Cliff Lake
Environmental Assessment

Kalispell Unit
Northwest Land Office
Montana Department of Natural Resources and Conservation
September 2023

Cliff Lake

Environmental Assessment

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Environmental Assessment

Project Name: Cliff Lake
Proposed Implementation Date: June 2024
Proponent: Kalispell Unit, Northwest Land Office, Montana DNRC
County: Flathead

Type and Purpose of Action

Description of Proposed Action:

The Kalispell Unit of the Montana Department of Natural Resources and Conservation (DNRC) is proposing the Cliff Lake Timber Sale. The project is located approximately 9 air miles northwest of Kalispell, MT (refer to Attachments vicinity map A-**1** and project map A-**2**) and includes the following sections:

Beneficiary	Legal Description	Total Acres	Treated Acres
Common Schools			
Public Buildings	**s. 31, T30N, R22W**	**640**	**145.6**
MSU 2nd Grant	**s. 19, T30N, R22W**	**300**	**21.0**
MSU Morrill			
Eastern College-MSU/Western College-U of M	**s. 29, T30N, R22W**	**320**	**175.2**
Montana Tech			
University of Montana			
School for the Deaf and Blind	**s. 30, T30N, R22W**	**480.5**	**133.0**
Pine Hills School			
Veterans Home			
Public Land Trust			
Acquired Land			

Objectives of the project include:

- Promote a healthy, productive forest and return the area to more historic forest conditions.
- Reduce fuel loading and increase the stand's fire resiliency.
- Manage outbreaks of disease and insects in the stands.
- Generate revenue for the ACB, State Normal School, Deaf & Blind, and Public Building Trusts.

Proposed activities include:

Action	Quantity
Proposed Harvest Activities	# Acres
Clearcut	
Seed Tree	
Shelterwood	
Selection	
Commercial Thinning	
Individual Tree Selection	474.8
Total Treatment Acres	
Proposed Forest Improvement Treatment	# Acres
Pre-commercial Thinning	
Planting	175
Site preparation/scarification	400
Proposed Road Activities	# Miles
New permanent road construction	1.0
New temporary road construction	
Road maintenance	4.9
Road reconstruction	
Road abandoned	
Road reclaimed	
Other Activities	
Weed Spraying	5 miles
Pile Burning	474.8 acres

Duration of Activities:	9 to 12 months
Implementation Period:	06/2024 thru 07/2027

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

The DNRC would manage lands involved in this project in accordance with:

- The State Forest Land Management Plan (DNRC 1996),
- Administrative Rules for Forest Management (ARM 36.11.401 through 471),
- The Montana DNRC Forested State Trust Lands Habitat Conservation Plan (HCP) (DNRC 2010)
- and all other applicable state and federal laws.

Project Development

SCOPING:

- DATE:
  - June 1, 2023

- PUBLIC SCOPED:
  - The scoping notice was posted on the DNRC Website: https://dnrc.mt.gov/News/scoping-notices
  - Scoping notices were sent to 56 adjacent landowners and to contacts on the statewide and Kalispell Unit scoping list.
- AGENCIES SCOPED:
  - Montana Fish, Wildlife, and Parks; Blackfeet Tribe, Chippewa Tribe, Confederated Salish and Kootenai Tribe, Fort Belknap Tribe, Northern Cheyenne Tribe, Fort Peck Assiniboine and Sioux Tribe
- COMMENTS RECEIVED:
  - How many: 5 public comments were received, including three comments of support for the project.
  - Concerns: MT FWP expressed concern regarding impacts to white-tailed deer winter range due to the removal of mature Douglas-fir. The Northern Cheyenne Tribe inquired if a Class I or III archeological review had been completed in the project area.
  - Results (how were concerns addressed): DNRC wildlife biologist worked closely with FWP biologist to come up with mitigations to lessen the impacts on white-tailed deer winter range. Mitigations include retention of sub-merchantable trees, higher tree retention along a ridgetop in Unit 1, and retention of individual large trees and groups of trees within harvest units. A Class I (literature review) level review was conducted by the DNRC staff archaeologist for the area of potential effect (APE). This entailed inspection of project maps, DNRC's sites/site leads database, land use records, General Land Office Survey Plats, and control cards. The Class I search results revealed that no cultural or paleontological resources have been identified in the APE, but it should be noted that Class III level inventory work has not been conducted there to date.

Internal and external issues and concerns were incorporated into project planning and design and will be implemented in associated contracts.

INTERDISCIPLINARY TEAM (ID):

- Project Leader: Pete Seigmund
- Archeologist: Patrick Rennie
- Wildlife Biologist: Justin Cooper
- Hydrologist: Josh Harris
- Soil Scientist: Josh Harris
- Silviculturist: Tim Spoelma

OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED: *(Conservation Easements, Army Corps of Engineers, road use permits, etc.)*

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

project complies with the HCP. The HCP can be found at https://dnrc.mt.gov/TrustLand/about/planning-and-reports.

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

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

ALTERNATIVES CONSIDERED:

No-Action Alternative: No forest management activities would occur. Small quantities of wood products would continue to be sold from the project area in the form of residential firewood permits. Forest succession would continue to be mainly influenced by the occurrence of natural events such as insect and disease outbreaks, windthrow, or wildland fire.

Action Alternative: Under the action alternative, the DNRC would harvest approximately 4,500 thousand board feet from 474.8 acres. An individual tree selection prescription would be applied to all harvest acres . Forest health and vigor would be improved in all treated acres, and fuel loading/ continuity in the WUI would be reduced. Site preparation would occur in all harvest units following harvest operations. Western larch would be promoted through planting and/or natural regeneration. Timber would be harvested using traditional ground-based logging systems. The transportation plan would utilize approximately 5 miles of existing road and 1 mile of new road construction.

Impacts on the Physical Environment

VEGETATION:

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to vegetation:

- Overstocked stand conditions are contributing to loss of timber productivity and may increase mortality from insect and disease.

- There has been a species composition shift from a predominately western larch stand to Douglas-fir.
- There is an absence of regeneration due to deer browse.
- Forest management activities could increase prevalence of noxious weeds in the project area.

Recommended Mitigation Measures for Vegetation- The analysis and levels of effects to vegetation resources are based on implementation of the following mitigation measures.

- Reduce stand densities to increase tree growth and vigor and improve forest health.
- Provide for regeneration of western larch by reducing basal area, conducting site preparation activities to provide for natural regeneration and to provide spots for planting of western larch.
- Design harvest activities to promote desired future conditions across all stands.
- Use integrated pest management to reduce risk of noxious weed spread.

FOR COMPLETE VEGETATION ANALYSIS SEE ATTACHMENT B.

SOILS:

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to soils:

- Soil Physical Properties: Disturbance from ground-based and cable harvesting can displace fertile topsoil affecting vegetation growth and water quality.
- Nutrient Recycling: 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.
- Slope Stability: Timber harvesting could remove some of the vegetation that stabilizes the slopes.

Recommended Mitigation Measures for Soils- The analysis and levels of effects to soils resources are based on implementation of the following mitigation measures.

- Limit equipment operations to periods when soils are dry (less than 20% oven-dried weight), frozen or snow-covered in order to minimize soil compaction and rutting, and to maintain drainage features. Check soil moisture conditions prior to equipment start-up.
- On ground-based units, the logger and sale administrator would agree to a skidding plan prior to equipment operations. Skid trail planning would identify which existing trails to use and how many additional trails are needed.
- Do not use existing trails if they are located in draw bottoms or other unfavorable locations.
- Grass seeding or other erosion control measures may be required to stabilize some trails.
- Limit ground-based operations to slopes less than 40% unless they can be used without causing excessive displacement or erosion.

- Keep skid trails to 20 percent or less of the harvest unit acreage. Provide for surface drainage of all roads and skid trails concurrent with operations.
- Slash disposal: Limit the total of disturbance and scarification to 30-40 percent of harvest units.
- Limit dozer piling to slopes less than 35 percent and limit excavator piling to slopes less than 40 percent unless it can be completed without causing excessive erosion.
- Retain between 12 and 24 tons/acre of woody debris 3-inches in diameter or greater (depending on habitat type) and a feasible majority of fine branches and needles 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 fine 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.

FOR COMPLETE SOILS ANALYSIS SEE ATTACHMENT C.

WATER RESOURCES:

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to water resources:

- Sediment delivery and subsequent water quality impacts can be affected by timber harvest activities.
- Water yield increases can result from timber harvesting activities.

Recommended Mitigation Measures for Water Resources- The analysis and levels of effects to water resources are based on implementation of the following mitigation measures.

- Implement BMPs on all new roads and improve BMPs on existing roads where needed
- Use spot-blading on existing roads to preserve as much of the existing vegetative cover as possible on vegetated road surfaces

FOR COMPLETE WATER RESOURCES ANALYSIS SEE ATTACHMENT C.

FISHERIES RESOURCES *(including unique, federally listed as threatened or endangered, sensitive, and/or species of special concern):*

After the consideration of project-specific issue statements and the extent of the proposed actions, potential effects to fisheries resources in the Beaver Creek – Stillwater River watershed are dismissed from further assessment. Potential effects to fisheries resources are **dismissed from further assessment** due to: (1) less than 10% of the acreage within the watershed would be affected by timber harvest, (2) no timber harvest would occur within 120 feet of any stream channel in the watershed, (3) no forest road haul route use would occur within 150 feet of any stream channel in the watershed, and (4) no road construction would occur within 150 feet of any stream channel in the watershed. No foreseeable direct or indirect impacts to fisheries resources would be expected to occur in the watershed, and no additional cumulative effects to fisheries resources would be expected in the watershed as a result of implementing the Action Alternative.

WILDLIFE ***(terrestrial & avian including unique, federally listed as threatened or endangered, sensitive, and/or species of special concern):***

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to wildlife:

- Mature forest cover, old-growth, and connectivity. The proposed activities could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature and old-growth forest.
- Canada lynx. The proposed activities could result in the modification of habitat preferred by Canada lynx (*Felis lynx*) and decrease the area's suitability for lynx.
- Flammulated owls. The proposed activities could alter the structure of flammulated owl (*Otus flammeolus*) preferred habitat types, which could reduce habitat suitability for flammulated owls.
- Pileated woodpeckers. The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers (*Dryocopus pileatus*).
- Big game. The proposed activities could reduce habitat quality for big game, especially during the fall hunting and winter seasons, by removing hiding cover, increasing roads in secure areas, and disturbing animals. The proposed activities could also reduce the quality and availability of thermal cover, by reducing forest canopy cover and increasing the distance between large mature trees.

Recommended Mitigation Measures for Wildlife- The analysis and levels of effects to wildlife are based on implementation of the following mitigation measures.

- If a threatened or endangered species is encountered, consult a DNRC biologist immediately. Similarly, if undocumented nesting raptors are encountered within ½ mile of the Project Area contact a DNRC biologist.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per *ARM 36.11.432(1)(c)* and *GB-PR2* (*USFWS and DNRC 2010)*.
- Contractors will adhere to food storage and sanitation requirements as described in the timber sale contract. Ensure that all attractants such as food, garbage, and petroleum products are stored in a bear-resistant manner.
- Restrict public access at all times on restricted roads that are opened for harvesting activities. Effectively close all restricted roads following harvest completion.
- Close roads and trails to the maximum extent possible following the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags to firewood gathering.
- Retain patches of advanced regeneration of shade-tolerant trees within harvest units as per *LY-HB4* (*USFWS and DNRC 2010*).
- Provide visual screening along open roads to the extent practicable by retaining available submerchantable trees and brush.

- Retain at least 2 snags and 2 snag recruits per acre (>21" dbh or largest available size class), particularly favoring western larch, ponderosa pine and Douglas-fir for retention. If snags are cut for safety concerns, leave them in the harvest unit. Retain coarse-woody debris as described in the Forest Management ARMs and *SOILS ANALYSIS* in this document.
- Retain 12 to 24 tons/acre coarse-woody debris according to *ARM 36.11.414* and emphasize retention of 15-inch diameter downed logs aiming for at least one 20-foot-long section per acre (*USFWS and DNRC 2010*).
- Maintain a 300-foot-wide corridor with a minimum of 40% canopy cover, where possible, on south and west facing aspects to provide connective thermal cover between untreated stands of mature forest after harvest.

FOR COMPLETE WILDLIFE ANALYSIS SEE ATTACHMENT D.

AESTHETICS

Any change to the scenery in the area from these alternatives would be in addition to past activity within the project area. This analysis includes all past and present effects.

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to aesthetics:

- Timber harvesting and associated activities may affect the aesthetic value of the project area. Roads, skid trails, and canopy openings may appear unnatural. Residual logging slash, damaged trees, stumps, and uniform tree spacing may detract from the natural appearance associated with an unmanaged forest.

Recommended Mitigation Measures for Aesthetics- The analysis and levels of effects to aesthetics are based on implementation of the following mitigation measures.

- Timber harvest and road building will minimize effects of soil erosion by meeting best management practices. Disturbed areas associated with road building will be promptly revegetated.
- Prescriptions will attempt to mimic natural patterns that would result from fire or other natural forest altering events.
- Reserve patches and uneven tree spacing will reduce unnatural appearance on the project area.

Existing Conditions

The project area is currently a mosaic of forest patches that have resulted from natural events and conditions, previous harvest, and fire suppression activities.

Environmental Effects

The project area is popular for biking, hiking, and horseback riding. Forest management activities would change the current visual appearance of harvested areas and may affect the visual appearance to recreationists passing through.

-VISUAL QUALITY

No-Action Alternative:

The no-action alternative would not have any direct or secondary effects on the visual quality of the stand. The stand is currently overcrowded with large areas being slowly converted to shade-tolerant tree dominated forest. Under this alternative it is likely that overcrowding and regeneration of shade tolerant species would continue. This would likely lead to a more Douglas-fir dominated stand that would replace western larch acreage on the Kalispell unit.

Action Alternative:

Direct, Secondary, and Cumulative Effects

The action alternative would have direct, secondary, and cumulative effects to visual quality in the stand. These effects would include temporary dust generation, reduced tree density, and openings in the canopy where timber would be removed and overcrowding would be reduced. The cumulative effect on the stand would be to promote natural regeneration and forest succession would be pushed towards a more historic condition across the project area.

Through the proposed sale area, slash from the harvest would be noticeable yet temporary. Generally, slash disappears from the site within five years, and is often covered by other vegetation within three years.

-NOISE

No-Action Alternative:

The no-action alternative would have no effect on noise in the project area.

Action Alternative:

Direct, Secondary, and Cumulative Effects
Harvest activities would be quite audible, and, depending upon air conditions, equipment could be heard many miles from their location. Noise would be generated by harvest operations, harvest related traffic, road construction, and administrative oversight. This could be expected to be present for the entire season of harvest, typically from mid-June through mid-March of the following year, for the duration of the harvest of two to three years during the general “work week”.

Based on the anticipated operating periods and the short duration of the timber sale direct, secondary, and cumulative effects of noise will be low.

HISTORICAL AND ARCHEOLOGICAL SITES:

DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR, AND ENERGY:

There will be no measurable direct, secondary, and cumulative impacts related to environmental resources of land, water, air, and energy due to the relatively small size of the timber sale project.

OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

- No other environmental documents are pertinent to this project.

Impacts on the Human Population

HUMAN HEALTH AND SAFETY:

Air Quality

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

The project area is located within Montana Airshed 2, which encompasses portions of Flathead and Lake Counties. Currently, this Airshed does contain impact zones. The project area is located with the Kalispell impact zone.

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to air quality:

- Smoke will be produced during pile burning.
- Dust will be produced during harvesting and hauling activities.

Recommended Mitigation Measures for Air Quality- The analysis and levels of effects to air quality are based on implementation of the following mitigation measures:

- Only burn on days approved by the Montana/Idaho Airshed group and DEQ.
- Conduct test burn to verify good dispersal.
- Dust abatement may be used as necessary.
- Slower speed limits may be included in contracts as necessary to reduce dust.

-SLASH BURNING

No-Action Alternative:
No slash would be burned within the project areas. Thus, there would be no effects to air quality within the local vicinity and throughout Airshed 2.

Action Alternative:

Direct and Secondary Effects
Slash consisting of tree limbs and tops and other vegetative debris would be piled throughout the project area during harvesting. Slash would ultimately be burned after harvesting operations have been completed. Burning would introduce particulate matter into the local airshed,

temporarily affecting local air quality. Over 70% of emissions emitted from prescribed burning are less than 2.5 microns (National Ambient Air Quality PM 2.5). High, short-term levels of PM 2.5 may be hazardous. Within the typical column of biomass burning, the chemical toxics are: Formaldehyde, Acrolein, Acetaldehyde, 1,4 Butadiene, and Polycyclic Organic Matter. Burning within the project area would be short in duration and would be conducted when conditions favor good to excellent ventilation and smoke dispersion as determined by the Montana Department of Environmental Quality and the Montana/Idaho Airshed Group. The DNRC, as a member of the Montana/Idaho Airshed Group, would burn only on approved days.

Thus, direct and secondary effects to air quality due to slash burning associated with the proposed action would be minimal.

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

-DUST

No-Action Alternative:
No increased dust would be produced as a result of the proposed timber sale. Current levels of dust would be produced in the area.

Action Alternative:

Direct, Secondary, and Cumulative Effects
Harvesting operations would be short in duration. 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 or require trucks to reduce speed if necessary to reduce dust near any affected residences.

Thus, direct, secondary, and cumulative effects to air quality due to harvesting and hauling associated with the proposed action would be minimal.

Log Hauling Traffic
Log hauling traffic is common in the project area.

Issues and Concerns- The following issue statements were developed during scoping regarding the effects of the proposed action to log hauling traffic:

- There will be increased travel on weekends.
- Trucks will drive fast.

Recommended Mitigation Measures for Log Hauling Traffic- The analysis and levels of effects of log hauling traffic is based on implementation of the following mitigation measures:

- Log hauling will take place typically during the general “work week”.
- Signs will be posted making the public aware of log hauling traffic in the area.
- If necessary, a slower speed limit may be imposed in the timber harvest contract.

No-Action Alternative:
No increase in log truck traffic would occur.

Action Alternative:

Direct, Secondary, and Cumulative Effects
Log truck traffic in the area would increase for the duration of the timber sale. However, signs will be posted indicating that log truck traffic is present in the area. If necessary, a slower speed limit may be imposed in the timber harvest contract.

Based on the mitigation measures direct, secondary, and cumulative effects of log hauling on human health and safety would be minimal.

RECREATION ***(including access to and quality of recreational and wilderness activities):***
The area is used for hiking, hunting, mountain biking, horseback riding, cross-country skiing, snowmobiling and general recreating. Currently, roads through the area are closed to motorized use and used only for administrative purposes. This is one of the higher use recreational areas on the Kalispell Unit. 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.

No-Action Alternative:
No change from the existing condition on recreational use of the area.

Action Alternative:

Direct, Secondary, and Cumulative Effects
Timber harvest and associated log hauling activities may temporarily displace recreational activities on haul roads and trails that are located within harvest units. This is a large area that would allow recreational activities to disperse and avoid timber harvest activities. Based on the mitigation measures direct, secondary, and cumulative effects on recreation would be minimal and short duration.

Recommended Mitigation Measures for Recreation. The analysis and levels of effects of recreation is based on implementation of the following mitigation measures:

- Log hauling and timber harvest activities will take place typically during the general “work week” allowing recreation on weekends when use is the higher.
- Signs and maps will be posted making the public aware of log hauling and timber sale activities in the area. Recreationists will need to avoid active areas of timber harvest for safety.
- Due to the project area’s proximity to Kalispell, there is a strong likelihood timber harvest activities will occur in the winter (November thru February). This would avoid the high use summer season.
- Horse back riding will be strongly discouraged on roads during active harvest operations.

Will Alternative result in potential impacts to:	Impact												Can Impact Be Mitigated?	Comment Number
	Direct				Secondary				Cumulative					
	No	Low	Mod	High	No	Low	Mod	High	No	Low	Mod	High		
No-Action														
Health and Human Safety	X				X				X					
Industrial, Commercial, and Agricultural Activities and Production	X				X				X					
Quantity and Distribution of Employment	X				X				X					
Local Tax Base and Tax Revenues	X				X				X					
Demand for Government Services	X				X				X					
Density and Distribution of Population and Housing	X				X				X					
Social Structures and Mores	X				X				X					
Cultural Uniqueness and Diversity	X				X				X					
Action														
Health and Human Safety	X				X				X					
Industrial, Commercial, and Agricultural Activities and Production	X				X				X					
Quantity and Distribution of Employment	X				X				X					
Local Tax Base and Tax Revenues	X				X				X					
Demand for Government Services	X				X				X					
Density and Distribution of Population and Housing	X				X				X					
Social Structures and Mores	X				X				X					
Cultural Uniqueness and Diversity	X				X				X					

LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS *(includes local MOUs, management plans, conservation easements, etc):*

The project area was identified in the Montana Forest Action Plan as a priority area due to its location in the wildland urban interface (WUI) and as a forest health risk. Flathead County has a Community Wildfire Protection Plan (CWPP) and identified the proposed project area as 'Area 2' in their plan. This includes the area west of Whitefish and Kalispell.

OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

The proposed action has a projected harvest volume between 4.5 and 5.4 MMBF. This volume is worth approximately $562/MBF delivered to a forest products manufacture site at current market prices. Delivered to market, the proposed action has a total revenue value of an estimated $2,753,800.00. Removing the timber sale purchaser's contracted operations and DNRC's development, administration, and operation expenses, the trust beneficiaries net between an estimated 15 and 35 percent of total delivered sawlog market value. Therefore, the proposed action may generate net income for trust beneficiaries between $413,070.00 and $963,830.00.

Costs related to the administration of the timber sale program are only tracked at the Land Office and Statewide level. DNRC does not track project-level costs for individual timber sales. An annual cash flow analysis is conducted on the DNRC forest product sales program. Revenue and costs are calculated by land office and statewide. These revenue-to-cost ratios are a measure of economic efficiency. A recent revenue-to-cost ratio of the Northwestern Land Office was 1:2.41. This means that, on average, for every $1.00 spent in costs, $2.41 in revenue was generated. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return.

Currently the Sustained yield and target harvest from Trust Lands is 60.0 MMBF, which represents approximately 16.4% of timber harvested in the state of Montana. This project would provide approximately 4.9 MMBF of timber towards the annual sustained yield target thus helping sustain current mill capacity.

Environmental Assessment Checklist Prepared By:

Name: Pete Seigmund
Title: Forest Management Supervisor
Date: January 29, 2024

Finding

Alternative Selected

Action Alternative

Significance of Potential Impacts

Upon review of the above primary issues and their mitigations considered as part of this EA I find that none of the project impacts are regarded as severe, enduring, geographically widespread, or frequent. Further, I find that the quantity and quality of various resources will not be adversely affected to a significant degree. I find no precedent for future actions that would cause significant impacts, nor do I find conflict with local, State, or Federal laws, requirements,

or formal plans. In summary, I find that the identified adverse impacts will be avoided, controlled, or mitigated by the design of the project to an extent that they are not significant.

Need for Further Environmental Analysis

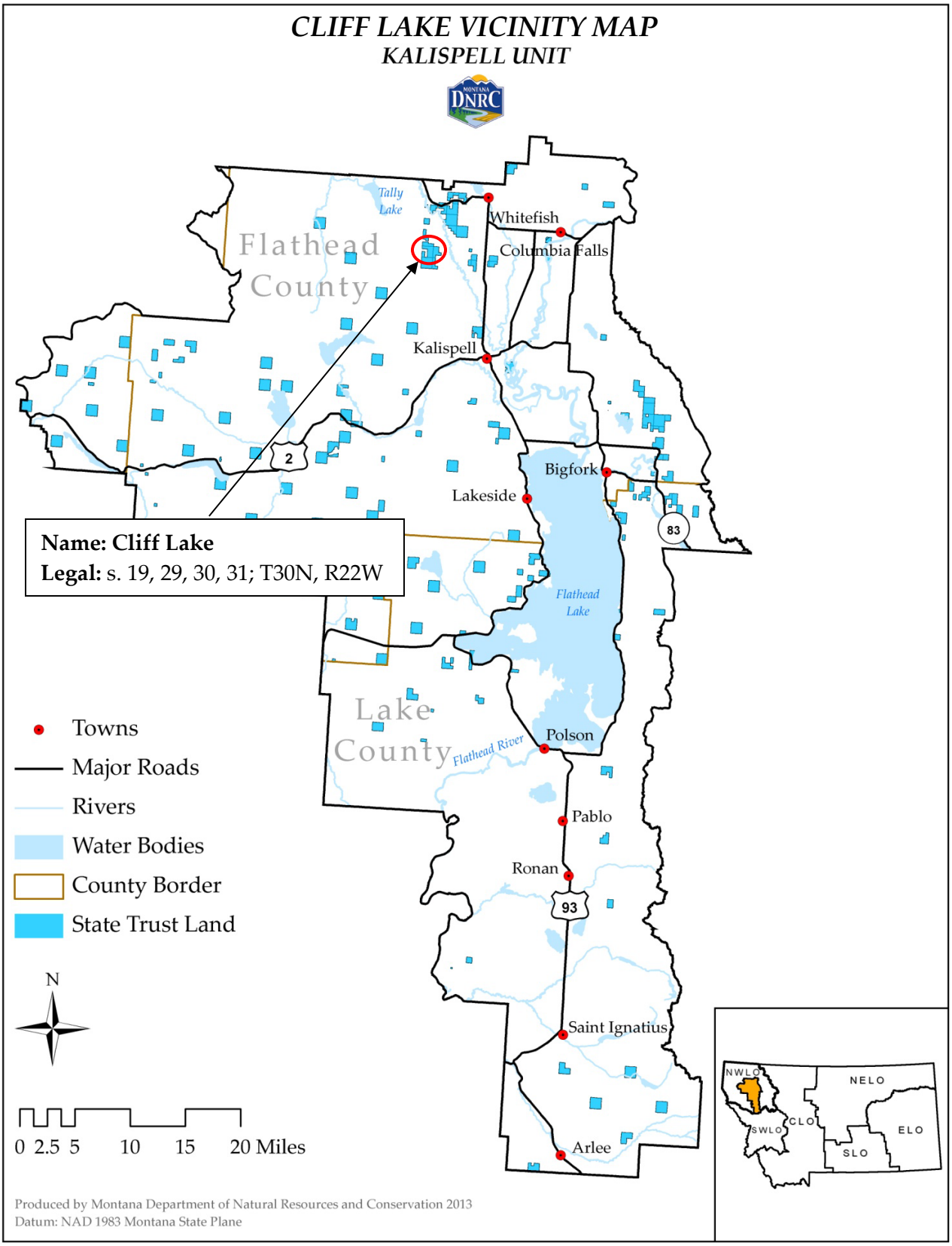
☐	EIS	☐	More Detailed EA	X	No Further Analysis

Environmental Assessment Checklist Approved By:

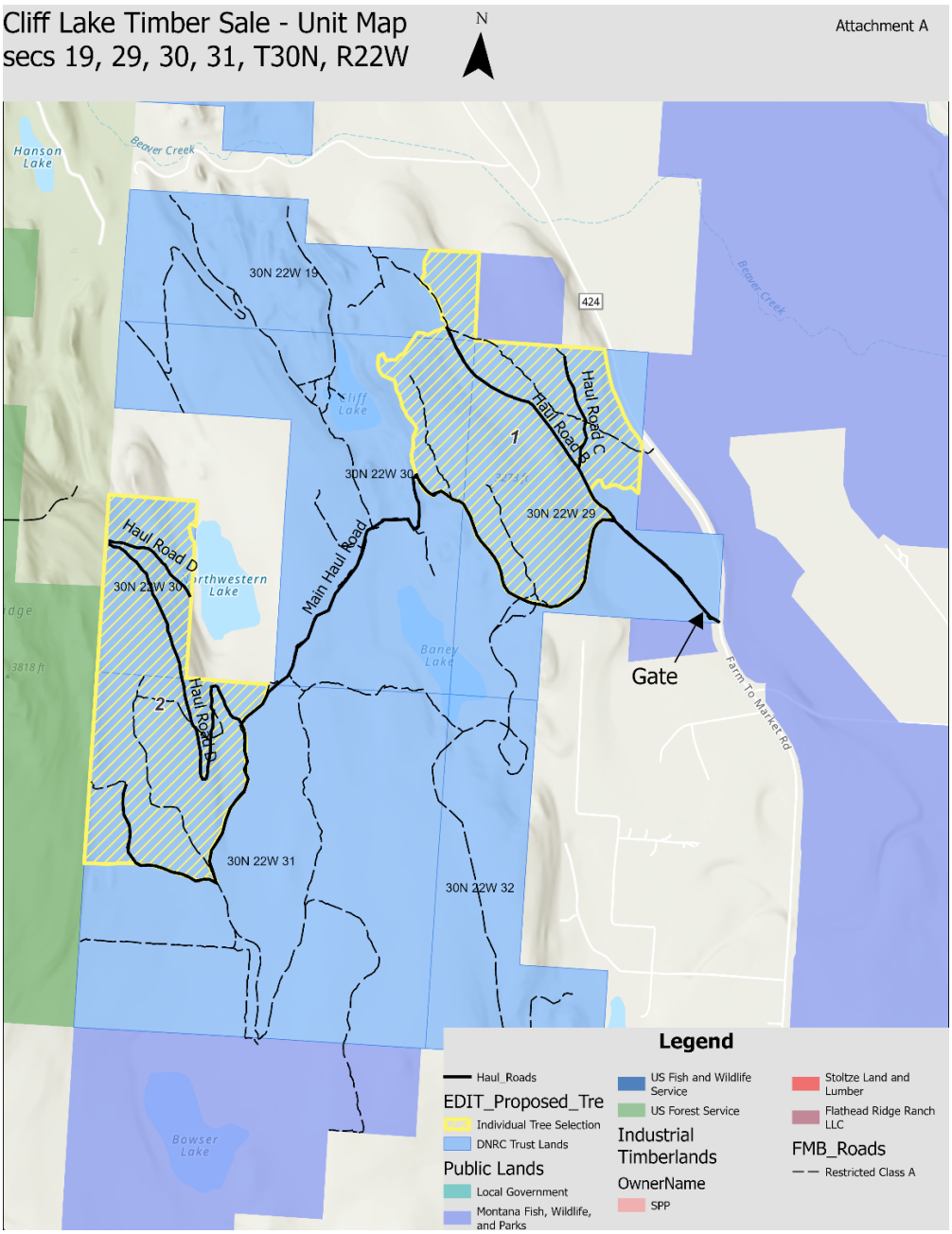
Name: David M. Poukish
Title: Kalispell Unit Manager
Date: February 5, 2024
Signature: /s/ David M. Poukish

Attachment A - Maps

A-1: Cliff Lake Timber Sale Vicinity Map



A-2: INSERT TEXT Timber Sale Harvest Units



Attachment B – Vegetation Analysis

Cliff Lake – Vegetation Analysis

Analysis Prepared By:
Name: Pete Seigmund
Title: Forest Management Supervisor, Kalispell Unit, Montana DNRC

Introduction

The vegetation section describes present conditions and components of the forest as well as the anticipated effects of both the No Action and the Action Alternatives.

Issues and Measurement Criteria

The following issue statements were developed during scoping regarding the effects of the proposed action to vegetation:

- Overstocked stand conditions are contributing to loss of timber productivity and may increase mortality from insect and disease.
- There has been a species composition shift from a predominately western larch stand to Douglas-fir.
- There is an absence of regeneration due to deer browse.
- Forest management activities could increase prevalence of noxious weeds in the project area.

Regulatory Framework

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

State Forest Land Management Plan (SFLMP)
DNRC developed the SFLMP to "provide field personnel with consistent policy, direction, and guidance for the management of state forested lands" (DNRC 1996: Executive Summary). The SFLMP provides the philosophical basis, technical rationale, and direction for DNRC's forest management program. The SFLMP is premised on the philosophy that the best way to produce long-term income for the trust beneficiaries is to manage intensively for healthy and biologically diverse forests. In the foreseeable future, timber management would continue to be the primary source of revenue and primary tool for achieving biodiversity objectives on DNRC forested state trust lands.

DNRC Forest Management Rules
DNRC Forest Management Rules (*ARM 36.11.401 through 456*) are the specific legal resource management standards and measures under which DNRC implements the SFLMP and subsequently its forest management program. The Forest Management Rules were adopted in March 2003 and provide the legal framework for DNRC project-level decisions and provide field personnel with consistent policy and direction for managing forested state trust lands. Project design considerations and mitigations developed for this project must comply with applicable Forest Management Rules.

Montana Best Management Practices (BMPs) for Forestry

Montana BMPs consists of forest stewardship practices that reduce forest management impacts to water quality and forest soils. The implementation of BMPs by DNRC is required under *ARM 36.11.422*. Key forestry BMP elements include streamside management; road design and planning; timber harvesting and site preparation; stream crossing design and installation; winter logging; and hazardous substances storage, handling, and application.

Montana DNRC Forested Trust Lands Habitat Conservation Plan (HCP)

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

Analysis Areas

Direct and Secondary Effects Analysis Area
The assessment of direct and indirect effects to cover types and age classes, old-growth attributes, timber stand health (insect and disease conditions), forest fuels, and noxious weeds were conducted on the project area. The project area includes DNRC managed lands in sections 19, 29 30, and 31 in T30N, R22W. Total project area acreage is 1,740.5.

Cumulative Effects Analysis Area
The cumulative effects analysis area for cover types and age classes, old growth, and timber stand health are based on the Kalispell Unit's administrative area. The cumulative effects for fire regimes and noxious weeds are based on the project area.

Existing Conditions

Noxious Weeds
The project area has isolated areas of noxious weeds which are located along existing roads and trails. Observed noxious weeds include spotted knapweed, thistle, and hounds' tongue. This area has been on our spray list with Flathead County for the last 8 years.

Rare Plants
No rare or endangered plants have been identified or documented within the project area.

Standard Vegetative Community

- Stand History/Past Management

  Much of the project area was first harvested in the late 1920's to early 1930's. These first harvests removed most of the large diameter western larch, ponderosa pine and Douglas-fir. Smaller sales occurred in the 1950's and 1970's. In July of 2008, a timber sale was sold in the project area that consisted of 320 acres of commercial thinning and 152 acres of shelterwood harvest. Approximately 7 small salvage sales (200 MBF or less) occurred in the area from 2001 to 2018. Approximately 1 MMBF (thousand board feet) of timber has been salvage harvested from the project area since 2001. No regeneration is present in the salvaged areas due to a lack of site preparation and deer browse. These salvage sales removed only dead and bark beetle infested trees and helped to limit the spread of further bark beetle infestations. In the last 2 decades, minor amounts of weed spraying, and incidental cutting of Christmas trees, firewood, or post and rails have occurred in the project area. Active fire suppression starting in the 1930's has limited the extent of wildfires to small acreages, generally less than ¼ acre in size.

- **Current stand conditions (species composition, size, density, insects and disease, forest age class and distribution, etc.)**

  In the Cliff Lake Project Area, approximately 95% of the area is occupied by forest habitat types in the Douglas-fir (*Pseudotsuga menziesii)* series indicating the influence of moderately warm/dry and moderately cool/dry climatic conditions. The *Vaccinium caespitosum* (dwarf huckleberry) and *Linnaea borealis* (twinflower) types in the Douglas-fir series are the most prevalent. Western larch, ponderosa pine, and lodgepole pine are the most prevalent trees species along with Douglas-fir. Much of the forests with these habitat types had open, park-like conditions. Numerous fire scars indicate frequent, lower intensity fires that favored development of larger diameter seral trees. Fire scars were prevalent on older western larch in the project area.

- Some spruce types are located in draw bottoms and near the floodplain/wet area of shallow lakes that are prevalent in the area. Timber productivity ranges from low to high for these habitat types, with higher productivity generally found in stands dominated by seral species. Indeed, high ridges with shallower soils and less moisture are often dominated by Douglas-fir.

- ***Fire Regimes*** **–**

- Fire regimes for the Kalispell Landscape are variable, given the broad and scattered nature of trust lands, but are predominantly within the moderate severity fire regime. As a whole, the forest exists as a mosaic of differing age and size classes that have developed from different human activities, fire frequencies and intensities in relation to other site factors such as aspect, elevation, weather, stand structure, and fuel loadings. Areas of frequent fire have produced WL/DF, PP, and DF cover types. In low severity fire regimes, fires occur frequently and create relatively smaller patches of open-grown forest. Historically, these low severity regimes maintained stand conditions that were resistant to stand replacement fires, by regularly consuming forest fuels, killing small trees, and pruning boles of small trees. As fire intervals become longer and management activities occur less frequently, more shade tolerant tree species begin to develop in the understory and stands tend to be multi-storied, with varied patch sizes. These characteristics reflect a moderate to low severity fire regime. High severity fire regimes are characterized by large patch sizes and stand replacement fires, but often include low severity fires that act as a thinning agent or create small openings where clumps of trees die where small crown fires erupt.
- A mosaic of even and multi-aged patches is present in the project area. Much of the Cliff Lake project area and all the proposed harvest units would be classified in a low to moderate severity fire regime. Fire intervals are considered to be frequent, 50 years or less. Most of the project area has evidence of past fire activity. Most of section 19 had a major fire in the early to mid-1930's. Forest stands shaped by frequent fires typically have an abundance of seral species in the overstory. Harvest units proposed for regeneration harvest have a much smaller composition of seral species than was historically present. Commercial thinning and improvement cuts are proposed for stands that are younger and have a higher composition of western larch in the overstory.
- In general, fire return intervals have been lengthened and fire intensity has increased due to increased fuel loadings vertically and horizontally. Lower intensity, more frequent fires would have kept a larger composition of seral species and provided for less shade tolerant regeneration.

Table V-1 – Current and appropriate cover type for the Cliff Lake Project Area.

Cover Type	Current Acres	Current Percent of Project Area	Desired Future Condition (DFC)	
			Acres	Percent
Subalpine fir				
Douglas-fir	228.5	13.1	0	0
Lodgepole pine	5.3	0.3	0	0
Mixed conifer				

Ponderosa pine	6.5	0.4	147.0	8.4
Western larch/Douglas-fir	1,448	83.2	1,541.3	88.6
Western white pine				
Non-stocked				
Non-forest	52.2	3.0	52.2	3.0
Other (specify)				
Total:	**1,740.5**	**100**	**1,740.5**	**100**

Old Growth
Two stands of old growth, totaling 66.3 acres, were identified within the project area. These stands are not included in harvest units scheduled for treatment as part of this project.

Environmental Effects

No Action Alternative: Direct and Secondary Effects and Cumulative Effects

Noxious Weeds

No Action Alternative – Direct and Secondary Effects

Weed seed would continue to be spread or be introduced throughout the project area from recreational use, residential development and use adjacent to state land or within, and commercial and non-commercial use. Herbicide treatment along open, public roads and enhancement of road closures would continue as funding and unit priorities allow. Containment of weed infestation areas or a reduction of weed infested acres may be realized.

No Action Alternative – Cumulative Effects

Cumulatively the potential spread of weed seeds and increases in areas where weed populations could start is possible under the No Action Alternative, across the Kalispell Landscape. With adoption of ARM 36.11.445 and implementation of Cooperative Noxious Weed Agreements with Flathead, Lake, and Lincoln counties, a more aggressive approach to identification and treatment of noxious weeds has occurred than in the past. This ongoing treatment of noxious weeds should limit large increases in noxious weed spread and may reduce the number of acres infested in the future.

Rare Plants

No Action Alternative – Direct and Secondary Effects

A review of the records from the MNHP for the project indicated no plant species of special concern identified within the project area. Field reconnaissance also indicated no unique or sensitive plants within the project area.

No Action Alternative – Cumulative Effects

Cumulative effects to the distribution or viability of sensitive plants populations are not expected under No Action Alternative.

Standard Vegetative Community

Forest Age Class & Cover Type Distribution

No Action Alternative – Direct and Secondary Effects

Under the No Action Alternative, natural processes would continue to have a direct influence on these forest characteristics. In the absence of wildfires, the effects of current insect infestation-induced mortality will continue to influence both short and long term age class distribution and cover type representation. It is estimated that 10% or more of the stands in the project area may drop into the next younger age class over the five years, as older Douglas-fir in the upper canopy levels succumbs to bark beetle attacks. This estimate is based on an expected and continued level of bark beetle induced mortality. Infrared satellite imagery of the project area was also examined and showed large areas of stressed trees making up approximately 10% of the total project area. Composition of western larch will continue to decrease due to mortality of overstory trees and a lack of larch regeneration in the understory. There will continue to be a gradual conversion of WL/DF cover types to DF cover types.

Openings created in the canopy from bark beetle mortality in Douglas-fir dominated stands are not expected to resemble natural fire effects. Openings are likely to be smaller and many may continue to be stocked with younger pole-sized trees. Without duff reduction and soil exposure, the regeneration of openings is expected to favor shade tolerant species over seral species. The lack of regeneration under denser canopies or the predominance of Douglas-fir in numerous understories would perpetuate the trend of increasing DF cover types over much of the project area. Without fire, the older age classes from 100 years up would continue to dominate the area and the 0-39 and 40 to 99 age classes would continue to decline, as several 70 to 80 year old stands move into the next age class without replacement.

