have been various timber sales from 1927 to 1974 in various portions of the project area. The stand cover in the early 1900's was generally WL/DF, LPP and PP with some brushy areas created by wildfire burns. Over time, stands have gradually converted to a MC type. With this gradual conversion to MC, the stand health has deteriorated significantly over the last 36-83 years due to insects and disease, causing a high rate of mortality in the grand fir, western hemlock and Douglas-fir.

4. Libby Unit (landscape level) Age Class Distribution

The Libby Unit's Stand Level Inventory (SLI) 2009 version was used to summarize the estimated age class distribution for current cover types. Table 3 displays this information.

Table 3: Libby Unit Age Class Distribution by Current Cover Type

	Non Forested	00 - 39	40 - 99	100 – 149	150 +	Old Growth	**Total**
DF			59	269	1,012	19	**1,359**
HW		72	115	41			**228**
LP		385	279			22	**686**
MC		199	769	1,515	929	572	**3,984**
NonFor	246						**246**
NonStkd		364					**364**
PP		3,156	2,910	3,765	3,345	544	**13,720**
SUBALP		103		134	181	54	**472**
WL/DF		397	1,794	2,757	2,726	1,442	**9,116**
WWP		417		50	137		**604**
Total	**246**	**5,093**	**5,926**	**8,531**	**8,330**	**2,653**	**30,779**

5. Iron Schoolhouse Timber Sale (project area) Age Classification Distribution

Table 4: Displays the estimated age class distribution for the Iron Schoolhouse project area from SLI observations.

Table 4: Iron Schoolhouse Timber Sale Age Class Distribution by Current Cover Type

	NONFORESTED	40 – 99	100 – 149	150 +	OLD GROWTH	**Total**

MC			130	152	36	**318**
NONFOR	6					**6**
PP			45			**45**
WL/DF		40		53		**93**
WWP				63		**63**
Total	6	40	175	268	36	**525**

5. Old Growth

As per the State Land Board's decision in February, 2001, the DNRC adopted definitions for old growth by cover types, based on minimum number and size of large trees per acre and age of those trees as noted in *Old-Growth Forest Types Of The Northern Region* (Green et al. 1992). Older stands within proposed project areas are assessed for determining actual acreage that meet DNRC's old growth definitions. DNRC manages old growth stands to meet biodiversity and fiduciary objectives in the SFLMP, pursuant to state law and the Forest Management rules, ARM 36.11.401 through 36.11.450.

SLI identified one 36 acre stand within the project area that met the criteria for DNRC's old growth definitions.

6. Iron Schoolhouse Timber Sale Stand Characteristics

Stand characteristics helpful in describing existing stand conditions are summarized below in Table 6.

Table 6: General Stand Characteristics for the Iron Schoolhouse Timber Sale Project Area.

** Species Composition refers to the following: D = Douglas-fir, P = Ponderosa pine, LP = Lodgepole pine, GF = Grand fir, C = Western red cedar, WH = Western Hemlock, WP = Western white pine. Additionally, each number following the letter(s) corresponds to an approximate percentage in multiples of ten, while zero refers to a percentage less ten).*

Section 20, T31N, R33W

Stand #	Acres	Current – Desired FC	Habitat Type	Stocking BFBA	Structure	*Species Composition
1	45	PP-PP	ABGR/LIBO	120	Two	D4,P3,LP2, GF0

Section 32, T31N, R33W

Stand #	Acres	Current – Desired FC	Habitat Type	Stocking BA/Ac.	Structure	*Species Composition
1	10.9	WL-WWP	PSME/PHMA - CARU	140	Multi	L5,D4

2	29.1	WL/DF-WL/DF	TSHE/CLUN - ARNU	190	Multi	L5,D3,LP1
3	41.1	MC-PP	TSHE/CLUN - CLUN	180	Multi	D3,L3, LP1, GF1
4	35.6	MC-MC	TSHE/CLUN - ARNU	260	Multi	L3,D3,S2,GF1
5	43.5	MC-WWP	TSHE/CLUN - ARNU	140	Multi	D4,WH2,L2,C1

