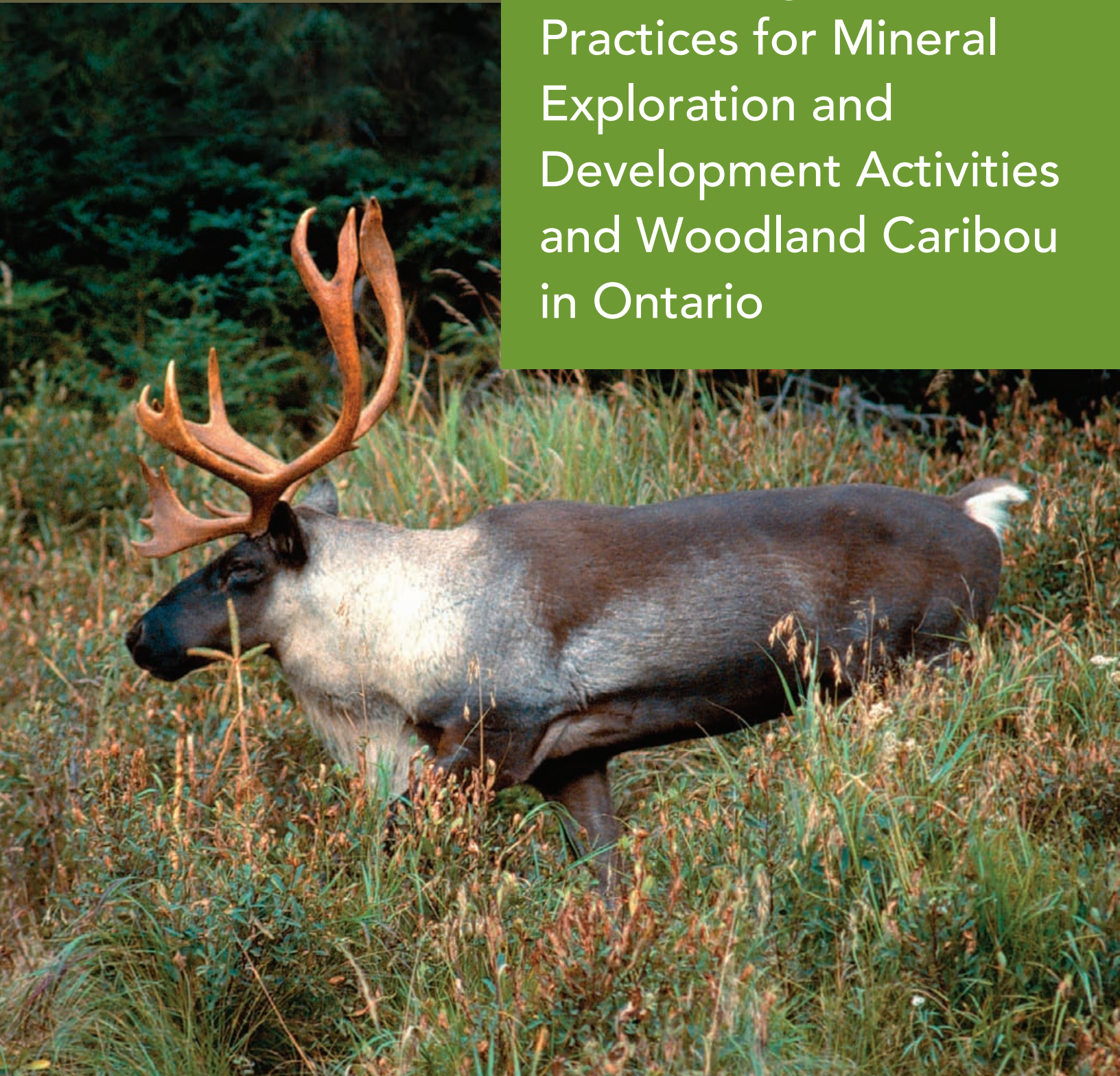


Best Management Practices for Mineral Exploration and Development Activities and Woodland Caribou in Ontario



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Preamble

These Best Management Practices (BMPs) are meant to be used by mineral exploration and development proponents who are planning or conducting early exploration, advanced exploration, mine production and related closure activities. BMPs should be used during all phases of an activity and/or development, while working in the area of continuous and discontinuous distribution of woodland caribou (forest-dwelling boreal population), to reduce and/or mitigate direct and indirect impacts to caribou and caribou habitat. Woodland caribou (forest-dwelling boreal population) are a threatened species in Ontario and receive protection under the *Endangered Species Act, 2007*.