No Action Alternative – Cumulative Effects

Under the No Action Alternative, there would likely be a decline in acreage in WL/DF cover types. WL composition will continue to decrease leading to a shift from WL/DF to DF cover types. Across the landscape, fire suppression, insect and disease occurrence, and increasing human use may influence cover type and age class distribution to an unknown degree. In the absence of stand replacement fires, variability of age class and cover type distribution would decline.

Stand Structure and Development

No Action Alternative – Direct and Secondary Effects

Stand structure and development would continue to change as a result of damaging agents. Older stands (100 years +) comprising 72% of the project area are experiencing noticeable reductions in live tree canopy closure due to Douglas-fir bark beetle and other insect caused mortality. The mosaic pattern of multi-aged and multi-storied or small even-aged patches are likely to persist with this type of disturbance, resembling the unstable conditions and stand development often associated with late successional forests. More shade tolerant species would increase in all canopy levels continuing to replace or inhibit growth of seral species, as dense small diameter trees develop in the understory. Area coverage of forest in early successional stages, especially in larger patch sizes would continue to decrease. Forest fuels, both ground and vertical would continue to build up in stand areas where mortality is occurring, increasing the potential for severe, less controllable fires that may result in large scale stand replacement fires.

No Action Alternative – Cumulative Effects

Forest succession and fire suppression would continue. Conditions favoring the establishment of shade tolerant species in canopy gaps, the slow growth of seedlings and saplings under closed canopies or the hindrance of tree establishment under closed canopies and increasing fuel loadings would continue.

Timber Productivity and Value

No Action Alternative – Direct and Secondary Effects

Due to the effects of insects and disease the commercial value of sawlogs would continue to decline. Non-sawlog or pulp values are generally less than that received for sawlogs, and the value of this timber trust asset would continue to decline. Growth rates of individual trees in denser, older stands would remain static or continue to decline and opportunities for establishment of replacement trees would be limited to small openings favoring shade tolerant trees. Development of larger diameter commercially valuable western larch as a persistent component in the overstory of older stands would be hindered. Loss of dead and dying trees along both open and closed roads would continue to occur from activities associated with firewood gathering and maintenance of powerline corridors and public right-of-way easements. The request for small-scale salvage permits would likely increase.

No Action Alternative – Cumulative Effects

Without silvicultural treatments or wildfires to control tree densities, reduce losses to insects or disease, and recover mortality or initiate new stands, the trend towards increasing acreage on the Kalispell Unit covered by older, slower growing stands that are more susceptible to beetle infestations, stem decays, or wildfires would continue.

Old Growth

No Action Alternative – Direct, Indirect, and Cumulative Effects

Two old growth stands were identified within the project area. Under the No Action Alternative, stands would continue to develop under the influence of suppressed wildfire activity and other natural disturbances such as insect and disease activity. Maintenance of old-growth characteristics and defining criteria will be dependent on the persistence and the rate of mortality and from the Douglas-fir bark beetle and other insects that are currently killing live trees in the project area. If droughty conditions continue in this area, it is expected that the live trees will continue to die resulting in a younger stand, or an old stand of smaller trees in the near future.

Action Alternative: Direct, Secondary, and Cumulative Effects

Noxious Weeds

Action Alternative – Direct and Secondary Effects

Logging disturbance would increase the potential for further establishment of noxious weeds with the exposure of mineral soil in skid trails, landings, existing roads, new road construction, and road improvement sites. Applying integrated weed management techniques within the sale design would reduce the occurrences and spread of weeds. Grass seeding new and disturbed roads and landings and spot spraying new weed infestations would reduce or prevent establishment of additional populations. Washing logging equipment prior to use would limit the introduction of weed seeds into the forest. Trampling slash in skid trails and closing additional roads would limit the potential for soil disturbance within these routes during or after logging,

reducing the potential for weed establishment. Treating existing weed populations along or within roads with herbicide spray would reduce current weed populations or contain the area of infestation. This project would also likely be winter logged which would limit the exposure of mineral soil and deter new weed infestations.

Under the Action Alternative, harvesting would occur on 474.8 acres, and involve road work on approximately 6 miles of state roads. Acreage within harvest units are at higher risk of incurring weed establishment within the units due to soil disturbances that may occur from skidding, landing, and heavy equipment use for scarifying or fuels reduction treatments. This risk would be limited by mitigation measures described above. Enhancement of existing road closures, trampling slash in road prisms, grass seeding sites disturbed during road construction or work, and additional road closures in combination with spot herbicide treatments would reduce current coverage of weed populations and limit the potential risk of further establishment.

Action Alternative – Cumulative Effects

In combination with other management activities and recreational use of the Kalispell Landscape, the action alterative would increase the risk of further encroachment of forested sites by noxious weeds. The potential risk would be limited with the use of prevention measures implemented under County Weed plans in addition to the site-specific mitigation measures for the Cliff Lake project. Actual treatments would likely be applied to a more extensive area under the Action Alternative and have a greater potential for reducing current weed populations within the project area, thereby reducing the noxious weed affected area within the Kalispell Landscape.

Rare Plants

Action Alternative – Direct and Secondary Effects

Since no sensitive plants are present within the project area, the Action Alternative would not have any direct or secondary effects to sensitive plants.

Action Alternative – Cumulative Effects

Since no sensitive plants are present within the project area, the Action Alternative would not have any cumulative effects to sensitive plants.

Standard Vegetative Community

Forest Age Class & Cover Type Distribution

Action Alternative – Direct and Secondary Effects

As a result of harvesting, site preparation and tree planting activities, WL/DF cover types would persist within the harvest units. Dominant tree composition would begin to move toward historic conditions. By removing shade tolerant species (mostly Douglas-fir) and retaining seral species, WL/DF cover types would persist for a longer time. The average age of some treated stands would decrease, although some stands would remain in the same age class after harvest, depending on the extent of overstory tree removal. Units proposed for shelterwood cutting would move to younger age classes such as occurs with a mixed severity fire event. The action alternative would increase the diversity of stand age classes and cover types in the project area.

This alternative would harvest 474.8 acres. All harvest units would be treated with an individual tree selection prescription. The goal of treatment would be to promote regeneration of western larch to move stands towards

more historic stand compositions. Individual tree selection would create openings and shelterwood type areas in harvest units where western larch regeneration would be promoted, either through nature regen or planting. There would also be areas of healthy, younger overstory trees that could be thinned to improve growth and vigor. Improving health and vigor as well as removing some of the older age class trees would increase stand resilience to bark beetle attack. Healthy Douglas-fir would also be retained to help achieve desired stocking levels but western larch and ponderosa pine would be favored over Douglas-fir. The reduction in Douglas-fir would increase the proportion of other species in the overstory resulting in a change in composition. Larger openings may be planted with western larch as needed. This alternative would convert approximately 122 acres from a Douglas-fir type to a WL/DF type.

The Action Alternative would treat 24% of the Cliff Lake project area. The DF cover type would decrease by about 7% within the project area. WL/DF would increase by about 7% within the project area. There would be no change in age class distribution.

Action Alternative – Cumulative Effects

The Action Alternative would result in a small decrease in the acreage for the DF cover type and small increase in acreage of the WL/DF cover type. There would be no change in age class distribution. Across the landscape, fire suppression, insect and disease occurrence, and increasing human use may influence cover type and age class distribution to an unknown degree.

Stand Structure and Development

Action Alternative – Direct and Secondary Effects

Under the Action Alternative, 474.8 acres would be treated with an Individual Tree Selection prescription. Trees may be retained in groups or individually distributed across harvest units depending on current stocking of healthy desirable leave trees. Less homogenous stand conditions would occur, reflecting attributes of forests initiated under the mixed severity fire regime in the mid successional stages of development, rather than the current late successional stages. These treatments would resemble low severity fires and act as a thinning agent, killing the less fire resistant species and releasing the more fire resistant trees, such as western larch. After slash disposal treatments are completed more fire resistant stand conditions and structures would be maintained for several decades.

The action alternative would result in no change in stand structure on the Kalispell Unit. Overstory tree canopy closure would be reduced on all harvested acres, temporarily reducing the percentage of closed canopy stands in the Cliff Lake area.

Action Alternative – Cumulative Effects

The action alternative would not have a measurable effect on stand structure. Individual tree selection prescriptions would promote uneven aged development of stands. Group select areas would increase patch sizes resembling moderate severity fire regimes and includes implementation of the Action Alternative.

Timber Productivity and Value

Action Alternative – Direct and Secondary Effects

Silvicultural treatments to be applied under the Action Alternative would remove both live and dead trees, some of which are affected by insects or diseases. Healthy and vigorous trees of all species would be favored for

retention where they occur. Snags and snag recruits in quantities meeting DNRC requirements would be left. Larger diameter snags and cull trees, especially shade intolerant species, if not infected with dwarf mistletoe would be favored for potential snag recruits and snag retention. Due to the removal of low vigor or diseased trees stand health would improve. Between-tree competition would be reduced allowing residual trees to maintain or increase current growth rates. The Douglas-fir bark beetle hazard rating for the treated stands will decrease due to a decrease in stocking, removal of a good number of the larger diameter, decadent trees, and by freeing up more available water, sunlight, and nutrients for residual trees. The number of leave trees/acre would be dependent on availability and is reflected in the types of cuts. In Table 3-6 an estimate of canopy coverage is used to display the density or stocking levels of residual trees to depict the level of tree removal or retention under the various cuts.

Table 3–6. Residual tree stocking levels by alternative.

Before Harvest	**Post Harvest**		
% Canopy Closure	Type of Harvest Cut	Action Alternative	% Canopy Closure
70 %	Individual tree selection	474.8 acres	~ 40%

*Note: Canopy closure is defined as the amount of area covered by a group or stand of trees. It is expressed as a percent of the total area. This is a different definition that may be used to express thermal cover or canopy cover for big game.

Tree length skidding will bring most of the slash into the landing area. Landing piles will be burned the ensuing fall. Some smaller slash (3 inches of less) will be left in trails for erosion control and nutrient cycling. Douglas-fir bark beetles are normally attracted to larger tops (8inches or greater). Utilization requirements specify a 5 ½ or 4 ½ inch top. Logging slash is not likely to be a problem attractant for bark beetles. Any long butts processed out will be made available to local residents for firewood the following summer/fall. This will actually serve as potential trap trees for beetles and may remove some brood prior to spring emergence. These activities would reduce the immediate increase in fire hazard from the increased loading of flashy fuels and would prepare the site for new tree establishment. Mineral soil would be exposed on approximately 30 –40% of the area to promote germination of western larch and some ponderosa pine. These areas would also be planted with western larch to assure appropriate representation of these species.

Silvicultural treatments would be applied to 474.8 acres, or 24% of the Cliff Lake project area under the Action Alternative. The effects for the various types of cuts as described above would occur on the treated acres. Timber productivity on the treated acres would increase or be maintained at a level closer to the site potential, improving the future opportunities for generating revenue for the trust with the use of the timber resource.

Action Alternative – Cumulative Effects

The percentage of forested land that is producing timber closer to the site potential would increase by approximately 1% on the Kalispell Unit. The acres of forest stands that are less susceptible to beetle infestations, stem decays, or wildfires would increase. Higher potential for greater long-term revenue from the timber resource is expected.

Old Growth

Action Alternative – Direct, Indirect, and Cumulative Effects

Under the Action Alternative, effects to old growth would be similar to the No Action Alternative. Growth and vigor would be improved on treated acres and could lead to the development of larger diameter trees.

Vegetation Mitigations

- Grass seed new and disturbed roads and landings; spot spray new weed infestations.
- Wash logging equipment prior to use.
- Treat existing weed populations along or within roads with herbicide spray.

Vegetation References

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Attachment C – Soils Analysis

Cliff Lake Timber Sale – Soils Analysis

Analysis Prepared By:
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Title: Hydrologist, Montana DNRC

Introduction

The following analysis will disclose anticipated effects on soil resources within the Cliff Lake project area. Direct, secondary, and cumulative effects of the No-Action and Action alternatives on soil resources will be analyzed.

Issues and Measurement Criteria

Physical Disturbance (compaction and displacement)
Analysis of physical disturbance addresses the potential effects of timber harvesting and associated activities on soil conditions within the proposed project area. These effects primarily result from ground-based and cable yarding operations and repeated entries into previously harvested zones. Ground-based machinery operations have the potential to displace nutrient-rich topsoil layers, consequently leading to a decline in vegetation growth. Moreover, the operation of such machinery can induce compaction of the upper soil layers, causing a reduction in pore space. This compaction restricts the soil's capacity to absorb and retain water, potentially triggering increased runoff and overland flow. Consequently, vegetation growth may be negatively affected.

Measurement Criteria: Quantitative assessment of soil physical properties will involve estimating the proportion of harvested terrain that will remain adversely affected after the completion of activities. Estimates will be based on DNRC Soil Monitoring (DNRC, 2011).

Nutrient Cycling and Soil Productivity
Coarse woody debris (CWD) and fine woody debris (FWD) within forested ecosystems play essential roles in nutrient cycling, providing microbial habitat, retaining moisture, and preventing mineral erosion (Harmon et al., 1986). The manipulation of these debris volumes can occur due to forest management activities, such as timber harvesting, potentially leading to alterations in the reservoir of available nutrients crucial for sustained long-term forest productivity.

Measurement Criteria: The assessment of nutrient cycling will involve quantifying the amount of coarse woody material per acre on harvested sites before and after the project, measured in tons.

Erosion
Soil erosion is an inherently natural process, but timber management activities can expedite it by removing protective cover materials like vegetation, woody debris, and duff. Moreover, it can be intensified by diminishing the soil's ability to absorb water, increasing surface runoff, and decreasing vegetative interception and transpiration. The various forms of erosion encompass sheet, rill, and gully erosion.

Accelerated erosion refers to soil loss rates that surpass those occurring naturally, exceeding the soil's ability to regenerate. This erosion can result in secondary consequences, notably the sedimentation of surface waters. In the subsequent section on water quality, we examine the impact of road erosion and drainage issues, as they possess a significant potential to compromise water quality. Additionally, this section delves into the analysis of hillslope erosion, including skid trail erosion.

The susceptibility of a site to erosion, accelerated by on-site activities, hinges on its existing conditions, such as soil composition (including mineralogy and grain size distribution), slope, and previous management practices like the effective implementation of Best Management Practices (BMPs).

Measurement Criteria: Soil erosion potential will be measured using the NRCS (1996) determined K-value.

Slope Stability

Timber management activities can substantially influence the stability of slopes through various mechanisms. These include the removal or stabilization of vegetation, alterations in runoff patterns, and potential shifts in soil moisture levels. Such interactions can heighten the vulnerability of slopes to instability. The areas most prone to slope stability issues include, though are not confined to, land categories predisposed to soil mass movement and terrains characterized by steep inclines, typically exceeding gradients of 60 percent or more.

Measurement Criteria: Assessing slope stability risk will involve quantifying the proportion of slopes exceeding a 60% gradient within areas classified as high-risk land types.

Regulatory Framework

The development of this project has been intricately molded by a robust framework comprising plans, regulations, and established practices that both steer and oversee its diverse undertakings. Within this framework are fundamental guidelines and benchmarks, which encompass:

1. **The Montana Department of Natural Resources and Conservation (DNRC) Forested Trust Lands Habitat Conservation Plan (HCP; USFWS and DNRC 2010):** This plan serves as a vital roadmap for ensuring the preservation of critical habitats on trust lands. It outlines strategies and measures to safeguard the unique ecosystems and wildlife populations found within the project area.

2. **The Montana Code Annotated (Title 77, Chapter 5):** This legal framework governs Montana's natural resource management and land use. It provides the statutory foundation for the project's activities, ensuring they align with state laws and regulations.

3. **The Administrative Rules of Montana (Rule Chapter 36.11):** These administrative rules serve as the detailed operational guidelines for various aspects of the project. They cover essential areas such as permitting, compliance, and reporting, ensuring project activities adhere to established standards.

4. **The Montana Forestry Best Management Practices:** While these practices are voluntary, they are a fundamental requirement for managing State Lands. They encompass a range of sustainable forestry practices aimed at minimizing environmental impacts, promoting responsible timber harvesting, and preserving the health of Montana's forests.

5. **The State Forest Land Management Plan (DNRC, 1996):** This foundational document provides a long-term vision for managing state forest lands. It sets forth strategies for balancing multiple land-use objectives within the project area, such as timber production, recreation, and wildlife habitat preservation.

Integrating these plans, rules, and practices into the project's framework ensures a responsible project planning and implementation approach. This comprehensive strategy not only safeguards the environment but also upholds the principles of sustainability and compliance with the legal and regulatory framework governing Montana's natural resources.

Analysis Areas

Direct and Secondary Effects Analysis Area

The examination of direct, secondary, and cumulative effects on soil physical properties, nutrient cycling, erosion, and slope stability will encompass 1,745 acres owned by the Montana Department of Natural Resources and Conservation (DNRC). It is situated within Township 30 North, Range 22 West, and encompasses Sections 19, 29, 30, and 31. For a visual reference, please refer to **Figure S-1**, which provides a graphical representation of this designated area.

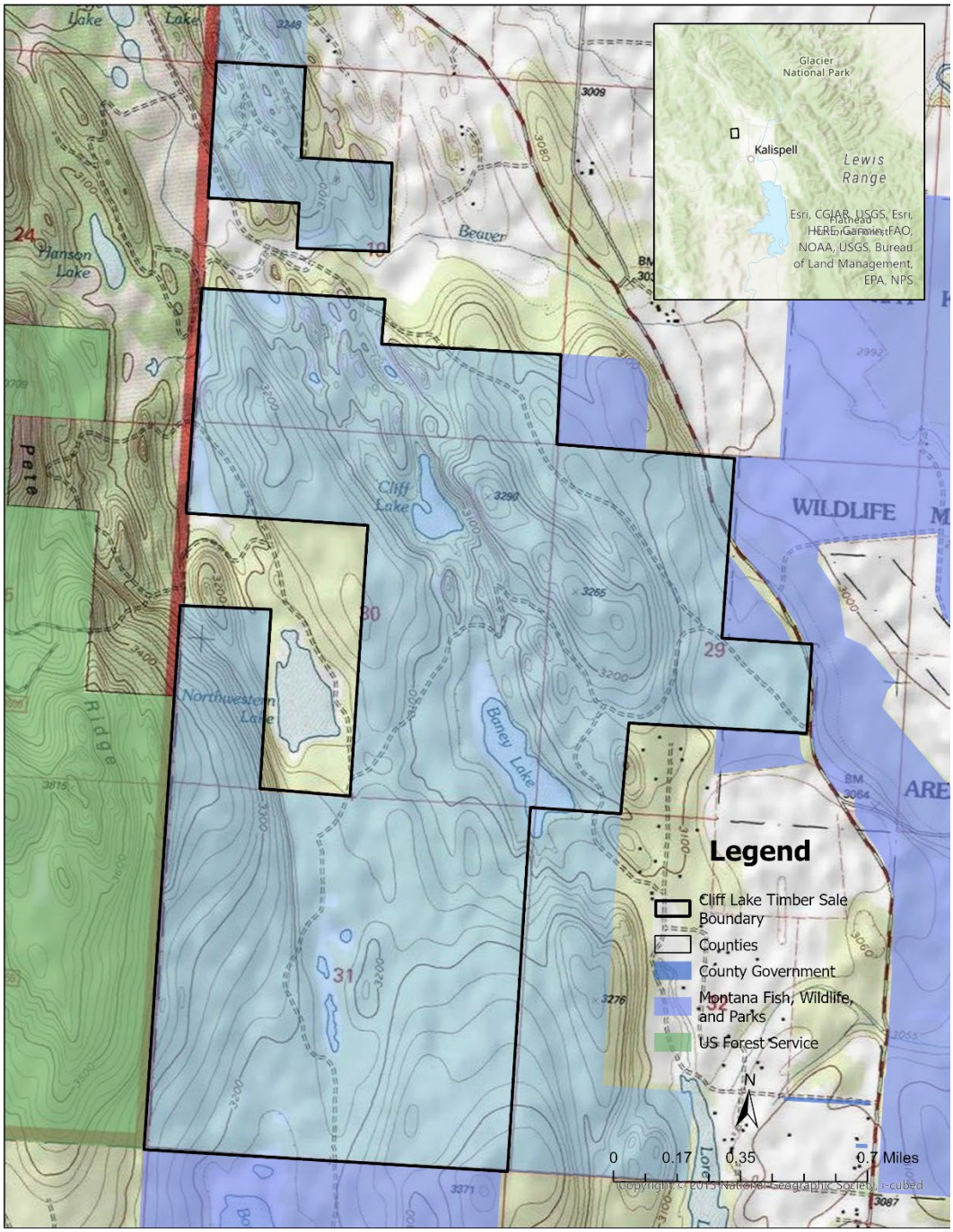

Figure S-1. Ownership and location of the Cliff Lake Timber Sale project area.