Section 36, T31N, R34W

Stand #	Acres	Current – Desired FC	Habitat Type	Stocking BA/Ac.	Structure	*Species Composition
1	42.9	MC-WL/DF	THPL/CLUN - ARNU	120	Multi	C4,WH3,GF2,L0
2	24.9	MC-WL/DF	TSHE/CLUN - ARNU	120	Multi	C4,D2,WH2,L1
3	105.2	MC-WL/DF	TSHE/CLUN - ARNU	120	Multi	C5,GF2,L1,D1
4	24.4	MC-HW	THPL/CLUN - ARNU	120	Multi	C4,HW2,WH2,L1
5	63.2	WWP-WL/DF	TSHE/CLUN - ARNU	130	Multi	C3,WH3,GF2,WP1
6	53.1	WL/DF-PP	PSME/PHMA - PHMA	100	Multi	D5,L3,P1,WP0
7	6.4	Non-forested	—	—	—	—

7. Iron Schoolhouse Timber Sale stand health and vigor

Overall stand vigor is rated as “good - average” for the stands, however a considerable number of the shade tolerant trees (primarily Grand fir, and Western Hemlock) are infected with Indian Paint fungus (*Echinodontium Tinctorium*) and in a few areas, a sizable proportion of Western larch trees are infected with White Pocket Rot (*Phellinus Pini*). Sporadically, Western Larch Dwarf Mistletoe (*Arceuthobium larcis*) is present in the Western larch throughout the project area. Endemic losses from outbreaks of the Douglas-fir beetle (*Dendroctunus pseudotsugae*), Fir Engraver beetle (*Scolytus ventralis*), and root rots have and continue to negatively affect stand health and vigor.

9. Adjacent Lands' general forest conditions

US Forest Service, small private, as well as private industrial timberlands border the project area parcels. The US Forest Service lands adjacent to the project area do not appear to have been treated in the recent past and generally, are fully stocked with mature timber. US Forest Service land adjacent to the south of the state owned parcel in Sec, 20, T31N, R33W has had some timber harvested in the recent past and is planned for an improvement harvest under the Sparring Bulls Environmental Impact

Statement (Alternative B). The small private ownership that borders the project area is generally managed for hay, livestock, small woodlots and home sites. These lands are vegetated with a mixture of open, grass fields to moderately stocked, mature timber stands. The private industrial land adjacent to the project area has been actively managed and was likely harvested within the last 10 years. Most of this private, industrial land is stocked with advanced regeneration to pole sized timber.

B. Sensitive, Threatened, and Endangered Plants – existing condition

A review of the records from the Montana Natural Heritage Program indicated no plant species of special concern identified with the project area.

C. Noxious Weeds – existing condition

Lincoln County and DNRC have a "Cooperative Integrated Noxious Weed Management Agreement" in compliance with the state law known as the County Weed Control Act (Section 7-22-2151, MCA). An annual coordination meeting between the county Weed Control District and DNRC allows for identification of weed problems; and determines an integrated approach at managing and treating priority areas as related to county and DNRC weed control goals.

At the landscape level, past activities have had a big impact on noxious weed populations. Land use activities such as logging, road building, livestock grazing, wildfires, and recreation have led to increases in the amount and distribution of noxious weeds on the Libby Unit. This has occurred at the project area level as well. In the county, tansy ragwort and rush skeletonweed have been identified as a target control species. These species have not been observed within the project area. Spotted knapweed and hawkweed have been observed along road edges of the project area.

D. Effects Project Actions:

1. Proposed Project Actions:

a.) Harvest/Logging:

A total of **470.6** acres would be commercially harvested. Approximately 448.8 of these acres would utilize seedtree and shelterwood, harvest systems and, the remaining 26.2 acres would utilize the individual tree selection harvest system.

Approximately 119.3 acres would utilize cable based, and approximately 54 of those acres may utilize helicopter based logging equipment. The remaining 351.3 acres would be harvested using ground based logging equipment.

b.) Roads:

Approximately **3.5 miles of new roads**, including temporary roads, would be constructed, approximately **1.1 miles of existing roads would be re-constructed** to meet BMP standards.

c.) Silvicultural treatment requirements for implementation:

Units 20-1, 32-1, 32-3 and 36-1: Seed Tree Harvest: leave approximately 10-15 trees per acre, favoring WWP, PP, WL, & DF.

Units 32-2, and 36-2: Shelterwood harvest: leave approximately 30 trees per acre, favoring WWP, PP, WL, & DF.

Unit 20-2: Lightly stocked shelterwood harvest: Leave approximately 15 – 20 trees per acre, favoring WWP, PP, WL, & DF.

Unit 32-4: Individual tree selection: Provide for retention trees as required under Montana's Streamside Management Zone law.

d.) After harvest treatments:

All harvest units: Slash would be treated in compliance with the Montana State Hazard Reduction Law.