Introduction

Woodland Caribou (forest-dwelling boreal population) (*Rangifer tarandus caribou*), henceforth referred to as caribou in this document are considered threatened in Ontario. Ontario's *Endangered Species Act, 2007* (ESA) provides species protection, under section 9, and habitat protection, under section 10, to species listed as threatened or endangered in Ontario. The Recovery Strategy for Woodland Caribou (*Rangifer tarandus caribou*, forest-dwelling, boreal population) in Ontario identifies threats to caribou and provides science-based advice for protecting and recovering caribou.

Habitat loss, degradation, and fragmentation from anthropogenic and natural sources, and increased predation as a result of habitat alterations, have led to local population declines throughout the distribution of caribou in Canada (Environment Canada 2012). Habitat alterations are due in part to resource development activities and linear features such as roads and corridors. The additive effect of these individual threats (i.e. cumulative effects), cause significant change to landscape-scale ecological functions, which affect the ability of caribou to live or persist in particular geographic area.

Ontario's Woodland Caribou Conservation Plan (CCP) is the government response statement to the recovery strategy as required by the ESA. The CCP outlines broad policy direction regarding caribou conservation and recovery, and prioritizes the actions the Ontario government intends to take to conserve and recover caribou in Ontario. The goal of the CCP is to maintain self-sustaining, genetically-connected local populations of caribou where they currently exist; improve security and connections among isolated mainland local populations; and, facilitate the return of caribou to strategic areas near their current extent of occurrence. Ontario has developed a number of policy documents to support the CCP and the conservation and recovery of caribou, which includes BMPs to increase awareness of caribou ecology and conservation practices (CCP Section 7.2).

BMPs describe techniques, methods, or processes that help reduce and/or mitigate direct and indirect threats that can negatively impact caribou and caribou habitat. BMPs may also enable

collaboration among and between sectors in managing cumulative disturbance and associated effects within caribou ranges. BMPs are to be used in all phases of a resource development activity – *planning, development, operations and rehabilitation*.

Mineral Exploration and Development and Caribou

Mineral exploration and development is a multi-phase sequence that may or may not lead to the development of a mine. Mineral exploration is the first phase of the mining sequence and is further sub-divided into three stages: prospecting and claim staking, early exploration, and advanced exploration¹. Development, or Mine Production, is the second phase of the mining sequence is the excavation of a mine (underground or open pit) along with accompanying infrastructure required to operate the mine. The production phase involves active extraction of materials, environmental monitoring and reporting. The last phase of the mining sequence is closure and rehabilitation, and includes implementation of the mine closure plan and returning the land to near natural state.

Mineral exploration and development activities can negatively impact caribou and caribou habitat. Impacts may include increased cumulative disturbance and loss of habitat within caribou range(s), habitat changes and fragmentation, increased sensory disturbance and direct or indirect mortality. These impacts can result in increased predators and loss of connectivity between sub-range habitat features and caribou avoidance of high use areas (e.g. nursery areas) during sensitive periods (Refer to the general habitat description for caribou for description of sub-range habitat features and information on sensory disturbance). If proponents are only able to minimize or mitigate impacts through BMPs, additional authorizations (e.g. an overall benefit permit) under the ESA may be required if the species, or protected habitat, are impacted by the activity. Additional authorizations may include applying for an overall benefit permit under the ESA.

Proponents should be familiar with all statues, regulations, amendments and guidelines governing all aspects of mineral exploration and development projects in the area where the activities are being conducted. Prior to commencing activities, these should be reviewed and the local MNR office should be contacted to obtain the most up-to-date information and the proper planning, minimization and rehabilitation techniques can be considered and employed.