Permanent road construction and maintenance of existing roads will be assessed in the water quality analysis section.

Cumulative Effects Analysis Area

Cumulative soil effects are the combined consequences on the natural environment resulting from the proposed action when evaluated with other historical, ongoing, and potential activities of similar nature and location. This analysis comprehensively assesses state and non-state activities that have influenced or might impact the same environmental aspect as the proposed action.

The examination of cumulative impact encompasses the broader scope of the project area, involving an evaluation of the aggregated effects on soil resources resulting from various activities. Temporally, the analysis of cumulative soil effects spans different time frames, including incorporating historical actions, ongoing management practices, and anticipated future endeavors within the defined project area.

Analysis Methods

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

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

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

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

Physical Disturbance (compaction and displacement)

Impacts to soil physical disturbance will be analyzed by evaluating the current levels of soil disturbance in the proposed project area based on field review and aerial photo review of existing and proposed harvest units. Skid trail density and road mileage will be analyzed through pace transects, aerial photo interpretation, and GIS to determine spacing and width. The estimated effects of proposed ground-based and cable yarding activities will be assessed based on findings of DNRC soil monitoring (DNRC, 2011).

Nutrient Cycling

Nutrient cycling will be analyzed by disclosing existing levels of coarse woody debris from transects conducted during the field survey. The Handbook for Inventorying Downed Woody Material describes the method for quantifying coarse woody debris (Brown, 1974). Potential impacts to nutrient cycling will be assessed by evaluating risks to nutrient pools and long-term site productivity from timber sale contract requirements and mitigation measures.

Erosion

Erosion risk will be analyzed by reviewing the Web Soil Survey K Factor, Whole Soil (Kw) values. Hazard ratings will be assigned based on the values in **Table S-1**.

Table S-1. Whole soils hazard rating guidelines

Kw Rating	Hazard
0.02 - 0.23	Low

0.23 - 0.46	Moderate
0.46 - 0.69	High

Slope Stability

Slope stability risk factors will be analyzed by reviewing the Web Soil Survey to identify landtypes listed as high risk for mass movement. Field reconnaissance and GIS will also be used to identify slopes greater than 60 percent as an elevated risk for mass movement.

Existing Conditions

Geology

The geological composition of the project area primarily consists of Quaternary glacial deposits, described by till, outwash, and deposits from ancient glacial lakes. These deposits are characteristic of regions that have experienced significant glaciation. Additionally, Mesoproterozoic sediments from the Helena and Wallace formation are exposed within the project area. It is worth noting that no unstable or distinctive geological features were observed during geological assessment of the project area.

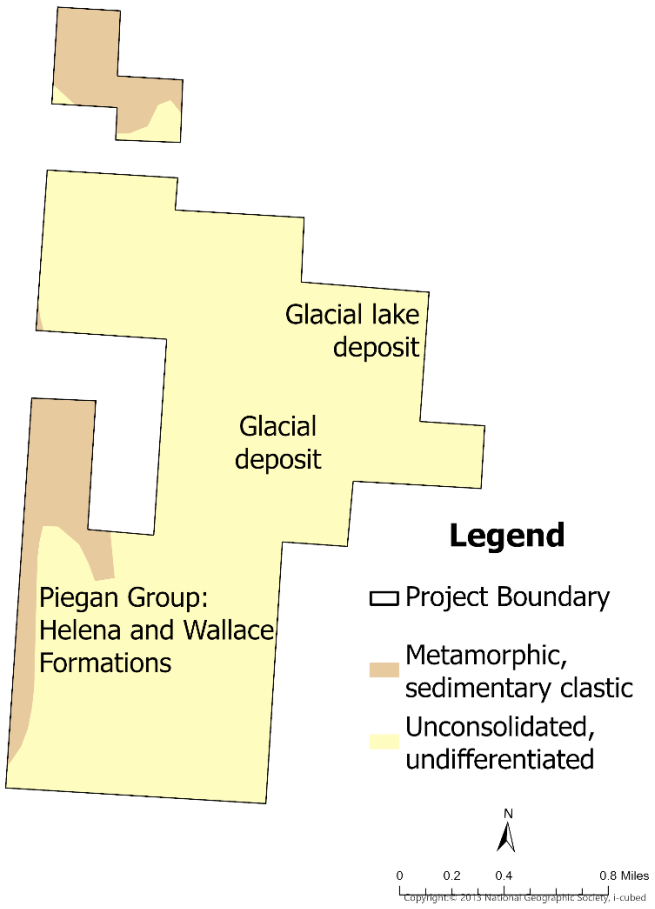

Figure S-2. Surficial geology units within the Cliff Lake project area.

Land Types

The analysis area for existing conditions and slope stability include 12 separate soils types which are generally defined by glacial activities. A map of the Landtypes in the Cliff Lake project area is found below in ***Figure S-3***.

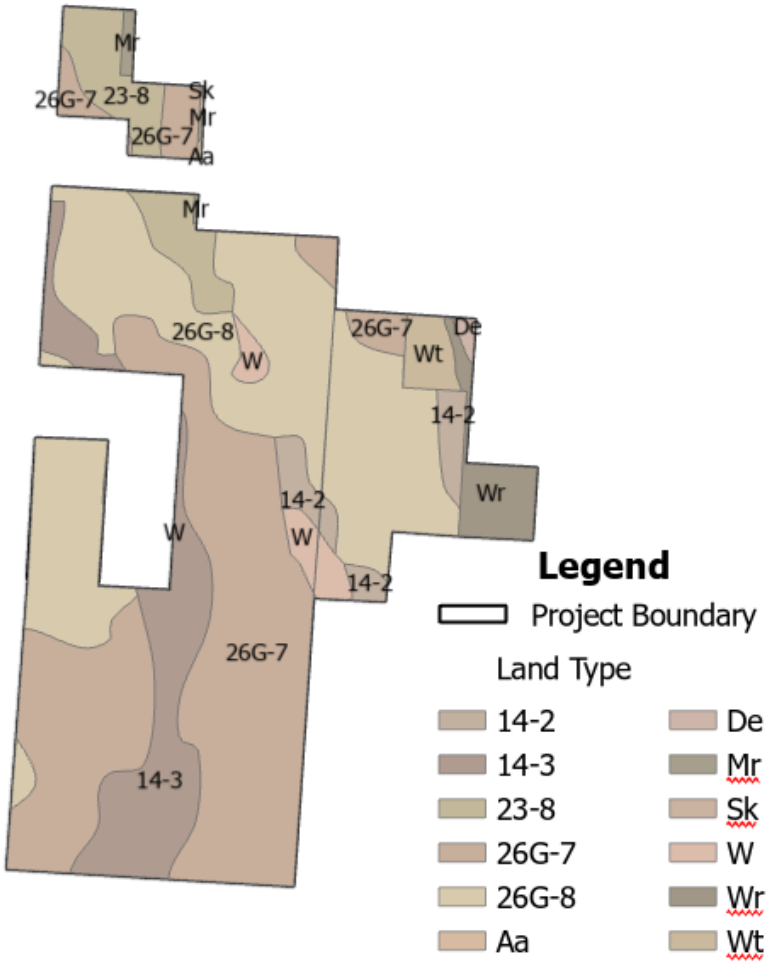

Figure S-3. Land types within the Cliff Lake project area.

Physical Disturbance (compaction and displacement)

Timber management activities have taken place in the gross project area since the early-1920s. Ground-based yarding can create soil impacts through displacement and compaction of productive surface layers of soil, mainly on heavily used trails. Existing skid trails are spaced at between 60 and 120 feet apart, and none were identified as erosion or sediment sources. Existing soils impacts (including ruts, erosion, compaction, and displacement) are ameliorating from frost and vegetation. Based on field review, existing soils impacts on old harvest units in the proposed project area are estimated to be 10% or less. Recreational use of the project area includes hunting, hiking, biking, and horseback riding. No signs of motorized use were visible during field review.

Table S-2. Soil Map Unit Description (Flathead National Forest Area, Montana (MT619), and Upper Flathead Valley Area, Montana (MT617))

Map Unit	Description	Acres	Analysis Area %	Landtype Description	Compaction Risk	Erosion Risk	Displacement Risk

14-2	Glossic Cryoboralfs, lacustrine substratum	53.9	3.10%	Stream bottoms, moraines	Not Rated	Moderate	Moderate
14-3	Aquepts, lacustrine substratum	197.5	11.40%	Stream bottoms, terraces, moraines	Medium	Moderate	Moderate
23-8	Andeptic Cryoboralfs-Andic Cryochrepts complex, hilly	103.5	6.00%	Glaciated mountain slopes and ridges	Medium	High	Low
26G-7	Typic Eutroboralfs, silty till substratum, rolling	666.1	38.40%	Moraines	Medium	High	Moderate
26G-8	Typic Eutroboralfs, silty till substratum, hilly	587.2	33.80%	Glaciated mountain slopes	Medium	High	Low
Aa	Alluvial land, poorly drained	1	0.10%	Stream bottoms	Medium	Moderate	Severe
De	Depew silty clay loam, 0 to 3 percent slopes	4.5	0.30%	Terraces	Medium	Moderate	Moderate
Mr	Mountainous land	7.1	0.40%	Slopes	Not Rated	Moderate	Low
Sk	Stryker silt loam, 0 to 3 percent slopes	0.2	0.00%	Stream terraces	High	High	Severe
Wr	Whitefish cobbly silt loam, 0 to 7 percent slopes	61.6	4.20%	Moraines	High	Moderate	Severe
Wt	Whitefish cobbly silt loam, 12 to 20 percent slopes	27	1.90%	Moraines	High	Moderate	Severe

Erosion

Minimal evidence of isolated soils erosion was observed within the project area. This seems isolated to slopes located the cliff faces that overlook, Cliff Lake.

Nutrient Cycling

Nutrient cycling was assessed in the proposed project area by field review. The proposed harvest units have been largely undisturbed except for a small salvage in 2015, so the coarse woody debris levels would be considered at natural levels. These results appear to be within the recommended range discussed in Managing Coarse Woody Debris in Forests of the Rocky Mountains (Graham et. al., 1994) on similar habitat types. Douglas-fir habitat types in Montana are recommended to have a range of 12 to 24 tons/acre to maintain forest productivity.

Slope Stability

Soil types in the project area are primarily gentle to moderately sloped (0-40%) residual soils and glacially derived soils associated with lacustrine deposits and glaciated slopes. No slope failures were identified during reconnaissance in the proposed project area. Because none of the slope stability risk factors are present in any parcel of the proposed project area, slope stability will not be evaluated on this project in the remainder of this analysis. A map of slopes found in the Cliff Lake project area is found in **Figure S-4**.

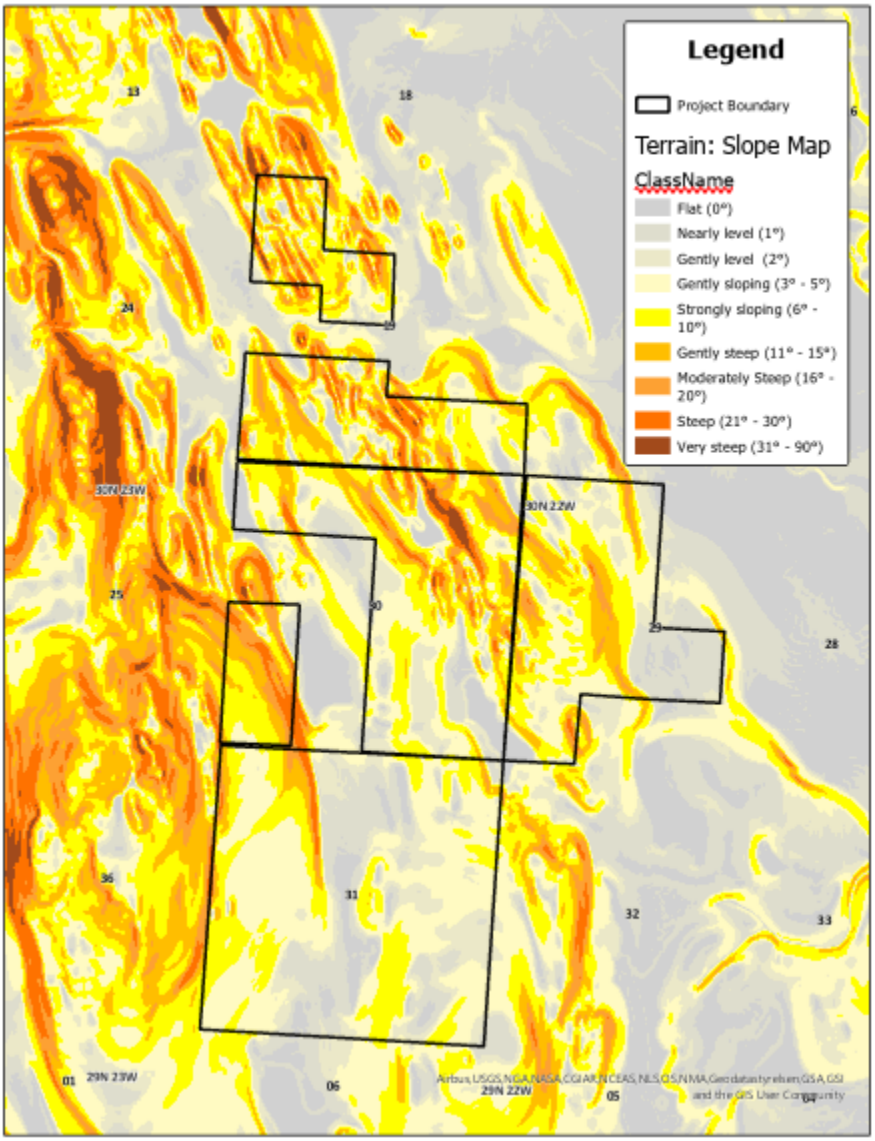

Figure S-4. Slope map of the Cliff Lake project area.

Environmental Effects

No Action Alternative: Direct, Secondary, and Cumulative Effects

The No Action Alternative would have no direct or indirect effects of soil productivity. No ground-based activity would take place under this alternative, which would leave the soil in the project area unchanged from the description in the Existing Conditions portion of this analysis.

Action Alternative: Direct, Secondary, and Cumulative Effects

Geology

Direct, Secondary, & Cumulative

The geology would remain similar to those described in the existing conditions sections of this environmental assessment.

Physical Disturbance (compaction and displacement)

Direct and Secondary

Based on DNRC soil monitoring on soils and sites similar to those found in the project area, direct impacts to soil physical disturbance would be expected on up to 53.7 acres of the total 474.8 acres proposed for harvesting in the Cliff Lake project area. Soil monitoring conducted on DNRC owned lands shows that sites with similar soils with ground-based machinery had a range of impacts from 1 to 21.2 percent of the acres treated, with an average disturbance rate of 11.3% (DNRC, 2011). These impacts include operations on dry soils in non-winter conditions.

Ground-based site preparation would be done on tractor units generating direct impacts to the soil physical disturbance. Site-preparation disturbance would be intentionally done, and these impacts are considered light and promote reforestation of the site. The combination of these activities would leave approximately 11.3 percent of the proposed harvest units in an impacted condition in the Cliff Lake project area. These levels are below the range analyzed for in the expected future conditions section of the SFLMP, and well within the 20-percent impacted area established as a level of concern in the SFLMP (DNRC 1996). These levels translate to a low risk of low direct and indirect impacts to soil physical disturbance. These impacts would likely persist for 20-40 years, depending on site specific conditions. In addition, BMPs and a combination of mitigation measures would be implemented to limit the area and degree of soil impacts as noted in ARM 36.11.422 and the SFLMP (DNRC, 1996).

Table S4 – Detrimental Soil Disturbance for the Action Alternative

Area of Analysis	Total Area (Acres)	Disturbance Rate (%)	Affected Area (Acres)
Harvest Units (including landings)	474.8	11.3	53.7
Roads *	2	100	2

* Based on average 33-foot road clearing limits

Cumulative

Cumulative effects to soil physical disturbance may occur from repeated entries into a forest stand where additional ground is impacted by equipment operations. None of the proposed units in this alternative have had any past harvesting activity. As a result, the cumulative effects to soil physical properties in these areas would be identical to those displayed in the Direct and Indirect Effects section of this analysis. Cumulative impacts to soil physical properties under the Action Alternative would fall below the range analyzed for in the expected future conditions section of the SFLMP and are well within the 20-percent impacted area established as a level of concern in the SFLMP (DNRC, 1996). This level translates to a low risk of low cumulative impacts to soil physical properties. These impacts would likely persist for 20-40 years, depending on site specific conditions.

Erosion

Direct and Secondary

Direct and secondary effects to erosion from the proposed project would include skid trails in ground-based harvest areas and new roads. In each of these areas, there is a high risk of low impacts to erosion due to exposure of bare soil. Skid trails would present a short-term risk which would decrease once disturbed areas re-vegetate. New roads would represent a longer-term risk due to continued exposure of bare soil on road tread areas. Erosion from roads is addressed in the watershed and hydrology portion of the analysis. All of the soils in the project area have a moderate to high risk for erosion based on whole soil K values. Winter logging operations are recommended along with limiting equipment operations to periods when soils are dry (less than

20% oven-dried weight), frozen or snow-covered in order to minimize soil compaction and rutting, and to maintain drainage features

Cumulative
Cumulative effects to erosion would be similar to the values reported for soil disturbance. Approximately 11.3% of the proposed harvest units in the Cliff Lake project area would have exposed soil following activity. These areas of disturbance present a low risk of low impacts to erosion and subsequent sediment delivery due to implementation of all applicable BMPs and mitigations listed in this analysis and in the watershed and hydrology analysis.

Nutrient Cycling
Direct and Secondary
Direct and indirect effects to nutrient cycling would include maintaining CWD at expected levels by habitat type with the Action Alternative. This would present a low risk of low direct and indirect effects to nutrient cycling. Stands where woody debris levels are low would see an increase in large woody debris as a result of the proposed harvesting. In addition, this alternative would lead to an increase in fine woody material in the form of limbs and treetops being left after harvest. Through the timber sale contract, approximately 12-24 tons of coarse woody material would be left on the ground following harvesting activities, as well as fine material for nutrient retention.

Cumulative
The risk of cumulative effects to nutrient cycling from nutrient pool loss would be low. This would present a low risk of low cumulative effects to nutrient cycling. This alternative would follow research recommendations found in (Graham, 1994) for retention of coarse and fine woody debris through contract clauses and site-specific mitigation measures.

Soils Mitigations

1. Limit equipment operations to periods when soils are dry (less than 20% oven-dried weight), frozen or snow-covered in order to minimize soil compaction and rutting, and to maintain drainage features. Check soil moisture conditions prior to equipment start-up.
2. On ground-based units, the logger and sale administrator would agree to a skidding plan prior to equipment operations. Skid trail planning would identify which existing trails to use and how many additional trails are needed.
3. Do not use existing trails if they are located in draw bottoms or other unfavorable locations.
4. Grass seeding or other erosion control measures may be required to stabilize some trails.
5. Limit ground-based operations to slopes less than 40% unless they can be used without causing excessive displacement or erosion.
6. Keep skid trails to 20 percent or less of the harvest unit acreage. Provide for surface drainage of all roads and skid trails concurrent with operations.
7. Slash disposal: Limit the total of disturbance and scarification to 30-40 percent of harvest units.
8. Limit dozer piling to slopes less than 35 percent and limit excavator piling to slopes less than 40 percent unless it can be completed without causing excessive erosion.
9. Retain between 12 and 24 tons/acre of woody debris 3-inches in diameter or greater (depending on habitat type) and a feasible majority of fine branches and needles 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 fine 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.

Soils 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, 2011. DNRC Compiled Soils Monitoring Report on Timber Harvest Projects. Missoula, MT.

DNRC, 1996. State Forest Land Management Plan. Montana Department of Natural Resources and Conservation. 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 Forests of the Rocky Mountains. USDA Forest Service Research Paper. INT-RP-447. 13 pp.

NRCS, 1998. MT603-Soil Survey of Lolo National Forest Area, Montana. United States Department of Agriculture Natural Resources Conservation Service.