2. Effects on Cover Type and Age Class Distribution:

a.) Direct and Indirect Effects

1. *NO ACTION:* Short term effects are not anticipated with the no action alternative. In the long term, the general trend of increasing the acreage of Mixed Conifer and Douglas-fir cover types and would continue moving the project area further away from desired future condition cover types. The increasing prevalence of shade tolerant species would promote increasing timber loss to decay among those species. Fuel loading would be expected to increase and stands would become more susceptible to a stand replacement fire.

2. *ACTION ALTERNATIVE:* Harvesting, according to the silvicultural prescriptions would result in the even-aged harvest of approximately 444.4 acres, while another 26.2 acres would result in un-even-aged harvest. The resulting even-aged stands would contain healthy overstory seed trees of naturally occurring seral (primarily PP, WL, WWP, and DF) species. Regeneration of these seral species would be encouraged both naturally and through artificial planting where necessary. The un-even-aged stands would consist of slightly healthier, and more disease resistant species.

All treated stands, currently containing Mixed Conifer, Western Larch/Douglas-fir, Western White Pine, and Ponderosa Pine cover types (refer

to Tables 1 & 2), would move the distribution of cover types in the project area closer toward desired future conditions.

Approximately 444.4 acres would be shifted from older age classes to the 0-39 year age class as a result of timber harvesting. Unit 32-4, with 26.2 acres, containing old growth would remain in an old growth condition, and 9.6 acres would no longer be classified as old growth following harvesting.

b.) Cumulative Effects:

1. *NO ACTION ALTERNATIVE*: Without disturbance, the no action alternative would allow the trend of increasing acreages and densities of shade tolerant species to continue. The number of acres with desirable seral species would continue to decline.

2. *ACTION ALTERNATIVE*: Since the project area comprises approximately 2% of the Libby Unit landscape the magnitude of effects would be minimal. The action alternative would contribute to moving stand conditions towards more historical condition by decreasing the excess of MC and WL/DF cover type acres by ~311.2, and returning those acres to the historical WWP and PP cover types. Stand health would be improved in the remaining ~159.4 acres while allowing those stands to remain in their current cover types. The action alternative would increase the proportion of forested acres in the 0-39 year age class on state lands with the conversion of approximately 444.4 acres from older age classes. Approximately 26.2 acres of the identified 36 acre old growth stand would remain in an old growth condition following harvest however, the conversion of 9.6 acres of old growth to the 0–39 year age class would bring the total Libby Unit old growth acres to 2,643.4.

3. Effects on other forest stand characteristics, health and vigor

a.) Direct and Indirect Effects:

1. *NO ACTION ALTERNATIVE*: Forest stands would continue to grow and develop without disturbance. Growth rates are likely to decline or become static without density control, and stand susceptibility to insects and disease would increase. Defect from stem decays in grand fir, western hemlock and western larch would slowly affect currently infected trees and spread to other trees, decreasing timber yield potential. Overall stand vigor would decline slowly as trees age and mature. Tree regeneration in canopy gaps or under poorly stocked upper canopies would be dominated by shade tolerant species, further diminishing the proportion of ponderosa pine and other seral species in stand compositions.

2. *ACTION ALTERNATIVE*: Under this alternative, a total of 470.6 acres would be commercially harvested. Approximately 444.4 of these acres would

be harvested, leaving seed trees and snags. This harvest would be a stand replacing treatment where PP, WL, DF and WWP would be naturally regenerated or planted. The action would result in an improved health and vigor of the stand and a reduction of fuels. The less desirable climax species that currently occupy the site would be replaced with more desirable seral species, thus promoting more historic species compositions. An additional 26.2 of these acres would be harvested, by removing individual trees, resulting in little change to stand structure with some improvement expected in stand health by reducing the percentage of disease prone trees as well as reducing a small portion the over-all stand .

b.) Cumulative Effects:

1. *NO ACTION ALTERNATIVE*: Forest stands within this section would continue to develop, retaining a larger proportion of the surrounding landscape in older, denser forest stands.

2. *ACTION ALTERNATIVE*: A total of 470.6 acres would be commercially harvested. Of this, 444.4 acres would receive silvicultural treatments, increasing the acreage of open canopied forest and young, newly established forest in the surrounding landscape. Additionally, 26.2 of these acres would receive silvicultural treatments that would result in subtle improvements to health and vigor.