¹ Refer to Mineral Exploration and Development Sequence figure

Mineral Exploration and Development Sequence

MINERAL EXPLORATION			DEVELOPMENT	PRODUCTION	CLOSURE/ REHABILITATION
Prospecting and Claim Staking	Early Exploration				
	Plan	Permit			
Mining Act applies	Mining Act and other acts apply		Part VII of the Mining Act and other acts apply		
			Closure plans and other permits are required for Advanced Exploration and Mine Development with full Financial Assurance		Site is rehabilitated in accordance with the Closure Plan Requirements
<p>Prospector's license required to prospect on crown land</p> <p>Work includes:</p> <ul style="list-style-type: none"> - Airborne geophysical surveys - Geological mapping (reconnaissance) - Rock sampling - Claim staking (ground staking) – land must be open for staking - Blazing claim lines 	<p>Work includes</p> <ul style="list-style-type: none"> - Line cutting (< 1.5 m) - Drilling (< 150 kg) - Mechanical stripping (< 100 m² in 200 m radius) - Test pitting and trenching (1-3 m³ in 200 m radius) -- Ground geophysical surveys requiring generator 	<p>Work includes:</p> <ul style="list-style-type: none"> - Line cutting (> 1.5 m) - Drilling (> 150 kg) - Mechanized stripping (> 100 m² in a 200 m radius) - Test pitting and trenching (> 3 m³ in 200 m radius) <p><i>Additional activities may include:</i></p> <ul style="list-style-type: none"> - Trail planning and rehabilitation - Burning of vegetation 	<p>Work includes:</p> <ul style="list-style-type: none"> - Large bulk samples or Extraction (> 1000 tonnes) - Surface stripping or clearing > 1 ha 	<p>Work includes:</p> <ul style="list-style-type: none"> - Infrastructure of roads, camps, mills, surface buildings, power lines and mine development (underground or open pit) including road upgrades and water crossings and airstrips - Construction and operation of dams and tailings impoundments 	<p>Work includes:</p> <ul style="list-style-type: none"> - Active mining operations such as hauling, drilling, extraction <p>Work includes:</p> <ul style="list-style-type: none"> - Implement closure plan - Remove infrastructure (buildings, roads, power lines, etc.) - Return land to near natural state - Physical safety - Monitor environment - Returning lands to the Crown <p>Abandoned sites with no closure plan are closed by Crown or landowner</p>
Aboriginal communities and proponents notified. Further engagement is encouraged.	Public and Aboriginal consultations			Consultation required on Crown held sites and in event of amendments to Closure Plan	

Additional Policy Considerations related to Caribou and the ESA

This document is one of a series of guidance documents developed to support the implementation of the ESA and caribou conservation and recovery. The MNR species at risk website will continue to be updated as new information and guidance is developed. Regular visits to this website are encouraged to find the most recent species at risk information and direction.

Endangered Species Act Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits

The *ESA Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits* assists proponents in understanding the processes involved in assessing activities for potential impacts to species at risk (SAR), assessing the need for overall benefit permits and developing overall benefit permits under clause 17(2)(c) of the ESA. The concept, guiding principles and legal requirements and a detailed description of the general process for applying for an overall benefit permit are described. The package includes; Information Gathering Form and guide, Avoidance Alternatives Form and guide, and the C-Permit Application Form and guide.

<http://www.mnr.gov.on.ca/en/Business/Species/index.html>

Categorizing and Protecting Habitat under the Endangered Species Act

The *Categorizing and Protecting Habitat under the Endangered Species Act* provides guidance on the terms “damage” and “destroy” within the context of subsection 10(1) of the Act. The Policy identifies a set of principles and considerations that MNR will use when determining whether a proposed activity will damage or destroy habitat. The Policy also explains how habitat protected under the ESA will be categorized based on the species anticipated tolerance to alteration.

http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/stdprod_085648.pdf

Range Management Policy in support of Woodland Caribou Conservation and Recovery

The *Range Management Policy in support of Woodland Caribou Conservation and Recovery* provides direction to conserve and recover caribou in Ontario through the development and implementation of a Range Management Approach. This Policy works in conjunction with MNR’s existing legislative framework and provide further direction when authorizing activities proposed to occur within caribou ranges. The direction in this policy works to be consistent with the protection provisions afforded to caribou under the ESA. Implementation of the Range Management Approach requires application of this policy across all sectors and activities.

http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/mnr_sar_car_rmgmt_ply_en.pdf