Attachment D – Watershed Analysis

Cliff Lake Timber Sale – Water Resources Analysis

Analysis Prepared By:
Name: Josh Harris
Title: Hydrologist, Montana DNRC

Introduction

The following analysis will disclose anticipated effects on water resources within the Cliff Lake project area. Direct, secondary, and cumulative effects of the No-Action and Action alternatives on soil resources will be analyzed.

Issues and Measurement Criteria

Sediment Delivery
Sediment delivery and subsequent water quality impacts can be affected by timber harvest and related activities, such as road construction, by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and deliver substantial amounts of sediment by removing vegetation and exposing bare soil. In addition, removing vegetation near stream channels reduces the sediment-filtering capacity and may reduce channel stability. Harvesting near a stream can influence the amounts of large woody material available. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce stream flows' velocity and erosive power.

Measurement Criteria: Sediment delivery from roads, harvesting activities and vegetative removal will be analyzed qualitatively through data collected during past statewide and DNRC internal BMPs (Best Management Practices) field reviews.

Water Yield
Water yield increases can result from timber harvesting and associated activities, affecting the timing, distribution, and amount of water yield in a watershed. Water yields increase proportionately to the percentage of canopy removal (Haupt, 1976) because removing live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which leads to further water-yield increases. Higher water yields may increase peak flows and peak-flow duration, accelerating streambank erosion and sediment deposition. Vegetation removal can also reduce peak flows by changing the timing of snowmelt. Openings will melt earlier in the spring with solar radiation and have less snow available in late spring when temperatures are warm. This effect can reduce the synchronization of snowmelt runoff and lower peak flows.

Measurement Criteria: The water yield increase for the project area was determined using field review and aerial photo interpretation. Visual inspection of the runoff patterns and stream channel stability within the Cliff Lake project area were used to assess the impacts of past management to water yield. Aerial photo interpretation was used to determine the extent of past management in these watersheds.

Regulatory Framework

The development of this project has been intricately molded by a robust framework comprising plans, regulations, and established practices that both steer and oversee its diverse undertakings. Within this framework are fundamental guidelines and benchmarks, which encompass:

1. **Montana Surface Water Quality Standards:** These standards serve as the bedrock for maintaining and enhancing water quality in Montana. They define the specific criteria and parameters that must be met to safeguard water bodies and their ecosystems. Adherence to these standards is paramount to ensure the project minimizes its impact on water quality.

2. **Water-Quality-Limited Waterbodies:** Identification and consideration of water-quality-limited water bodies are crucial aspects of this project. These water bodies must meet the prescribed water quality standards and require special attention to mitigate and improve their conditions.

3. **Montana SMZ Law:** The Streamside Management Zone (SMZ) Law in Montana is a vital regulatory framework that governs activities near water bodies. It prescribes specific buffer zones and management practices to protect water quality, aquatic habitats, and riparian ecosystems. Compliance with this law is integral to the project's commitment to environmental stewardship.

4. **Forest Management Rules:** The Forest Management Rules provide the essential guidelines and regulations for sustainable forestry practices. They dictate responsible timber harvesting, reforestation, and habitat conservation measures to ensure that forest management activities align with ecological and conservation goals.

5. **Habitat Conservation Plan:** The Habitat Conservation Plan is a strategic document that outlines measures to safeguard critical habitats and species within the project area. It underscores the project's commitment to balancing development with conservation to protect the region's unique flora and fauna.

Integrating these plans, rules, and practices into the project's framework ensures a responsible project planning and implementation approach. This comprehensive strategy not only safeguards the environment but also upholds the principles of sustainability and compliance with the legal and regulatory framework governing Montana's natural resources.

Analysis Areas

Sediment Delivery

The area for direct, indirect, and cumulative effects of sediment delivery will be analyzed on all existing roads leading to and within the proposed project area (Figure S-1). Sediment delivery will be analyzed qualitatively where roads cross draws in the proposed project area using visual inspection and lineal measurement to determine the road surface area that could potentially deliver sediment. Additional sites on proposed haul routes outside the project area will be assessed qualitatively for their potential to affect downstream water.

Water Yield
Direct, indirect, and cumulative effects on water yield will be analyzed within the project area. All existing activities on all ownership and proposed activities related to the Cliff Lake project will be analyzed using the methods described below. These areas were chosen as an appropriate scale of analysis and will effectively display the estimated impacts of proposed activities.

Analysis Methods

Sediment Delivery
Analysis methods to assess sediment delivery will include qualitative assessments where draw and stream crossings exist within the proposed project area using visual inspection and lineal measurement to determine the road surface area that could potentially deliver sediment. Sediment from roads, harvesting activities, and vegetative removal will be analyzed qualitatively through data collected during past statewide and DNRC internal BMP field reviews.

Water Yield
Analysis methods to assess water yield increases for the project area streams were determined using field review and aerial photo interpretation. Visual inspection of the runoff patterns within the Cliff Lake project area were used to assess the impacts of past management on water yield. All existing activities on all ownership within project area watersheds and proposed activities related to the Cliff Lake project will be analyzed using the methods described above.

Existing Conditions

General Description
The project area is within the Beaver Creek – Stillwater River (HUC170102100403) watershed which spans 58 square miles and receives 17 inches of precipitation annually. Land ownership is distributed 81% private, 11% DNRC, and 2% federal. Beaver Creek is located between the northern sections of the project area and Lost Creek is located to the east. Notable scattered lakes in the project area include Cliff Lake and Baney Lake. Northwestern Lake, Bowser Lake, and Lore Lake are located outside of the project area found below in **Figure W-1**. No surface water flow was identified during site visits and the system appears to be groundwater driven.

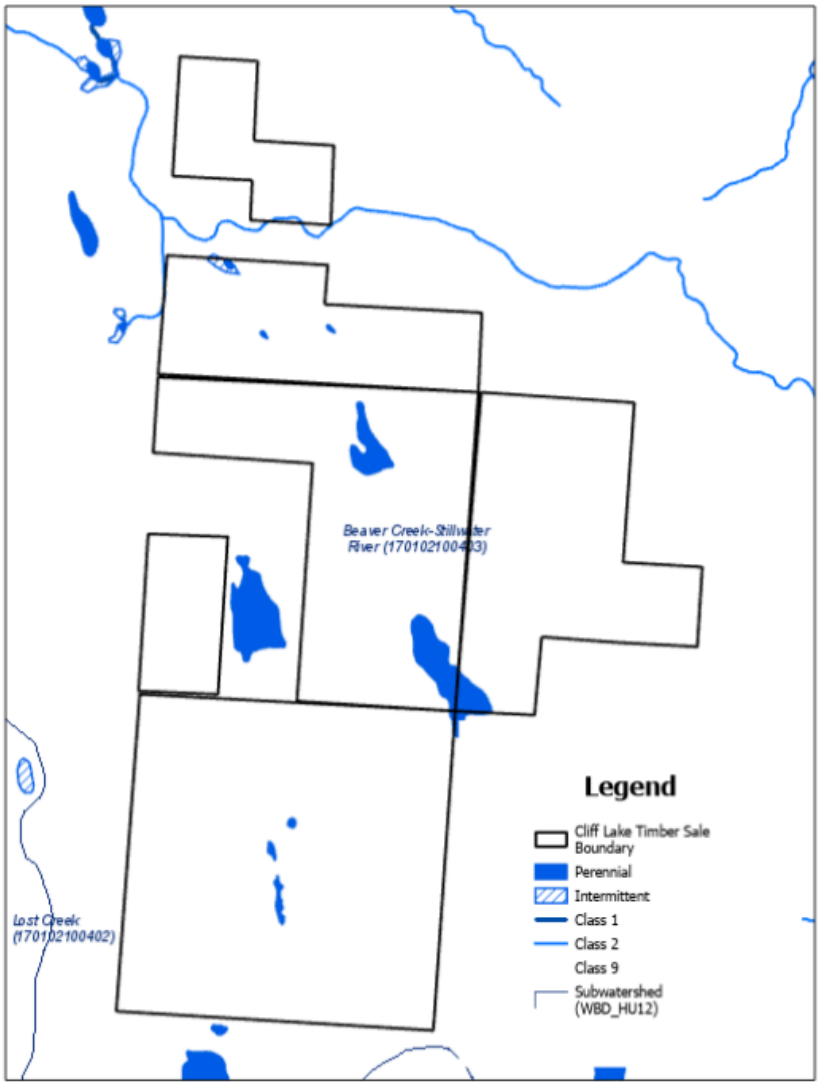

Figure W-1. Water Resources within the Cliff Lake project area.

Sediment Delivery

No streams were identified near the harvest units in the project area. All other draws and drainage features were stable and not actively eroding. Based on these findings, no in-channel sources of erosion or deposition were identified in the project area.

No sediment delivery to a waterbody from the existing road system was identified on the proposed haul routes within or leading to the project area. The existing road system is a moderate standard native-surfaced road. Existing roads meet applicable best management practices for surface drainage and erosion control, but there are reaches in need of improvement of surface drainage features, specifically dips. Nine crossing structures were identified in the project area, with five not passing BMP's, mainly due to sedimentation. No crossing structures are within 300 feet of a stream. Most road grades are generally under 8%.

Water Yield

Field reconnaissance of the proposed project area did not identify any streams. Additionally, a harvest of 474.8 acres would account for 1.28% of the total watershed. As a result, it was

determined that a detailed water yield analysis would not be necessary for the proposed project area. After evaluating the watershed cumulative effects risks and the current conditions in the Cliff Lake project area by ARM 36.11.423, a detailed quantitative watershed analysis is not needed in these parcels.

Environmental Effects

No Action Alternative: Direct, Secondary, and Cumulative Effects

Sediment Delivery

Direct and Secondary

Under this alternative, no timber harvesting or related activities would occur. Water Quality would continue as described in the existing conditions.

Cumulative

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

Water Yield

Direct and Secondary

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

Cumulative

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

Action Alternative: Direct, Secondary, and Cumulative Effects

Sediment Delivery

Direct and Secondary

There is a low risk of direct or indirect effects to sediment delivery to draws from the timber harvesting activities proposed in the Action Alternative. However, the project area does not contain any streams therefore direct sediment delivery to streams would not occur. Sedimentation to ponds and lake is low due to the distance from harvest units.

The action alternative would maintain and improve erosion control and surface drainage on all roads proposed for haul. The action alternative proposes to construct approximately 1 mile of new permanent road. None of the proposed new road construction would involve stream crossings. In addition, 4.8 miles of existing road would be reconditioned. All applicable BMPs would be followed in order to minimize potential impacts to draws where existing crossing structures exist. Short-term risk of low levels of erosion and deposition would be increased for approximately 2 to 3 years after completion due to exposure of bare soil during construction, surface drainage improvement and hauling activities. This risk would return to near current levels as road surfaces and cut and fill slopes re-vegetate. Overall, there is a low risk of short-term low-level increase in erosion and sediment delivery for about 2-3 years at the new draw crossings. However, water quality standards are expected to be met and there is a low risk of impacts to downstream beneficial uses.

Cumulative
The risk of sediment delivery and sediment loading to downstream waters from the proposed project area would be slightly increased from current levels in the short term and below current levels in the long term. Maintenance and improvement of existing erosion control and surface drainage on the existing road system would yield erosion rates similar to or below current levels. Overall, there is a low risk of short-term low-level increases in sediment loading for about 2 to 3 years. However, water quality standards are expected to be met and there is a low risk of impacts to beneficial uses.

Water Yield
Direct and Secondary
There is a low risk of very low direct or secondary effects to water yield from harvesting of approximately 474.8 acres of timber under this alternative within the proposed project area. It is a low risk that this level of harvesting would be sufficient to generate measurable increases in water yield in any streams located near the project area or cause scour in any of the draws located within the project area. As a result, there is a low risk of very low direct or secondary impacts to water yield in project area drainages as a result of the proposed Action Alternative.

Cumulative
The proposal is to harvest the stands within the proposed project area with a seed tree or shelterwood prescription. Cumulative effects to water yield in this parcel are not anticipated for the following reasons: 1) The well-drained to excessively well-drained nature of the soils would absorb additional available and not produce increased surface runoff, and would in turn produce little or no detectable change in water yield from upland sites, 2) Draws and the stream in the project area are stable, and have not shown lateral or vertical erosion that could be attributed to increased flows, so any increases in water yield present a low risk of increased erosion or other channel adjustments, and 3) Ephemeral draws within the parcel are stable and vegetated with a dense mat of grass and forbs vegetation, making them capable of handling potential water yield increases without destabilizing.

Water Resources Mitigations

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

1. Implement BMPs on all new roads and improve BMPs on existing roads where needed
2. Use spot-blading on existing roads to preserve as much of the existing vegetative cover as possible on vegetated road surfaces

Water Resource References

DNRC, 1990-2018. Montana Forestry Best Management Practices Monitoring. Missoula, Montana.

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

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

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

ATTACHMENT E- WILDLIFE ANAYLSIS

Cliff Lake Timber Sale – Wildlife Analysis

Analysis Prepared By:
Name: Justin Cooper
Title: Wildlife Biologist, Montana DNRC

Introduction

The following analysis will disclose the anticipated direct, secondary, and cumulative effects to wildlife associated with the No-Action and Action alternatives.

Issues

- Mature forest cover, old-growth, and connectivity. The proposed activities could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature and old-growth forest.
- Canada lynx. The proposed activities could result in the modification of habitat preferred by Canada lynx (*Felis lynx*) and decrease the area's suitability for lynx.
- Flammulated owls. The proposed activities could alter the structure of flammulated owl (*Otus flammeolus*) preferred habitat types, which could reduce habitat suitability for flammulated owls.
- Pileated woodpeckers. The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers (*Dryocopus pileatus*).
- Big game. The proposed activities could reduce habitat quality for big game, especially during the fall hunting and winter seasons, by removing hiding cover, increasing roads in secure areas, and disturbing animals. The proposed activities could also reduce the quality and availability of thermal cover, by reducing forest canopy cover and increasing the distance between large mature trees.

Regulatory Framework

The following plans, rules, and practices have guided this project's planning and/or will be implemented during project activities: *DNRC Forest Management Rules, DNRC Forested Trust Lands and Habitat Conservation Plan (USFWS and DNRC 2010), the Endangered Species Act, the Migratory Bird Treaty Act,* and the *Bald and Golden Eagle Protection Act.*

Analysis Areas

Direct and Secondary Effects Analysis Area
Direct and indirect effects of the proposed activities on all species/issues were analyzed within the Project Area (*FIGURE WI-1*), which consists of adjacent DNRC parcels within sections 19, 29, 30, and 31 of T30N, R22W.

Cumulative Effects Analysis Areas
The cumulative effects of the proposed activities on all species/issues were analyzed at a broad surrounding landscape scale that varies according to the issue or wildlife species being discussed. Cumulative effects analysis areas are named according to the relative size of the area and are summarized in *TABLE WI-1* and *FIGURE WI-1*. Cumulative effects analysis areas (CEAAs) include the Project Area as well as lands managed by other agencies and private landowners. Detailed descriptions of each analysis area are located in the **Affected Environment** section for each issue or wildlife species evaluated (e.g., flammulated owl, pileated woodpecker, etc.). In general, CEAAs were delineated to approximate the size of a focal species' home range or to approximate a surrounding landscape in which the proposed activities could most likely have measurable cumulative effects to wildlife habitat.

Table WI-1 - Wildlife Analysis Areas. *Descriptions of the areas used to analyze the proposed project's effects on wildlife species/issues.*

Analysis Area Name	Description	Total Acres	Issues/Species Analyzed
Project Area	Portions of sections 19, 29, 30, and 31 of T30N, R22W	**1,743**	**Direct & indirect effects for all issues/species**
Small CEAA	**The Project Area and sections surrounding it.**	**7,647**	**Mature forest cover, flammulated owls, pileated woodpeckers, hoary bats**
Large CEAA	**Portions of the Tobie Creek, Beaver Creek, Lost Creek, and Spring Creek HUC12 subwatersheds, bordered by Montana Highway 93 to the East.**	**58,926**	**Canada lynx, fishers, big game**

Analysis Methods

Analysis methods are based on the DNRC State Forest Land Management Plan, which is designed to promote biodiversity. The primary basis for this analysis includes information obtained by field visits, review of scientific literature, Montana Natural Heritage Program (MNHP) data queries, DNRC Stand Level Inventory (SLI) data analysis, USDA Forest Service VMap data, GIS aerial photograph analysis, canopy height models, and consultation with professionals.

The coarse-filter wildlife analysis section includes analyses of the direct, secondary, and cumulative effects of the proposed alternatives on old-growth forest and connectivity of mature forest habitat.

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species federally listed under the Endangered Species Act, species listed as sensitive by DNRC, and species managed as big game by the Montana Department of Fish Wildlife and Parks (DFWP).

Cumulative effects analyses account for known past and current activities, as well as planned future agency actions. Recent timber sale projects (≤10 years) that could contribute to cumulative effects are summarized in the following table.

Table WI-2 RECENT PROJECTS. *Recent projects that could contribute to cumulative effects and the number of harvested or potentially affected acres that occur in each analysis area.*

Project Name	Agency	Status	Project Area	Small CEAA	Large CEAA
Cliff/Bowser Salvage	**DNRC**	**Closed 2015**	**100**	**112**	**112**
Bowser Lake	**DNRC**	**Closed 2015**	**16**	**16**	**16**
Stovepipe	**USFS**	**2023-2033**	**0**	**750**	**5,143**
Ray Kuhns WMA	**DFWP**	**Scoped**	**0**	**95**	**358**

Coarse Filter Wildlife Analysis

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

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

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

Analysis Area
The analysis area for direct and indirect effects is the Project Area and the analysis area for cumulative effects is the 7,647-acre Small CEAA as described in *TABLE W-1* and depicted in *FIGURE W-1*. The Small CEAA is large enough to support a diversity of species that use mature forested habitat and/or require connected forested habitats and centers evaluation of cumulative effects on those areas most likely to be affected by the proposed action.

Measurement Criteria
Mature forested habitat was defined as forest stands with ≥40% canopy cover comprised primarily of trees ≥9 inches dbh. Forested stands containing trees of at least this size and density were considered adequate for providing minimal conditions necessary to facilitate movements of many wildlife species that benefit from well-connected mature forest conditions across the landscape. On DNRC-managed lands, old-growth stands were identified using the tree density, age, and size standards published in Green et al. (1992). Road density was calculated in linear miles per square mile by dividing the number of road miles by the specified analysis area in square miles. Factors considered in the analysis include: 1) availability of mature forested habitat (≥40% canopy cover, ≥9 inches dbh) and old-growth forest, 2) average patch size, 3) the degree of timber harvesting, 4) open and restricted road density, and 5) the availability of potential travel corridors.

Affected Environment
The Project Area currently contains approximately 1,251 acres (71.7% of Project Area) of mature Douglas-fir/western larch stands that have a reasonably well-developed canopy (≥40% crown closure). Unforested areas of dry grassy slopes, rock outcrops, paved roads, and wetlands make up another 53 acres (3.0% of Project Area). Old-growth forest, as defined by Green et. al (1992), is present on 13 acres (0.8%% of Project Area) within the Project Area. Mature forested stands are relatively well represented and connected within the proposed Project Area; with three patches averaging 417 acres in size (see TABLE WI-3). All these patches are connected to larger patches of mature forest outside of the Project Area. In contrast, old growth forest is isolated in two smaller patches inside the Project Area. Habitat availability and connectivity for species requiring larger patches of old-growth is limited, although 404 acres of mature forest connected to old-growth stands outside the Project Area could be providing some additional habitat. Approximately 398 acres of timber harvesting with shelterwood and commercial thinning prescriptions occurred between 2008 and 2015. Approximately 284 acres of stands that received commercial thin-type prescriptions will likely become mature forest stands within the next 15 to 20 years, albeit with crown closure in the 40-50% range. Another 14 acres previously received a shelterwood treatment, which will not become a mature forest within the next 80 years. The remaining 100 acres received a salvage treatment for insect damage in 2015. Forest connectivity in the Project Area is also affected by a transitional zone at the base of the Salish Mountain range, where gentle topography of the Flathead Valley containing mixed agriculture/grasslands and interspersed forest to the east is juxtaposed with dense montane forests of the Salish Range rising to the west. Mature forest stands within the Project Area are undergoing widespread mortality due to insects and disease. Beetles are targeting the larger Douglas-fir trees and live canopy cover is decreasing to below 40% in some patches as trees continue to die. Crown closure in mature stands on drier, south-southwest facing slopes also are near 40% and contain some scattered open patches <0.5 acres in size. Approximately 16.1 miles (5.9 miles/sq. mile) of roads exist in the Project Area, of which 15.6 miles (5.8 miles/sq. mile) are closed to public motorized use and the remaining 0.5 miles are open. Due to existing mature forest abundance, patch characteristics, and existing

road densities, habitat suitability and connectivity for species using well-stocked, mature forest is moderate to high within the Project Area.