4. Effects on Noxious Weeds:

a.) Direct and Indirect Effects:

1. *NO ACTION ALTERNATIVE:* Ground disturbing activities associated with timber harvesting and road maintenance or construction would not occur. Populations of spotted knapweed and Hawkweed would increase in size and distribution along roads. As weed control priorities and funding allows under County Cooperative Weed Control Agreements, spraying along roads may occur within the next 5 years to contain or decrease existing weed populations.

2. *ACTION ALTERNATIVE:* Timber harvesting and road construction activities would expose mineral soil and could promote encroachment and spread of noxious weeds into the forest stands. In order to control and minimize the risk of increasing noxious weed populations, contract clauses would require the timber sale purchaser to: 1.) apply grass seed on areas with soil exposed from road construction or maintenance activities, 2.) wash and clean off-road equipment so it is free of weed parts and have it inspected prior to moving onto site; and 3.) incorporate slash into skid trails or apply grass seed to heavily used trails that have soil exposed. The proposed harvest area and project area roads would be monitored for noxious weed activity. If

necessary, treatments including herbicide and, or biological control methods would be implemented for appropriate noxious weed control.

b.) Cumulative Effects:

1. *NO ACTION ALTERNATIVE:* Current noxious weed populations would continue to spread or new weed populations would invade the general area at the current rate given continuance of road and land uses.

2. *ACTION ALTERNATIVE:* The risk of additional noxious weed encroachment or invasion is higher under this alternative. Mitigations discussed above have been effective in containing or controlling noxious weed populations.

SUMMARY OF MITIGATIONS INCORPORATED
IN TO THE
IRON SCHOOLHOUSE TIMBER SALE

Soil Resource Mitigations:

1. Ground based logging equipment would be restricted to periods when soil moisture is dry, or the ground is frozen or snow covered to minimize compaction, displacement, and erosion.
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.

Water Resource Mitigations:

1. Streamside Management Zones (SMZs) 50 to 100 feet in width (dependant on slope and benches) would be marked along all streams. Harvesting would be minimal 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 erodable slopes and minimize sediment production.
4. Temporary roads would be reclaimed after harvest activities are complete.

Vegetation Resource Mitigations:

1. Larger diameter snags will be protected as needed to assure retention of 2 snags per acre on average in all units where available.
2. Ponderosa pine, western larch, western white pine and Douglas-fir would be favored leave trees.
3. 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.
4. 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.
5. 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:

- A DNRC biologist will be consulted if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*) are needed.
- Public access would be restricted at all times on restricted roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.).
- Roads and skid trails that are opened with the proposed activities will be reclosed to reduce the potential for unauthorized motor vehicle use.
- Use a combination of topography, group retention, and roadside vegetation to reduce views into harvest units along open roads.
- Snags, snag recruits, and coarse woody debris will be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch, ponderosa pine, and western white pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Coarse woody debris retention would emphasize retention of downed logs of 15-inch diameter or larger.
- Contractors and purchasers conducting contract operations will be prohibited from carrying firearms while operating on restricted roads.
- Portions of the proposed units (units 32-1, 32-2, 36-1, and 36-2) would be conducted to limit disturbance to potential spring grizzly bear habitats by restricting harvesting between April 1 and June 15.

- Retention of visual screening adjacent to riparian management zones would reduce detection of grizzly bears near these important habitats.
- Retention of patches of advanced regeneration of shade-tolerant trees, where feasible, would provide some break-up site distances, provide horizontal cover, and provide forest structural attributes preferred by snowshoe hares and lynx.
- Provide connectivity for fisher, Canada lynx, grizzly bears, and a host of other species by maintaining corridors of unharvested and/or lighter harvested areas along riparian areas, ridgetops, and saddles.
- Project activities would be conducted to limit disturbance to nesting goshawks by avoiding the nesting period (April 1- August 15) in the vicinity of any verified nest. A no-harvest buffer of 300-feet radius around any active goshawk nests would further reduce potential disturbance while retaining important habitat attributes in the goshawk nest area.
- Project activities would be conducted to limit disturbance to the existing great blue heron rookery by avoiding the nesting period (March 15- August 1). A no-harvest buffer of 200-feet radius around the central point in the rookery would retain important habitat attributes while buffering the rookery from windthrow and potential disturbance vectors.

Marsh, David

From: Rennie, Patrick
Sent: Wednesday, August 20, 2008 9:28AM
To: Marsh, David
Subject: Iron School T.S.

Hi Dave"

I completed an inventory of cultural resources for the subject timber sale proposal. A series of log cabin remains were identified within one of the sale areas. These structures do not appear to constitute Heritage Properties, so no additional archaeological investigative work is recommended for this project.

Patrick