Integrated Assessment Protocol for Woodland Caribou Ranges in Ontario

The *Integrated Assessment Protocol for Woodland Caribou Ranges in Ontario* describes the process followed to conduct an Integrated Range Assessment and to prepare an Integrated Range Assessment Report. Integrated Range Assessments provide rationale for range

delineation, historical and contextual background information to quantitatively assess range condition and are a requirement of the Range Management Policy in support of Woodland Caribou Conservation and Recovery.

http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/mnr_sar_car_assmnt_ptl_en.pdf

General Habitat Description for the Woodland Caribou (Forest-dwelling boreal population) (Rangifer tarandus caribou)

The *General Habitat Description for the Woodland Caribou (Forest-dwelling boreal population) (Rangifer tarandus caribou)* is a technical document that provides greater clarity on protected habitat of caribou based on the general habitat definition found in the ESA. A general habitat description also indicates how caribou habitat has been categorized, as per the policy *Categorizing and Protecting Habitat under the Endangered Species Act*, and is based on the best scientific information available.

http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/mnr_sar_ghd_car_en.pdf

Guidance for Assessing Impacts of Activities on Woodland Caribou and their Habitat

The *Guidance for Assessing Impacts of Activities on Caribou and their Habitat* provides specific guidance pertaining to how to complete the *ESA Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits* process for caribou and caribou habitat. It can be used by proponents planning and conducting any type of activity within the continuous and discontinuous distribution of caribou. The guide explains how proponents can consider range level impacts and impacts to sub-range features when planning activities and when considering activity alternatives and how proponents can gather detailed information to support MNR in assessing if an activity is likely to contravene the ESA.

http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@species/documents/document/mnr_sar_car_assmnt_gd_fr.pdf

Using the BMPs

The Best Management Practices are organized in a hierarchical approach. The BMP Principles are the overarching purpose for applying General and Activity Specific BMPs where activities are being conducted in the continuous and discontinuous distribution of caribou. The General BMPs and Activity Specific BMPs, where appropriate, should be applied to all activities during the planning, development, operational and rehabilitation stages of a project. The General and Activity Specific BMPs are further organized into avoidance, minimization, and rehabilitation practices. Avoidance practices provide guidance to properly plan activities to limit the impact to caribou before commencing operations. Minimization practices provide guidance to minimize impacts while conducting activities in situations when avoidance practices cannot be employed. Rehabilitation practices should be used during all stages of resource development to ensure the long-term habitat disturbance from conducting the activity is remediated.

Activities and Best Management Practices can change from time to time based on new information. Not all activities related to the sector may be listed in the Activity Specific BMPs. In these cases, proponents should aim to meet the principles of these BMPs by applying the General BMPs, and other relevant specific activity guidance where necessary.

Best Management Practice Principles

During **planning, developing, operations and rehabilitation** of any mineral exploration and development activity, proponents should:

- **Minimize the disturbance footprint of the activity, and its overall contribution to cumulative disturbance and loss of habitat within the range**
- **Minimize habitat changes and fragmentation to maintain the function and connectivity of sub-range habitat features²**
- **Minimize the density of linear features to avoid increases in predator efficiency (i.e. distribution, ease of travel)**
- **Minimize habitat disturbance and sensory disturbance near High Use Areas²**
- **Minimize activities that increase the risk of caribou mortality (i.e. vehicle collisions, hunting)**

General Best Management Practices

Sub-range habitat features, such as seasonal ranges, high use areas (nursery areas, winter use areas, travel corridors) and other areas within a caribou range may be particularly sensitive to development². Proper planning such as employing BMPs for activities and rehabilitation will help to avoid or minimize habitat and sensory disturbance. When employing the BMP Principles, proponents should consider the use of the following General BMP for avoidance, minimization, and rehabilitation of any mineral exploration and development activity:

Avoidance

- Ensure the most current information on caribou distribution and habitat use is used during planning.
- Plan to avoid known or potential High Use Areas (Nursery Areas, Winter Use Areas, Travel Corridors).
- Plan to avoid activities within Seasonal Ranges, where possible.
- Plan to restrict field practices to only what is necessary (e.g. conduct desktop exercises when possible).
- Use existing infrastructure (e.g. trails, roads, etc.) for person and equipment travel as well as set-ups (e.g. drill and pump set-ups) rather than creating new infrastructure.
- Plan to provide caribou awareness and education to field staff when working in sensitive areas.