Abundance and locations of mature, well-stocked forest within the Small CEAA have been influenced by past timber harvesting, residential development, and agriculture. Montana Department of Natural Resources and Conservation (DNRC), Montana Department of Fish Wildlife and Parks (DFWP), and USDA Forest Service (USFS) own approximately 26%, 11%, and 12% of the Small CEAA, respectively. Another 50% of the Small CEAA is privately owned and has had variable levels of forest management in the past. Presently, 47.4 percent (3,628 acres) of the Small CEAA contains mature forest stands possessing ≥40% crown closure, approximately 35% of which is located on DNRC-managed lands. Average patch size of mature forest in the small CEAA is 259 acres (14 patches, see TABLE WI-3 – Mature Forest Attributes). The 14 acres of old-growth forest located on DNRC land is not contiguous with other old-growth that may occur within the CEAA. Old-growth forest stands may potentially exist on up to 2,377 acres of land containing mature forest within the CEAA, but aerial imagery cannot confirm it. If present, it would not be connected to old-growth within the Project Area. Landscape connectivity of mature forest stands within the CEAA is high, with the majority of mature forest (3,106 acres) connected in one patch. Other patches are smaller and more isolated, either by past management or by development and agriculture. Dry, unforested bottomlands associated with an ecotone become prevalent within the eastern portion of the CEAA and further limit the availability of well-stocked stands. Approximately 1,529 acres of the CEAA (20.0%) has been harvested within the last 40 years. Many of these harvested acres are comprised of scattered young, regenerating trees with few large, scattered trees that do not provide suitable habitat for species that utilize well-stocked, mature forests. Forest insects and disease are active within the CEAA, and canopy cover of mature forest is decreasing in some areas due to tree mortality. Approximately 49.8 miles (4.2 miles/sq. mile) of roads exist within the CEAA. Of these roads, there are 26.4 miles of open roads that equate to a density of 3.9 miles/square mile. Private residential and country roads account for approximately 13.7 miles of these open roads. The remaining roads are primarily public roads used for commuting and recreational activities within the CEAA and surrounding area. Given these assessments, mature forest habitat suitability and landscape connectivity are moderate for species that require and/or prefer these conditions.

Table WI-3 – Mature Forest Attributes. *Acreages and patch size metrics of mature forested habitat (≥40% canopy cover, ≥9 inches dbh) pre- and post-harvest in the Project Area and Small CEAA for the proposed Cliff Lake Timber Sale. Percent of the total corresponding analysis area is in parentheses.*

Mature Forest Attribute	Project Area		Small CEAA	
	Existing	Post-Harvest	Existing	Post-Harvest
Acres of Mature Forest	1,251.4 (71.7%)	840.4 (48.1%)	3,628.3 (47.4%)	3,217.3 (42.1%)
Number of Patches	3	3	14	15
Average Patch Size (acres)	417.1	280.6	259.2	214.6
Minimum Patch Size (acres)	7.6	7.6	3.0	3.0
Maximum Patch Size (acres)	1,184.6	775.2	3,105.8	2,564.3

Environmental Effects – Mature Forest Cover and Connectivity

No Action Alternative: Direct and Secondary Effects

None of the proposed forest management activities would occur. This would result in: 1) no immediate changes to existing stands; 2) no appreciable changes to forest age, the distribution

of forested cover, or landscape connectivity; and 3) no changes to wildlife use. However, gradual reductions in canopy cover and mature forest habitat suitability would be expected to continue due to tree mortality from insect and disease activity. Thus, no short-term direct or indirect effects to old-growth, mature forested habitat suitability and connectivity would be anticipated but minor long-term adverse effects to habitat suitability are likely under the No-Action Alternative.

No Action Alternative: Cumulative Effects

None of the proposed forest management activities would occur. Therefore: 1) no immediate changes to existing stands would occur, 2) no further changes to the suitability of mature forested cover or connectivity would be anticipated, and 3) no changes to wildlife use would be expected. Past and ongoing forest management projects have affected mature forest wildlife habitat in the CEAA, and other proposed projects could affect mature forest habitat in the future (see TABLE WI-2). Additionally, gradual reductions in canopy cover and mature forest habitat suitability are likely to continue due to tree mortality from insects and disease, primarily Douglas-fir bark beetle. Thus, no additional short-term cumulative effects to old-growth, mature forested habitat suitability and connectivity would be anticipated but minor long-term adverse effects to habitat suitability are likely under the No-Action Alternative.

Action Alternative: Direct and Secondary Effects

Under the Action Alternative, approximately 474 acres (27.2% of the Project Area) would be harvested. Of these acres, 443 acres (25.4% of the Project Area) of well-stocked, mature forest would undergo harvesting. Approximately 411 acres of mature forest (32.9% of existing mature forest) would receive harvest treatments that would reduce overstory crown closure to less than 40% and increase mature tree spacing to 30-35 feet. The remaining 32 acres are included in a corridor designed to maintain connectivity of mature forest post-harvest, with harvest treatments designed to reduce overstory crown closure to no less than 40% and increase mature tree spacing to 15-30 feet where insect and disease are not present. No old-growth forest would be harvested or affected under the proposed project; thus old-growth forest will not receive further discussion. Average patch size of mature forest within the Project Area would be reduced by 136.5 acres; however, the number of patches would remain the same (TABLE WI-3). Approximately 840 acres (67.1%) of mature forest in the Project Area with ≥40% crown closure would persist after harvesting and could provide suitable habitat for species utilizing mature forest. One 775-acre patch would remain and provide a larger amount of interior dense forest habitat. After harvest completion, the Project Area would appear more similar to adjacent recently-harvested forested stands within the Project Area, and patch size of young, regenerating forest stands would increase. Under the Action Alternative, 1.0 miles of new restricted road would be built in the Project Area. Approximately 5.7 miles of restricted road would be used for activities and temporary open road density would increase from 0.2 to 2.6 miles/sq. mile. Restricted roads opened for harvesting would remain restricted to the public. Thus, moderate adverse direct and secondary effects to connectivity and suitability of mature forested habitat in the Project Area would be expected since: 1) harvesting would appreciably reduce tree density and existing cover on approximately 411 acres (32.9%) of existing available mature stands; 2) connectivity of mature forest would be will be maintained through a corridor of higher tree retention, albeit with a decrease in average patch size from 417 to 281 acres; 3) a measure of habitat availability and connectivity would be maintained on 840 acres (48.1% of Project Area) of mature forest in 3 patches; 4) approximately 1.0 miles of new permanent restricted road would be built, increasing road density by 0.6 miles/sq. mile; and 5) open road density would increase temporarily but not change in the long-term.

Action Alternative: Cumulative Effects

Under the Action Alternative, timber harvesting would alter 443 acres of the 3,628 acres (12.2%) of mature forest habitat available in the Small CEAA. Harvest treatments would remove 411 acres of mature forest for 40-60 years (TABLE WI-3). Reductions in the availability and quality of suitable mature forested habitat would be additive to past harvest activities and to 634 acres of proposed commercial thinning projects (8.3% of the Small CEAA) within mature forests in the Small CEAA (TABLE WI-2). Across the CEAA, 88.7% of current mature, forested habitats would remain and landscape connectivity would be altered to a moderate degree given habitat conditions within the surrounding forested landscape. Habitat availability and connectivity of mature forest would be reduced, as average patch size would decrease from 259 acres to 214 acres and the number of patches would increase from 14 to 15 patches (TABLE WI-3). The largest mature forest patch (3,106 acres) within the CEAA would be fragmented by the proposed harvest, reducing the patch size by 542 acres. Under the Action Alternative, 1.0 miles of new restricted roads would be built in the CEAA, and road use would increase on 4.7 miles of existing restricted road. During activities, open road density would increase from 2.5 miles/sq. mile to 3.1 miles/sq. mile within the CEAA for up to 4 years. Increased road use and associated disturbance under the proposed Action Alternative would be additive to anticipated increases in open road traffic associated with other active projects within the CEAA (see TABLE WI-2). Thus, low adverse cumulative effects to mature forested habitat abundance, suitability, and connectivity would be anticipated as a result of the Action Alternative since: 1) habitat suitability and connectivity of mature forest would remain moderate ; 2) the abundance of mature forested habitat in the CEAA would decrease by 411 acres (11.3% of existing mature forest); 3) average patch size of mature forested habitat would decrease by 45 acres; 4) connectivity would be reduced with an increase in patches but the largest available patch would remain over 2,000 acres; 5) temporary increases in open roads would occur but long-term open road density would not change.

Fine Filter Wildlife Analysis

In the fine-filter analysis, individual species of concern are evaluated. These species include those listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and animals managed as big game by Montana DFWP. TABLE WI-4 – Fine Filter provides an analysis of the anticipated effects for each species.

Table WI-4 – Anticipated Effects of the Cliff Lake Timber Sale on wildlife species.

Species/Habitat	[Y/N] Potential Impacts and Mitigation Measures N = Not Present or No Impact is Likely to Occur Y = Impacts May Occur (Explain Below)
Threatened and Endangered Species	
Canada lynx (*Felix lynx)* Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zones	[**Y**] **Detailed Analysis Provided Below -** The Project Area contains approximately 61 acres of suitable lynx habitat.
Grizzly bear *(Ursus arctos)* Habitat: Recovery areas, security from human activity	[**N**] The Project Area is located 2 miles outside of grizzly bear recovery zone and non-recovery occupied habitat (USFWS 1993, Wittinger 2002) and no recent sightings of grizzly bears have occurred in the area (MNHP 2023). Appreciable use of the Project Area by grizzly bears is unlikely due to high amounts of recreational use, adjacent occupied home sites and surrounding unsuitable habitat. While a grizzly bear could pass through the

Species/Habitat	[Y/N] Potential Impacts and Mitigation Measures N = Not Present or No Impact is Likely to Occur Y = Impacts May Occur (Explain Below)
	Project Area during long-range movements, the proposed activities would not be expected to measurably affect use of the area by grizzly bears. Thus, negligible direct, indirect, or cumulative effects to grizzly bears would be expected to occur as a result of either alternative.
Yellow-billed cuckoo (*Coccyzus americanus*) Habitat: open cottonwood riparian forest with dense brush understories (Lake and Flathead counties)	[**N**] No suitable open cottonwood riparian habitat occurs in the vicinity of the Project Area and yellow-billed cuckoos have not been observed in the area (*MNHP 2023*). Thus, no direct, indirect, or cumulative effects to yellow-billed cuckoos would be expected to occur as a result of either alternative.
Wolverine *(Gulo gulo)* Habitat: Alpine tundra and high-elevation boreal forests that maintain deep persistent snow into late spring	[**N**] No potentially suitable wolverine habitat exists within the proposed Project Area. The Project Area does not maintain deep snow into late spring and does not contain high-elevation alpine habitat. Appreciable use of the area is not expected. Given the large home range area (average 150+ sq. miles) wolverines occupy, and long distances wolverines typically cover during their movements, the proposed activities would not be expected to measurably affect use of the area by wolverines. Thus, no direct, indirect, or cumulative effects to wolverines would be expected to occur under the proposed action.
Sensitive Species	
Bald eagle *(Haliaeetus leucocephalus)* Habitat: Late-successional forest less than 1 mile from open water	[**N**] The proposed Project Area occurs on the outer edge of the Spring Prairie Road eagle territory; approximately 1.5 miles from the last known nest location. Proposed harvesting would not affect areas near preferred habitat (e.g. lakes or meadows). Appreciable use of the Project Area by bald eagles would not be anticipated because this area is located at the edge of the nearest known eagle home range, and a relatively small amount of preferred habitat exists here. Thus, negligible direct, indirect, or cumulative effects to bald eagles would be expected to occur as a result of either alternative.
Black-backed woodpecker *(Picoides arcticus)* Habitat: Recently burned or beetle-infested forest	[**N**] No recently burned areas (<5 years) occur within 2 miles of the Project Area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
Common loon *(Gavia immer)* Habitat: Cold mountain lakes, nest in emergent vegetation	[**N**] No suitable lake habitat occurs within 500 feet of the Project Area. Thus, no direct, indirect, or cumulative effects to common loons would be expected to occur as a result of either alternative.

Species/Habitat	[Y/N] Potential Impacts and Mitigation Measures N = Not Present or No Impact is Likely to Occur Y = Impacts May Occur (Explain Below)
Fisher *(Martes pennanti)* Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	[**N**] Although portions of the Project Area are preferred fisher cover types, the area is largely drier than typically used by fisher. Additionally, no low elevation stands with high canopy closure exist near streams in the Project Area. Fisher have not been observed within 15 miles of the Project Area in the past 10 years (*MNHP 2023*). Thus, no direct, indirect, or cumulative effects to fisher would be expected to occur as a result of either alternative.
Flammulated owl *(Otus flammeolus)* Habitat: Late-successional ponderosa pine and Douglas-fir forest	[**Y**] **Detailed Analysis Provided Below -** The Project Area contains 1,529 acres of potential flammulated owl habitat.
Peregrine falcon *(Falco peregrinus)* Habitat: Cliff features near open foraging areas and/or wetlands	[**N**] No known cliffs suitable for peregrine falcon nesting exist within the Project Area. Recent or historical observations of peregrine falcons within 1 mile of the Project Area are lacking (MNHP 2023). 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	[**Y**] **Detailed Analysis Provided Below -** Approximately 1,354 acres of suitable pileated woodpecker habitat occur in the Project Area.
Fringed myotis (*Myotis thysanodes*) Habitat: low elevation ponderosa pine, Douglas-fir and riparian forest with diverse roost sites including outcrops, caves, mines	[**N**] No suitable caves or mine tunnels are known to occur in the Project Area. Recent or historical observations of fringed myotis within 10 miles of the Project Area are lacking (MNHP 2023). Thus, no direct, indirect, or cumulative effects to fringed myotis would be expected to occur as a result of either alternative.
Hoary bat (*Lasiurus cinereus*) Habitat: coniferous and deciduous forests and roost on foliage in trees, under bark, in snags, bridges	[**Y**] **Detailed Analysis Provided Below –** The Project Area contains approximately 1,354 acres of potentially suitable hoary bat habitat.
Townsend's big-eared bat *(Plecotus townsendii)* Habitat: Caves, caverns, old mines	[**N**] No suitable caves or mine tunnels are known to occur in the Project Area. Thus, no direct, indirect, or cumulative effects to Townsend's big-eared bats would be expected to occur as a result of either alternative.
Big Game Species	
Elk	[**Y**] **Detailed Analysis Provided Below -** The Project Area contains potential elk, moose, whitetail deer, and mule deer winter range habitat**.**
Whitetail Deer	
Mule Deer	
Moose	

Threatened and Endangered Species

CANADA LYNX

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

Introduction
Canada lynx are listed as "threatened" under the Endangered Species Act. Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). Lynx abundance and habitat use are strongly associated with snowshoe hare populations; thus, activities which decrease habitat quality for snowshoe hares can reduce the availability of prey for lynx. Lynx habitat in western Montana consists primarily of stands that provide habitat for snowshoe hares including young and mature coniferous stands with high levels of horizontal cover (Squires et al. 2010, Squires et al. 2013). Forest type, tree densities, natural disturbance history, and time since harvesting play important roles in shaping the suitability of foraging habitat for lynx. Mature forest stands with abundant horizontal cover and coarse woody debris provide structure important for foraging, denning, travel, and security. These conditions are found in a variety of habitat types (Pfister et al. 1977), particularly within the subalpine fir series. Historically, northwest Montana contained a variety of stand types with differing fire regimes. This variety of stand types, combined with patchy elevation and snow-depth gradients preferred by lynx, likely formed a non-continuous mosaic of lynx and non-lynx habitats (Fischer and Bradley 1987, Ruggiero et. al. 1999, Squires et al. 2010). Forest management considerations for lynx include providing a mosaic of young and mature lynx habitats that are well connected across the landscape.

Analysis Area
The analysis area for direct and indirect effects is the Project Area and the analysis area for cumulative effects is the 58,926-acre Large CEAA as described in *TABLE WI-1* and depicted in *FIGURE WI-1.* The Large CEAA is large enough to encompass one or more lynx home ranges, is centered on the Project Area, and is defined according to geographic features (e.g., ridgelines, forest habitat, high traffic roads) which are likely to influence movements of Canada lynx in the vicinity of the Project Area; providing a reasonable analysis area for Canada lynx that could be influenced by project-related activities.

Measurement Criteria
Factors considered in the analysis include: 1) the level of harvesting, 2) the availability of suitable lynx habitat, and 3) landscape connectivity. Suitable lynx habitat was subdivided into the following lynx habitat classes: 1) winter foraging, 2) summer foraging, 3) other suitable and 4) temporary non-habitat. Other suitable lynx habitat is defined as habitat that has the potential to provide connectivity and lower quality foraging habitat but does not contain the necessary attributes to be classified as winter or summer foraging habitat classes. The temporary non-habitat category consists of forested stands that are not expected to be used by lynx until suitable horizontal cover develops. All habitat classes were identified according to DNRC's lynx habitat mapping protocols (*USFWS and DNRC 2010*). On non-DNRC lands, mature stands (excluding ponderosa pine stands) with ≥40% canopy cover provided by trees ≥9 inches dbh on average were queried or digitized in a GIS to estimate potential lynx habitat. Using these forest metrics on non-DNRC lands provides a conservative estimate and likely underestimates the total amount of suitable lynx habitat on the landscape because it excludes young, dense stands that can also serve as suitable habitat for lynx and lynx prey.

Affected Environment
The Project Area contains 61 acres of suitable lynx habitat, comprising 3.5% of the total area (TABLE WI-5). In the Project Area, winter foraging habitat is the only type of suitable habitat

(TABLE W-5 – LYNX HABITAT). Suitable lynx habitat is poorly connected as three isolated patches within the Project Area; however, some connectivity exists between two patches outside of the Project Area within mature forest on private land. Human disturbance is high within the Project Area during all seasons due to an estimated 17.7 miles of user-built and maintained trails utilized for hunting, hiking, biking, cross-country skiing, and horseback riding. One lynx has been recorded within 5 miles of the Project Area within the last 30 years (MNHP 2023). Additionally, the Project Area is below the typical elevation range and winter snowfall levels preferred by lynx (Ruediger et al. 2000). Thus, habitat suitability for lynx in the Project Area is low and appreciable use by lynx would not be anticipated.

The Large CEAA contains approximately 795 acres (1.4%) of suitable lynx habitat on DNRC lands and another 13,944 acres (23.7%) of potentially suitable habitat on other ownerships (TABLE WI-5). The remaining portions of the CEAA that do not provide lynx habitat consist primarily of human development, agriculture, wetlands, and logged stands with <40% canopy cover. DNRC manages 8.2% of the CEAA, DFWP manages 2.6%, USDA Forest Service administers 27.0%, private timber companies own 4.8% and other private owners account for 57.4% of the CEAA. Approximately 12,217 acres (20.7%) of the CEAA has been harvested within the last 40 years and reduced the availability of suitable lynx habitat containing mature trees. In the eastern portion of the CEAA, and in surrounding forested areas on private land, the abundance and connectivity of suitable lynx habitat is relatively low. The largest potentially suitable blocks of mature (winter foraging) lynx habitat are situated in the western portion of the CEAA at higher-elevation and managed by the USDA Forest Service. Observations of lynx within the CEAA are lacking within the last 30 years (*MNHP 2023*). Lower elevations, lower average snow depths, forest management activities and the interspersion of unsuitable habitat types within the CEAA are factors that likely reduce the overall suitability of the CEAA for appreciable use by lynx.

Table WI-5 – **Lynx habitat.** *Estimates of existing lynx habitat and habitat that would persist post-harvest on DNRC lands in the Project Area and cumulative effects analysis area. Percent refers to the percent of the lynx habitat category of the total potential habitat[a] present on DNRC-managed lands.*

Lynx Habitat Category	Acres of lynx habitat			
	Project Area		Cumulative Effects Analysis Area	
	Existing	Post-Harvest	Existing	Post-Harvest
Other Suitable	0.0 (0%)	0.0 (0%)	477.1 (58.8%)	477.1 (58.8%)
Summer Forage	0.0 (0%)	0.0 (0%)	11.5 (1.4%)	11.5 (1.4%)
Temporary Nonsuitable	0.0 (0%)	0.0 (0.0%)	15.6 (1.9%)	15.6 (1.9%)
Winter Forage	60.5 (100%)	60.5 (100%)	306.5 (37.8%)	306.5 (37.8%)
Grand Total: Suitable Lynx Habitat	60.5 (100%)	60.5 (100%)	795.1 (98.1%)	795.1 (98.1%)

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

Environmental Effects – Canada Lynx

No Action Alternative: Direct and Secondary Effects on Canada Lynx

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

No Action Alternative: Cumulative Effects on Canada Lynx

No appreciable change in lynx habitats would occur under this No-Action Alternative, and no further changes in landscape connectivity would be anticipated. Future forest management projects not associated with the proposed Cliff Lake Timber Sale could alter lynx habitat in the future (TABLE WI-2). Activities on non-DNRC lands could continue altering lynx habitat and create disturbance within the CEAA. Thus, no additional cumulative effects to suitable lynx habitat are expected to result from the No-Action Alternative that could affect lynx habitat suitability in the CEAA.