² Refer to General Habitat Description for the Woodland Caribou (forest-dwelling boreal population) (*Rangifer tarandus caribou*) for additional detail

Minimization

- Minimize the cumulative disturbance of the activities by maximizing the use of existing infrastructure (e.g. trails, roads, etc.) for person and equipment travel when conducting operations.
- Minimize sensory disturbance (e.g. noise, dust, light, etc.) within 10km of known or potential High Use Areas during sensitive periods when reproduction and rearing, winter aggregation and foraging, and seasonal dispersal is occurring:
 - Nursery Areas (May 1 to July 14 very low tolerance, July 15 to September 15 low tolerance)
 - Winter Use Areas (December 1 to March 31)
 - Travel Corridors (April and/or November)
- Minimize noise by ensuring that all exhaust systems have mufflers installed properly and that all machinery is operating as per specifications, and avoid idling.
- Minimize the footprint; only make it as large as necessary to conduct the activity safely.
- Minimize the amount of time the activities take, plan to carry out scheduled activities in the shortest time frame possible.
- Minimize all activities that disturb the ground surface in such a way that the amount of topsoil that is moved is minimal.
- Minimize the amount of disturbance by restricting the size of area cleared with heavy machinery.
- Do not feed, follow or disturb animals.

Rehabilitation

- Ensure funding is in place before for rehabilitation before operations begin.
- Preserve organic material where possible or stockpile material on site when not possible.
- Store removed vegetation so that it can be later used as a seed source, moisture retention aid and shade for new growth during reclamation.
- Avoid seeding of non-native or invasive grass and legume based mixes which will create competition for native target species and alternate food sources for predators and alternate prey.
- Rehabilitate and restore habitat that was disturbed at the activity site:
 - a) site preparation and planting of jack pine or spruce at a minimum density of 1000 stems per hectare; or,
 - b) site preparation and aerial seeding of jack pine at 20,000 viable seeds per hectare; or
 - c) implement alternate site renewal treatments to return it to a forested condition that reflects the original stand.
- Rehabilitate progressively, rather than waiting until project is complete.

- Remove all extraneous materials – bring out what you bring in.

Activity Specific Best Management Practices

The following outlines activities and potential impacts associated with mineral exploration and development activities during planning, development, operations and closure; and identifies the potential effects those activities can have on caribou and/or caribou habitat. The BMPs provided below should be used with the General BMPs to avoid, minimize or mitigate. Moreover, they can be applied to other activities, where applicable. Other BMPs not listed here may be developed and applied to your activity.

Mineral Exploration

Mineral exploration is the first phase of the mining sequence; it includes prospecting and claim staking, early and advanced exploration. Staking involves the marking of land on the ground and on formal mining claim maps as an indication of ownership of mineral rights for potential future exploration and mine development. Once lands have been staked, preliminary exploration of the lands may be undertaken to assess the potential or extent of mineral deposits. Activities associated with prospecting and early exploration may include: various ground and air surveys; limited stripping and trenching of soil at the ground surface; limited sampling of ground materials; various forms of drilling; and limited bulk sampling (MDNM 2008).

Infrastructure associated with Mineral Exploration and Development

To be employed in addition with General Best Management Practices:

Trails

Typically, trail construction involves the removal of only enough trees and vegetation for off-road vehicles (e.g. all-terrain vehicles, snowmobiles, skidders)

Trails near known or potential high use may deter caribou from using those areas due to habitat loss and fragmentation leading to increased predator efficiency in the area, or increases in sensory disturbance (i.e. noise).

- Minimize traffic volume between May 1 to Sept 15 near nursery areas; during April and November near travel corridors; and between December 1 to March 31 near winter use areas.

Roads & Linear Corridors

Caribou may exhibit avoidance of high use areas due to sensory disturbance from construction and traffic during spring/summer reproductive, spring/ fall travel, and winter foraging periods.

- Minimize traffic volume between May 1 to Sept 15 near nursery areas; during April and November near travel corridors; and between December 1 to March 31 near winter use areas.

Traffic from large vehicles may lead to an increase risk of road mortality and may deter caribou from using high use due increases in sensory disturbance (i.e. noise).