Action Alternative: Direct and Secondary Effects on Canada Lynx

The proposed activities would alter approximately 14 acres (23.3%) of the 61 acres of suitable lynx habitat available in the Project Area. Harvest treatments would reduce the mature canopy cover to approximately 30-40%; however, these acres currently contain enough submerchantable trees to account for 40% canopy closure within the understory and would contribute ≥10% total canopy cover post-harvest. Thus, all 61 acres of potential habitat would remain suitable winter foraging habitat after harvest (*TABLE WI-5*). To ensure that forest structural attributes preferred by snowshoe hares remain following harvest, patches of advanced regeneration and shade-tolerant tree species would be retained where possible within portions of lynx winter forage habitat. Additionally, 12 to 24 tons/acre of coarse woody debris would be retained in accordance with DNRC Forest Management Rules (*ARM 36.11.414)* and retention of downed logs ≥15 inch diameter (where available) would be emphasized. The proposed activities would not reduce habitat connectivity within the Project Area. Overall habitat suitability and connectivity in the Project Area would continue to be limited by nonsuitable habitat. If present in the vicinity of the Project Area, lynx could be temporarily displaced by forest management activities for up to 4 years due to disturbance caused by motorized activities. However, appreciable use of the area by lynx would not be expected before or after implementation of the Action Alternative. Thus, negligible adverse direct and indirect effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the Action Alternative since: 1) 14 acres (23.3% of existing suitable habitat in the Project Area, *TABLE WI-5*) would be directly impacted by proposed activities but would remain suitable habitat; 2) coarse woody debris and some small shade-tolerant conifers would be retained to promote forest structural complexity in harvest units; 3) existing lynx habitat connectivity to the Project Area is low and appreciable use of the area by lynx would not be expected given surrounding landscape attributes; and 4) adequate vegetative cover would persist along important travel features outside the Project Area.

Action Alternative: Cumulative Effects on Canada Lynx

The proposed activities would affect 14 acres (0.1%) of the 14,739 acres of potentially suitable lynx habitat available in the Large CEAA. All 14 harvested acres would remain winter foraging habitat post-harvest. Within harvest units, some patches of shade tolerant trees and approximately 12 to 24 tons/acre of coarse woody debris would be retained and leaving downed logs ≥15 inch diameter would be emphasized. Lynx habitat connectivity across the CEAA would

not be substantially affected, and overall suitability and connectivity of lynx habitat is currently low to moderate. Changes to lynx habitat availability and connectivity would be additive to past forest management projects and 5,501 additional acres of proposed forest management projects within the CEAA (TABLE WI-2). Of these proposed acres of treatment, 724 acres would be treated with prescriptions that reduce canopy closure to <10%, causing the structure of these stands to become unsuitable for appreciable use by Canada lynx. Additionally, disturbance due to logging and motorized equipment under the Action Alternative would be additive to current levels of disturbance associated with ongoing and proposed timber harvesting on other ownerships (TABLE WI-2). Thus, negligible adverse cumulative effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the Action Alternative since: 1) overall baseline habitat connectivity would remain moderate with 25.0% of the CEAA potentially suitable for lynx, primarily in the western half of the CEAA; 2) existing suitable lynx habitat within the CEAA would not be reduced by the proposed Action Alternative, 3) overall habitat connectivity within the CEAA would remain low to moderate, and 4) lynx could be temporarily displaced by the proposed logging activities concurrent with other active projects (TABLE WI-2) in a portion of the CEAA, however appreciable use of the CEAA in the vicinity of the Project Area does not likely occur.

Sensitive Species

Flammulated Owl

Issue
The proposed activities could alter the structure of flammulated owl (*Otus flammeolus*) preferred habitat types, which could change habitat suitability for flammulated owls within the Project Area.

Introduction
The flammulated owl is a small insectivorous species that is migratory and inhabits old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States (Linkhart and McCallum 2013). Flammulated owls are secondary cavity nesters, typically nesting in 12 to 25 inch dbh aspen, ponderosa pine, or Douglas-fir cavities excavated by pileated woodpeckers or northern flickers (*Colaptes auratus*). Forest management considerations for flammulated owls include providing open, dry stands of ponderosa pine and Douglas-fir with scattered dense sapling thickets and retaining snags for nesting.

Analysis Area
The analysis area for direct and indirect effects is the Project Area and the analysis area for cumulative effects is the 7,647-acre Small CEAA as described in *TABLE WI-1* and depicted in *FIGURE WI-1.* The Small CEAA scale includes sufficient area to support multiple pairs of flammulated owls if ample suitable habitat is present (Linkhart and McCallum 2013) and surrounds the Project Area, providing a reasonable analysis area for Flammulated owl that could be influenced by project-related activities.

Measurement Criteria
Analysis methods include field evaluations, aerial photograph interpretation, and GIS analysis of available habitats. Stand level data were used to identify preferred flammulated owl habitat types (*ARM 36.11.403(28)*). Canopy cover, trees/acre, snag abundance and cover type were considered in the analysis of flammulated owl habitat availability and structure. Factors

considered in the analysis include: 1) the degree of harvesting, and 2) the availability and structure of flammulated owl preferred habitats.

Affected Environment
Within the Project Area there are approximately 1,529 acres (87.6%) of potential flammulated owl habitat. Of these potential acres, 239 acres (13.7% of Project Area) are comprised of habitat conditions suitable for use by flammulated owls. Another 1,290 acres of forest cover types preferred by flammulated owls are currently too dense to be considered suitable for appreciable use by owls. Suitable forest stands in the Project Area are largely Douglas-fir, western larch, and ponderosa pine on drier, south and east facing slopes. Some portions of these stands contain tree densities and canopy bordering on the dense side for preferred habitat, but widespread beetle mortality is likely improving habitat conditions for owls by decreasing canopy cover and creating large (>21" dbh) snags used for nesting and foraging. Site-specific growing conditions and past timber harvesting have influenced the abundance and distribution of flammulated owl habitat and large snags within the proposed Project Area. Firewood gathering (and resulting snag loss) is likely low along the 0.5 miles of open roads in the Project Area. Given the amount of preferred forest habitat and favorable forest structure present, habitat suitability for flammulated owls within the Project Area is currently moderate.

The CEAA contains approximately 1,916 acres (25.1% of the Small CEAA) of potentially suitable flammulated owl habitat. Of these acres, approximately 388 acres (25.4% of suitable habitat) are currently suitable and present on DNRC lands. Another 1,528 acres of preferred flammulated owl cover types are currently unsuitable due to dense forest conditions. Potentially suitable flammulated owl habitat on non-DNRC lands is comprised of both managed and unmanaged forest stands. The suitability of managed stands for flammulated owl breeding is dependent upon snag and live tree retention levels, which likely varied depending upon the owner/land manager. Due to the amount of available suitable habitat within the CEAA, the presence of flammulated owls within the CEAA is moderate; however, flammulated owls have not been observed within the CEAA in the past (MNHP 2023). Suitable flammulated owl habitat within the CEAA is primarily limited by the presence of non-preferred cover types, the lack of large snags for nesting, and recent harvesting that has removed large, mature trees. Past harvesting on 1,529 acres (20.0% of the CEAA) within the CEAA has created more open canopy habitat favored by flammulated owls, however it has also likely reduced the amount of old forest stands and quality of large snags available for nesting. Additionally, 26.4 miles of open road within the CEAA allow access for firewood gathering, which likely further reduces the number of available snags. Currently, habitat suitability for flammulated owls within the CEAA is moderate.

Environmental Effects – Flammulated owl
No Action Alternative: Direct and Secondary Effects on Flammulated owl
Under this alternative, no proposed project activities would occur. Thus, since there would be no change in availability or structure of preferred flammulated owl habitats, no direct or indirect effects to habitat suitability for flammulated owls would be anticipated as a result of the No-Action Alternative.

No Action Alternative: Cumulative Effects on Flammulated owl
Under this alternative, no proposed project activities would occur. Past forest management projects not associated with the proposed Cliff Lake Timber Sales have affected flammulated owl habitat in the CEAA, and ongoing and proposed projects could alter owl habitat in the future (TABLE WI-2). Activities on non-DNRC lands could continue altering flammulated owl habitat and create disturbance within the CEAA. Thus, since no additional change in the availability or

structure of preferred flammulated owl habitats would occur, no cumulative effects to habitat suitability for flammulated owls would be anticipated as a result of the No-Action Alternative.

Action Alternative: Direct and Secondary Effects on Flammulated owl
Timber harvest would occur on 411 of the 1,529 acres (26.9%) of potential flammulated owl cover types available in the Project Area. The proposed activities would open stands up to 30%-40% canopy cover, increasing stand structure suitability for flammulated owls on 402 acres where conditions are currently too dense. Additionally, the proposed harvest prescription would leave some larger-diameter ponderosa pine and Douglas-fir live trees and snags, however the density of these species would decrease. Some snags could be removed by the proposed harvest, but at least 2 snags and 2 snag recruitment trees per acre (>21 inches dbh, or largest available) would be retained (*ARM 36.11.411*). Flammulated owls are somewhat tolerant of human disturbance (Linkhart and McCallum 2013), however disturbance associated with harvesting could temporarily displace flammulated owls should they be present in the Project Area. Flammulated owls would not be displaced or disturbed by activities occurring in the winter months when the birds have migrated to their winter range. All existing restricted roads and 1.0 mile of newly constructed roads would remain restricted; potential for snag loss due to firewood gathering in the future would not appreciably change. Thus, minor direct and indirect effects to flammulated owl habitat suitability would be anticipated as a result of the Action Alternative since: 1) habitat quality would increase on 23.2% of existing preferred cover types, 2) proposed harvesting prescriptions could maintain suitable habitat on approximately 9 acres if sufficient snags and patches of understory are retained; 3) flammulated owls could be temporarily displaced for up to four years; and 4) the number of large snags available for nesting would decrease but at least 2 large snags/acre would be retained where available.

Action Alternative: Cumulative Effects on Flammulated owl
Timber harvest would occur on 411 acres (21.5%) of suitable flammulated owl habitat available in the CEAA. Proposed harvest prescriptions within 402 acres of suitable flammulated owl cover types (21.0%), currently too dense to be suitable, would increase potential habitat suitability by opening forest structure for foraging flammulated owls. The retention of larger-diameter ponderosa pine, western larch, and Douglas-fir in all stands could help continue providing suitable habitat for flammulated owls if sufficient snags and clumps of regenerating conifers are maintained as well. Some snags would be removed by the proposed harvest, but at least 2 snags and 2 snag recruitment trees per acre (>21 inches dbh, or largest available) would be retained (*ARM 36.11.411*). Flammulated owls are tolerant of human disturbance (Linkhart and McCallum 2013), however disturbance associated with harvesting could temporarily displace flammulated owls should they be present in the Project Area. Disturbance to flammulated owls outside of the Project Area would be additive to past, ongoing, and proposed forest management projects within the CEAA on potentially suitable cover types (TABLE WI-2). Flammulated owls would not be displaced by activities occurring in the winter months when the birds have migrated to their winter range. Thus, minor cumulative effects to flammulated owl habitat suitability would be anticipated as a result of the Action Alternative since: 1) harvesting would alter approximately 21.5% of potentially suitable habitat, 2) harvesting would increase potential habitat suitability by opening up forest structure of approximately 402 acres of dense stands with suitable cover types, 3) some large trees and snags would be retained within harvest units, and 4) at least 973 acres of suitable habitat would be expected to persist within the CEAA.

Pileated Woodpeckers

Issue

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

Introduction
Pileated woodpeckers 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.” Necessary feeding and nesting habitat attributes include large snags, large, decayed trees, and downed wood, which 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
The analysis area for direct and indirect effects is the Project Area and the analysis area for cumulative effects is the 7,647-acre Small CEAA as described in *TABLE WI-1* and depicted in *FIGURE WI-1.* The Small CEAA is centered on the Project Area and provides a sufficient area to support multiple pairs of pileated woodpeckers if enough suitable habitat is present (Bull and Jackson 2011).

Measurement Criteria
Factors considered in the analysis include: 1) the degree of harvesting and 2) the amount and structure of pileated woodpecker preferred habitat types. On DNRC-managed lands, sawtimber stands averaging ≥100 years old within preferred pileated cover types (*ARM 36.11.403(63)*) with ≥40% canopy closure were considered potential pileated woodpecker habitat. On non-DNRC lands, the stands considered potential pileated woodpecker habitat were mature forest stands (≥40% canopy cover, ≥9 inches dbh average) below 6,000 feet elevation.

Affected Environment
In the Project Area, there are approximately 1,354 acres (77.6% of Project Area) of potential pileated woodpecker habitat. Current potential pileated habitat within the Project Area consists of mature Douglas-fir and western larch forest. Suitable habitat is relatively well-connected and well-represented within the Project Area as three patches: 1,185 acres, 59 acres, and 8 acres in size. Insects and disease are actively killing trees throughout the Project Area. While this is reducing live tree densities and canopy cover, it is also generating large snags and providing nest trees and/or food for pileated woodpeckers. Snags and coarse woody debris within the proposed Project Area are present and at appropriate levels for existing habitat types. Firewood gathering, which can result in a reduction of snags and downed logs valuable as woodpecker nesting and foraging substrates, is unlikely due to the small length of open roads within the Project Area; however, some private access could permit firewood gathering. Thus, habitat quality is moderate within the Project Area.

The CEAA contains approximately 5,038 acres (65.9% of the CEAA) of potential pileated woodpecker habitat. Of these acres, 1,410 acres (18.4 of the CEAA) are located within DNRC lands. The largest patch of potentially suitable habitat (3,106 acres) includes 1,185 acres inside the Project Area. Appreciable use of the CEAA and Project Area by pileated woodpeckers would be expected. Recent harvesting on 1,529 acres (20.0% of the CEAA) within the last 40

years has altered forest habitat and created forest conditions unsuitable for use by pileated woodpeckers. Thus, habitat quality and availability for pileated woodpeckers within the CEAA is currently moderate.

Environmental Effects – Pileated Woodpeckers

No Action Alternative: Direct and Secondary Effects on Pileated Woodpeckers

Under this alternative, no proposed project activities would occur. Thus, no direct or indirect effects to pileated woodpecker habitat suitability would be anticipated as a result of the No-Action Alternative.

No Action Alternative: Cumulative Effects on Pileated Woodpeckers

Under this alternative, no proposed project activities would occur. Past forest management projects not associated with the proposed Action Alternative have affected pileated woodpecker habitat in the CEAA, and ongoing and proposed projects could affect habitat suitability in the future (TABLE WI-2). Activities on non-DNRC lands could continue altering pileated woodpecker habitat within the CEAA. Thus, since no additional changes in available habitat would be anticipated as a result of the No-Action Alternative, no cumulative effects to pileated woodpecker habitat suitability would be anticipated.

Action Alternative: Direct and Secondary Effects on Pileated Woodpeckers

The proposed activities would occur in 462 acres (34.1%) of the 1,354 acres of pileated woodpecker habitat available in the Project Area. Proposed harvest prescriptions on 426 acres (31.5% of available) would open stands to 30-50% canopy cover causing the structure of these stands to become unsuitable for appreciable use by pileated woodpeckers. The remaining 36 acres would undergo less intensive harvesting and would likely retain some suitable habitat for pileated woodpeckers post-harvest, although fewer large trees and snags available for nesting and foraging. Patch size and connectivity of suitable habitat would be reduced but maintain 3 patches averaging 281 acres in size. Several of these patches would remain connected to larger patches of suitable habitat outside of the Project Area. However, the largest habitat patch within the Project Area would be partially removed and fragmented. One patch, 775 acres in size, would remain within the Project Area and could provide breeding habitat for pileated woodpeckers. Some snags would be removed by the proposed harvest, but at least 2 large snags and 2 large snag recruitment trees per acre (>21 inches dbh, or next largest size class) would be retained (*ARM 36.11.411*) where present. Approximately 12 to 24 tons of coarse woody debris per acre would also be left in harvest units, with an emphasis on downed logs >15 inches diameter. Disturbance associated with harvesting could adversely affect pileated woodpeckers within the Project Area for approximately 4 years, should they be present. Thus, moderate adverse direct and indirect effects to pileated woodpecker habitat suitability in the Project Area would be anticipated as a result of the Action Alternative since: 1) harvesting would reduce pileated woodpecker suitable habitat availability by 426 acres (31.5%) and 919 acres of suitable habitat would remain within the Project Area; 2) forest structural changes would occur, but mitigations would include retention of snags and coarse woody debris (*ARM 36.11.411, ARM 36.11.414*), as well as large-diameter seral species; 3) patch size of suitable habitat would decrease by 410 acres and connectivity would decline; and 4) pileated woodpeckers could be temporarily displaced for up to 4 years by forest management activities.

Action Alternative: Cumulative Effects on Pileated Woodpeckers

Under this alternative, pileated woodpecker habitat would be altered on 462 acres (9.2%) of the 5,038 acres of potentially suitable habitat in the CEAA. Harvesting would effectively remove 426 acres of pileated woodpecker suitable habitat for the next 40 to 60 years. Habitat suitability would decrease due to an increase in the number of patches from 14 to 15 patches and a

decrease in average patch size from 259 acres to 215 acres. The largest habitat patch would be reduced by 542 acres due to harvest and fragmentation. Past harvesting in the CEAA has altered the quality and abundance of pileated woodpecker habitat; reductions associated with this Action Alternative would be additive to those reductions and proposed reductions on approximately 729 acres (14.5%) of suitable pileated woodpecker habitat associated with active forest management projects within the CEAA (TABLE WI-2). Suitable habitat would remain present on 4,612 acres (60.3% of the CEAA) and continued use of the CEAA by breeding pileated woodpeckers would be anticipated. Snags, coarse woody debris, and potential nesting trees would be retained in the Project Area according to forest management *ARM 36.11.41*; however, snags and live trees would be reduced from existing levels in all of the proposed harvest units. Disturbance associated with the proposed activities could adversely affect pileated woodpeckers in the vicinity of the Project Area for up to 4 years. Timber harvesting throughout the CEAA and firewood gathering along open roads would continue to limit the abundance of snags and woody debris within more accessible areas of the CEAA. Thus, minor cumulative effects to habitat suitability for pileated woodpeckers would be anticipated since: 1) 9.2% of suitable pileated woodpecker habitat currently present within the CEAA would be altered; 2) approximately 60.3% of the CEAA would contain suitable habitat post-harvest; 3) patch size of suitable habitat would decrease and connectivity of suitable habitat be altered within the CEAA; and 4) some snags and snag recruits would be removed in the proposed harvest areas for operational and human safety purposes, however, mitigation measures would retain at least 2 large snags and 2 large recruitment trees per acre, as well as 12 to 24 tons per acre of coarse woody debris in harvested areas.

Hoary Bat

Issue
The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for hoary bats.

Introduction
The hoary bat is a large insectivorous bat species that is found throughout Montana, though not in high numbers. Solitary creatures, hoary bats roost alone in foliage and under the thick bark of Douglas firs, ponderosa pines, and cottonwoods 10 to 40 feet above the ground. They prefer live trees and snags at the edge of clearings but have also been found in dense forests, open wooded glades, and shade trees along urban streets and in city parks (Anderson 2002). Hoary bats reach their peak activity at about five hours after sunset, often feeding in open spaces such as over water and roads, in forest clearings, and along forest edges. Females have been documented traveling one-way distances up to 20 km from day roosts while on first of up to five nightly foraging bouts in Manitoba Canada (Barclay 1989). The bats begin arriving in Montana each spring during May, and in September fly south for warmer climates. Hoary bats are considered common and widespread throughout Montana, but wind energy and diseases such as white-nosed syndrome pose threats to their population (Bachen et al. 2020).

Analysis Area
The analysis area for direct and indirect effects is the Project Area and the analysis area for cumulative effects is the 58,926-acre Large CEAA as described in *TABLE WI-1* and depicted in *FIGURE WI-1.* The Large CEAA is centered on the Project Area and provides a sufficient area to support foraging if enough suitable habitat is present (Barclay 1989).

Measurement Criteria

Factors considered in the analysis include: 1) the degree of harvesting and 2) the amount and structure of hoary bat preferred habitat types. On DNRC-managed lands, sawtimber stands with ≥40% canopy cover were considered potential hoary bat roosting habitat. On non-DNRC lands, the stands considered potential hoary bat habitat were mature forest stands (≥40% canopy cover, ≥9 inches dbh average).

Affected Environment
In the Project Area, there are approximately 1,354 acres (77.6% of Project Area) of potential hoary bat habitat. Current potential hoary bat habitat within the Project Area consists of mature Douglas-fir and western larch forest. Insects and disease are actively killing trees throughout the Project Area. While this is reducing live tree densities and canopy cover, it is also generating large snags and providing nest trees and/or food for hoary bats. Snags and coarse woody debris within the proposed Project Area are present and at appropriate levels for existing habitat types, especially in unmanaged stands. Firewood gathering, which can result in a reduction of snags valuable as roosting sites, is unlikely due to the small length of open roads within the Project Area. Several open meadows with shallow wetlands provide foraging habitat within the project area and range from 11 to 22 acres in size. Thus, habitat quality is high for hoary bats within the Project Area.

The CEAA contains approximately 18,138 acres (36.5% of the CEAA) of potential hoary bat habitat. Of these acres, 3,368 acres (5.7% of the CEAA) are located within DNRC lands. Use of the CEAA and Project Area by hoary bats would be possible. Recent harvesting on 12,217 acres (20.7% of the CEAA) within the last 40 years has altered forest habitat and created forest conditions potentially unsuitable for roosting by hoary bats; however, these areas may still be used for foraging. Thus, habitat quality and availability for hoary bats within the CEAA is currently moderate.

Environmental Effects – Hoary Bats
No Action Alternative: Direct and Secondary Effects on Hoary Bats
Under this alternative, no proposed project activities would occur. Thus, no direct or indirect effects to hoary bat habitat suitability would be anticipated as a result of the No-Action Alternative.

No Action Alternative: Cumulative Effects on Hoary Bats
Under this alternative, no proposed project activities would occur. Past forest management projects not associated with the proposed Action Alternative have affected hoary bat habitat in the CEAA, and ongoing and proposed projects could affect habitat suitability in the future (TABLE WI-2). Activities on non-DNRC lands could continue altering hoary bat habitat within the CEAA. Thus, since no additional changes in available habitat would be anticipated as a result of the No-Action Alternative, no cumulative effects to hoary bat habitat suitability would be anticipated.

Action Alternative: Direct and Secondary Effects on Hoary Bats
The proposed activities would occur in 462 acres (34.1%) of the 1,354 acres of hoary bat roosting habitat available in the Project Area. Harvest prescriptions on 426 acres would reduce roosting habitat quality. However, these acres would remain suitable for foraging after harvest activities are completed. Because hoary bats typically roost in trees and snags, they could be temporarily disturbed by timber harvesting for up to four years. Potential disturbance would only be expected from June through September, when hoary bats are in Montana. After the conclusion of activities, continued use of the Project Area, including harvested areas, by hoary bats would be anticipated. At least 2 large snags and 2 large snag recruitment trees per acre

(>21 inches dbh, or largest size class available) would be retained and could provide roosting sites (ARM 36.11.411). Thus, minor adverse direct and indirect effects to hoary bat habitat suitability in the Project Area would be anticipated as a result of the Action Alternative since: 1) harvesting would reduce suitable roosting habitat availability by 426 acres (34.1%) but 919 acres of suitable habitat would remain; 2) forest structural changes would occur, but mitigations would include retention of snags and coarse woody debris (*ARM 36.11.411, ARM 36.11.414*), as well as large-diameter seral species; 3) hoary bats use recently logged areas and openings for foraging; and 4) hoary bats could be temporarily displaced for up to 4 years by forest management activities occurring during the summer season.

Action Alternative: Cumulative Effects on Hoary Bats
Under this alternative, hoary bat habitat would be altered on 462 acres (2.5%) of the 18,138 acres of potentially suitable roosting habitat in the CEAA. Harvesting would remove 426 acres of potentially suitable hoary bat roosting habitat for the next 40 to 60 years. Past harvesting in the CEAA has altered the quality and abundance of hoary bat habitat; reductions associated with this Action Alternative would be additive to those reductions and ongoing reductions on 2,530 acres (13.9%) of suitable hoary bat habitat associated with active forest management projects (TABLE WI-2). Suitable habitat would remain present on 17,712 acres (30.1% of the CEAA) and continued use of the CEAA by hoary bats would be anticipated. Snags, coarse woody debris, and potential nesting trees would be retained in the Project Area according to forest management *ARM 36.11.41*; however, snags and live trees would be reduced from existing levels in all of the proposed harvest units. Disturbance associated with the proposed activities could adversely affect hoary bats in the vicinity of the Project Area for up to 4 years if occurring during the summer season when bats are present. Timber harvesting throughout the CEAA and firewood gathering along open roads would continue to limit the abundance of snags and woody debris within more accessible areas of the CEAA. Thus, negligible cumulative effects to habitat suitability for hoary bats would be anticipated since: 1) 2.5% of suitable hoary bat habitat currently present within the CEAA would be altered; 2) approximately 30.1% of the CEAA would contain suitable roosting habitat after harvest and hoary bats would persist on the landscape; and 3) some snags and snag recruits would be removed in the proposed harvest areas for operational and human safety purposes, however, mitigation measures would retain at least 2 large snags and 2 large recruitment trees per acre in harvested areas.

BIG GAME

ELK, MOOSE, WHITE-TAILED DEER, AND MULE DEER WINTER RANGE

Issue
The proposed activities could reduce habitat quality for big game, especially during the fall hunting and winter seasons, by removing forest cover, and disturbing animals.

Introduction
Timber harvesting can affect big game and habitat quality through disturbance during harvest activities, removal of forest crown closure used for hiding and thermal cover, and by creating openings in the forest used for foraging. Forested cover on winter range enables big game survival by ameliorating the effects of severe winter weather conditions. Winter ranges tend to be areas found at lower elevations that support concentrations of big game, which are widely distributed during the remainder of the year. Suitable winter ranges have adequate midstory and overstory vegetative cover that reduces wind velocity and intercepts snow, while moderating ambient temperatures. Besides providing a moderated climate, snow-intercept capacity of tree

branches effectively lowers snow depths, which enables big game movement and access to forage. Snow depths differentially affect big game; deer are most affected, followed by elk, then moose.

Timber harvesting can increase big game (e.g., elk) vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during times of hunting pressure (Hillis et al. 1991). As visibility and accessibility increase within forested landscapes, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters. Because the female segments of the elk and deer populations are normally regulated carefully during hunting seasons, primary concerns are related to a substantial reduction of male animals and resulting decrease in hunter opportunity.

Analysis Area
The analysis area for direct and indirect effects is the Project Area and the analysis area for cumulative effects is the 58,926-acre Large CEAA as described in TABLE WI-I and depicted in FIGURE WI-1. The Large CEAA is defined according to geographic features (e.g., watershed boundaries, state highways), which provide a reasonable biological analysis unit for big game animals that could be influenced by project-related activities.

Measurement Criteria
Factors considered in the analysis include: 1) the degree of timber harvesting, 2) the availability and structure of forest cover on big game winter range, and 3) the level of human access for recreational hunting. Mature forested habitat (≥40% canopy cover, ≥9 inch dbh average) was considered capable of providing minimal thermal cover conditions for big game in the Large CEAA.

Affected Environment
The Project Area contains 1,108 acres (63.5%) of mule deer winter range, 1,745 acres (100%) of white-tailed deer, moose, and elk winter range, as identified by DFWP (2008). The area surrounding and including Cliff Lake is recognized by DFWP as important winter range for white-tailed deer in the Flathead Valley, especially during moderate to high snow loads (DFWP 2006). Evidence of summer deer use was also observed during field visits to the Project Area. The Project Area contains approximately 1,438 acres (82.4% of the Project Area) of habitat that is currently providing year-round visual screening for big game. Of these acres, 1,289 acres (63.5% of the Project Area) provide moderate to high amounts of thermal cover and snow intercept for wintering big game. Big game snow intercept and thermal cover is currently being reduced in portions of the Project Area by tree mortality due to insects and disease. Older, larger Douglas-fir (high value snow-intercept) are being disproportionally affected. Motorized hunter access in the Project Area is limited to one vehicle per day on restricted roads during the fall rifle season (approximately 1 month in length) for disabled individuals. The density of open roads in the Project Area is 0.18 miles/sq. mile and total road density is 5.9 miles/sq. mile. Human disturbance is high within the Project Area during all seasons due to 17.7 miles of user-built and maintained trails utilized for hunting, hiking, biking, cross-country skiing, and horseback riding. Recreational use of the Project Area by humans has increased exponentially in the 20+ years since DFWP concluded their deer winter range study. Overall, vegetation conditions provide high values of winter range cover and visual screening while habitat security is moderate due to the amount of roads and trails present within the Project Area.

Within the CEAA, mule deer winter range occupies approximately 9,524 acres (16.2%), 20,799 acres (35.3%) is elk winter range, 46,597 acres (79.1%) is white-tailed deer winter range, and 50,729 acres (86.1%) is moose winter range. Big game winter ranges within the CEAA are

connected to a much larger winter range area (>100,000 acres) outside of the CEAA. Presently, approximately 20,121 acres (34.2%) within the CEAA are providing usable thermal cover and snow intercept for big game. These forest patches are primarily distributed throughout the western half of the CEAA, as developed areas and agriculture are prevalent throughout the eastern half of the CEAA. In the last 40 years, up to 12,217 acres (20.7% of the CEAA) of harvesting has reduced thermal cover and snow intercept on big game winter range within the CEAA. Some harvested areas older than 20 years interspersed throughout the CEAA contain dense patches of 10 to 20-foot-tall trees that could be providing marginal levels of thermal cover/snow intercept. Recent harvests have reduced the quality and quantity of usable cover on winter range within the area, but they may have increased forage quality and quantity by opening the forest overstory canopy. However, forage occurring in forest openings is often not available to wintering animals during appreciable portions of the winter due to deep, crusted snow conditions. Encroachment of noxious weeds into recently logged areas has also likely offset some of the potential gain in forage production. Open road density within the CEAA is 2.9 miles/sq. mile and total road density is 3.5 miles/sq. mile. The CEAA also likely receives moderate levels of hunter access, especially in areas where roads, both open and restricted, are more numerous. Overall, winter range habitat quality and big game security are moderate within the CEAA.

Environmental Effects

No Action Alternative: Direct and Secondary Effects on Big Game

No changes in big game habitat would be expected as no timber harvesting activities would occur. Existing cover would continue to contribute to winter range quality and visual screening would not be altered in the short term. Continued mortality of mature trees could gradually decrease thermal cover values within the winter range and increase some forage production. No appreciable changes to winter carrying capacity would be anticipated. No direct effects to big game winter ranges would be anticipated. Since subtle changes in thermal cover due to continued tree mortality and successional advances would not change appreciably, and the levels of human disturbance would remain similar, indirect effects to big game winter ranges would be negligible adverse effects that gradually affect the winter ranges and the deer that use this resource during the next few decades. Thus, no immediate direct or indirect effects to big game habitat in the Project Area would be anticipated since: 1) no changes to big game habitat would be anticipated and continued mortality and successional advances would not change appreciably, and 2) the level of human access would remain unchanged.

No Action Alternative: Cumulative Effects on Big Game

No additional changes in big game habitat would be expected as no timber harvesting activities would occur. Stands that are providing thermal cover and snow intercept would be expected to continue providing these attributes. Past and ongoing forest management projects not associated with the proposed Cliff Lake Timber Sale have affected big game habitat in the Project Area, and other proposed projects could disturb big game species and/or alter habitat quality in the future (TABLE WI-2). Activities on other ownerships could continue altering big game winter range habitat and create disturbance within the CEAA. Gradual reductions in canopy cover and mature forest habitat suitability are likely to continue due to tree mortality from insects and disease, primarily Douglas-fir bark beetle. Human disturbance levels across the winter ranges would be anticipated to continue at similar levels, including the elevated levels due to USFS harvesting. No additional cumulative effects to big game habitat quality are expected to result from the No-Action Alternative that could affect big game species in the CEAA since: 1) no big game habitat would be altered and continued maturation of forest cover in harvested areas would improve thermal cover and snow intercept, and 2) the level of human access would remain unchanged.

Action Alternative: Direct and Secondary Effects on Big Game
Under the Action Alternative, approximately 474 acres (27.2% of Project Area) of big game habitat would be harvested within the Project Area. Of these acres, 455 acres (35.3% of thermal cover within Project Area) are currently providing thermal cover. Harvest prescriptions on 419 acres would result in forest canopy too open to effectively function as thermal cover or snow intercept. The remaining 36 acres are included in a 300-foot-wide corridor designed to maintain connectivity of mature forest, snow intercept, and thermal cover post-harvest along a prominent ridge with the highest predicted use by white-tailed deer under typical to severe snow conditions (DFWP 2006). Treatments within this corridor were designed to reduce overstory crown closure to no less than 40% and increase mature tree spacing to 15-30 feet, excluding some areas with active insect and disease issues. Additionally, the corridor will have a southwestern facing aspect, allowing the area to capture more solar radiation and warmth during the winter, helping reduce snow load and retain its value as winter habitat. The retention of small, scattered patches of regenerating conifers could provide marginal levels of thermal cover/snow intercept and hiding cover. Outside of the corridor, forest vegetation capable of providing adequate winter range thermal cover would require 40-60 years before suitable sized trees (>40 ft. tall) would develop in harvested stands, but the increased representation of western larch would generally be a reduction in winter range quality over existing conditions. Post-harvest planting would aid in establishing new seedlings within the harvested areas; however, the survival rate of regenerating trees within this area is known to be low, especially for Douglas Fir and Ponderosa Pine, due to the high browsing pressure from white-tailed deer (DNRC unpublished data). Continued tree mortality due to the current insect and disease levels could gradually decrease thermal cover and snow intercept properties elsewhere in the Project Area; however, the majority of existing insect and disease problems would be addressed with this alternative, which should improve the long-term health for remaining stands. Proposed timber harvesting would not prevent big game movement through the project area in winter and could stimulate browse production within the units.

The proposed Action Alternative would impact approximately 455 acres of hiding cover (31.6% of existing hiding cover within the Project Area). Proposed tree harvest would remove the ability of these stands to hide or screen big game on 419 acres (29.1% of available hiding cover within the Project Area). Rolling or steep topography and the retention of mature trees and scattered patches of regenerating conifers 5-20 feet tall within harvest units would help mitigate some loss of big game security. The remaining 36 acres (2.5% of available hiding cover within the Project Area) within a 300-foot wide corridor would maintain and connect existing hiding cover. The lack of open roads within the Project Area likely plays an even greater role in reducing the risk of big game mortality from hunting. Some short-term (1-4 years) displacement of big game would be expected as a result of the proposed motorized logging disturbance. Approximately 1.0 mile of new restricted road would be constructed and 4.7 miles of existing restricted road within the Project Area would see a temporary increase in use. During all phases of the project, any currently restricted roads would be restricted from motorized-use by the public and remain closed after completion of project activities. Thus, long-term open road density would not change. The level of human access would remain similar or be during active harvesting as a result of the proposed motorized logging equipment.

Thus, moderate adverse direct and indirect effects to big game security habitat and winter range habitat quality would be expected if moderate to severe winters are common during the next 40 to 60 years since: 1) 35.3% of thermal cover in the Project Area would be altered by harvesting; 2) 29.1% of hiding cover within the Project Area would be removed by harvesting; 3) the Project Area functions as important winter range habitat for white-tailed deer; 4) 870 acres (49.9% of

Project Area) of thermal cover/snow intercept would remain; 5) steep variable topography and connectivity of thermal cover through the retained corridor and patches of regenerating conifers would mitigate some of the adverse effects of cover removal; 6) relatively short-term logging activities would create disturbance in this area; 7) insect and disease activity in the stands are currently reducing cover attributes; 8) the high number of deer known to use this important local winter range annually; 9) the behavioral adaptability of white-tailed deer, such as winter feeding on lichens and food sources made more available by timber harvesting; and 10) long-term open road density would remain unchanged, but total road density would increase by 0.6 miles/sq. mile.

Action Alternative: Cumulative Effects on Big Game

The proposed Action Alternative would harvest 474 acres (0.8%) of the CEAA. Forest stands providing valuable thermal cover and snow intercept would be altered by harvesting on 455 acres (2.3%) of the 20,121 acres containing these habitat qualities. Of these acres, 419 acres undergoing treatment would be too open to provide adequate thermal cover/snow intercept after project completion. Additionally, 36 acres would be treated with a lighter harvest prescription designed to maintain connectivity of mature forest, snow intercept, and thermal cover in a 300-foot-wide corridor along the southwestern aspect of a prominent ridge after harvest. This reduction in thermal cover and snow intercept would be additive to past reductions and 5,501 acres of proposed or ongoing projects within the CEAA due to forest management (TABLE WI-2). Some dense patches of regenerating conifers (>6 feet height) and some canopy cover (30-40%) would be retained, providing some residual cover in harvest units. Reductions in cover may cause moderate decreases in winter use by big game in the Project Area; however, appreciative changes in big game distribution or abundance during the winter would not be expected at the scale of the CEAA.

Harvesting and motorized disturbance within the CEAA associated with the proposed project could temporarily displace wintering big game for up to 4 years, with elk most affected. Under the Action Alternative, use of existing roads and construction of new roads for harvesting activities could temporarily increase access and disturbance on 5.7 miles of restricted roads within the CEAA. After harvesting, open road density would be not change, however an extensive network of open and restricted roads would continue to facilitate moderate amounts of hunter and recreational access.

Thus, minor adverse cumulative effects to big game winter range and big game security would be expected since: 1) harvesting would reduce overall levels of thermal cover/snow intercept and hiding cover on 455 acres (2.3% of existing cover) of winter range within the CEAA and would be additive to changes in habitat alteration proposed on non-DNRC lands within the CEAA (TABLE WI-2); 2) the high value of the harvest areas as important winter range habitat for big game within the CEAA, especially during moderate and severe winters; 3) existing thermal cover and snow intercept on winter range in the CEAA would be altered, but approximately 19,299 acres (95.9% of existing thermal cover and snow intercept) of stands with these attributes would remain after harvest; 4) some canopy cover and regenerating conifer patches would remain; 5) overall habitat quality and connectivity within the larger winter range would not be appreciably altered; 6) logging activities would create additional disturbance on a minor portion of the CEAA and be additive to existing forest management activities in the area; and 7) new restricted road would be built but long-term open road densities would not change.

Wildlife Mitigations

- If a threatened or endangered species is encountered, consult a DNRC biologist immediately. Similarly, if undocumented nesting raptors are encountered within ½ mile of the Project Area contact a DNRC biologist.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per *ARM 36.11.432(1)(c)* and *GB-PR2* (*USFWS and DNRC 2010)*.
- Contractors will adhere to food storage and sanitation requirements as described in the timber sale contract. Ensure that all attractants such as food, garbage, and petroleum products are stored in a bear-resistant manner.
- Restrict public access at all times on restricted roads that are opened for harvesting activities. Effectively close all restricted roads following harvest completion.
- Close roads and trails to the maximum extent possible following the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags to firewood gathering.
- Retain patches of advanced regeneration of shade-tolerant trees within harvest units as per *LY-HB4* (*USFWS and DNRC 2010*).
- Provide visual screening along open roads to the extent practicable by retaining available submerchantable trees and brush.
- Retain at least 2 snags and 2 snag recruits per acre (>21" dbh or largest available size class), particularly favoring western larch, ponderosa pine and Douglas-fir for retention. If snags are cut for safety concerns, leave them in the harvest unit. Retain coarse-woody debris as described in the Forest Management ARMs and *SOILS ANALYSIS* in this document.
- Retain 12 to 24 tons/acre coarse-woody debris according to *ARM 36.11.414* and emphasize retention of 15-inch diameter downed logs aiming for at least one 20-foot-long section per acre (*USFWS and DNRC 2010*).
- Maintain a 300-foot-wide corridor with a minimum of 40% canopy cover, where possible, on south and west facing aspects to provide connective thermal cover between untreated stands of mature forest after harvest.

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Figure WI-1 – Wildlife analysis areas for the proposed Cliff Lake Timber