- Place signs along roads and corridors (e.g. to increase awareness of caribou, to post speed limits, to prevent public use, and to discourage recreational use, etc.).
- Identify reduced speed limits and/or seasonal travel restrictions (between May 1 to Sept 15 near nursery areas; during April and November near travel corridors; and between December 1 to March 31 near winter use areas).
- Use gates or other physical barriers to reduce additional traffic on roads.
- Allow for breaks along roads in long windrows (e.g., slash or rock, snow berms), unobstructed access routes across the right-of-way.

Roads can provide favourable areas for the growth of deciduous shrubs and trees, resulting in increased availability of browse for moose and deer, and potential wolf and bear predation.

- Use appropriate vegetation control measures to prevent growth of deciduous shrubs and trees within the right of way.

Plowing of roads not required for operations or maintenance during winter adds to the density of linear features and may leave additional travel corridors for predators and increased vehicular traffic.

- Limit snow plowing of access and maintenance roads to only those required for current operations, maintenance and/or emergency access. Wing snow banks to reduce height.

Roads may negatively impact caribou and their habitat by increasing the amount of habitat loss and fragmentation within the range.

- Ensure adequate water movement where an all-weather road crosses wetland complexes by using appropriate bridges, half culverts on pilings or other drainage techniques. Use techniques that will reduce soil/peat compaction.

Field Camps

Permanent land clearing for development including infrastructure such as field camps and buildings etc. may negatively impact caribou and their habitat by increasing disturbance, amount of habitat loss and fragmentation.

- Use existing clearings instead of creating new ones.

Camps and operational facilities may have predator attractants or alternate food sources such as food, garbage, and grey water. Predator-proofing areas with the use of fences and bear-resistant containers will reduce the potential attractants and access by predators.

- Install suitable and efficient fencing around potential predator attractants (e.g. food, garbage, etc.).
- Use bear-resistant garbage containers and receptacles.

Prospecting and Claim Staking

To be employed in addition with General Best Management Practices:

Airborne Geophysical Surveys

Geophysics is used to help “see” rocks and minerals that are hidden below the surface. In many areas, because there is little rock exposed at surface, geologists and mineral prospectors must use geophysics to help them with their work. When performed from the air, using specially modified aircraft, geophysical surveys can quickly cover very large and remote areas (MNDM 2013a).

Caribou may exhibit avoidance of high use areas due to sensory disturbance from aerial surveys during spring/summer reproductive and winter foraging periods. Where avoidance is not possible, reduce noise from airplanes by increasing flight altitudes to minimize caribou avoidance of sub-range habitat components³.

- If not possible to avoid high use area, maintain higher flight altitudes during sensitive periods; and if caribou are startled ascend to a higher flight path or veer away from the animals.

Claim Staking, Line Blazing, Rock Sampling and Geological Mapping

A mining claim is a square or rectangular area of open Crown land or Crown mineral rights that a licensed prospector marks out with a series of claim posts and blazed lines or by geological mapping (MNDM 1999). Rock sampling is conducted to gather information about the potential for ore and minerals to be found at the site.

Caribou may exhibit avoidance of high use areas due to sensory disturbance from carrying out prospecting activities (e.g. ATV, chain saw, other equipment).

- If possible, minimize cutting, or pruning standing trees of any type for the purpose of claim staking. Clearly mark the perimeter by securely affixing durable flagging tape to the trees, pegging, or by painting them on two sides in the direction of travel.

Early Exploration

To be employed in addition with General Best Management Practices:

Line Cutting

Line cutting involves cutting a main base line through the middle of the mining claim with a series of grid or wing lines running off of the base line at 90-degree angles. When there is ground cover present, an individual walks through the bush in a straight line cutting trees and vegetation with an axe, machete or a chainsaw. People and equipment are able to move more easily around an area and can use the grid for conducting work such as geophysical surveys (MNDM 2013b).

- Line cutting with a width of 1.5 metres or less requires an exploration plan.

³ Refer to General Habitat Description for the Woodland Caribou (forest-dwelling boreal population) (*Rangifer tarandus caribou*) for additional detail

- Line cutting done with a width greater than 1.5 metres requires an exploration permit.

Survey lines create potential travel corridors that can facilitate movement and search efficiency of predators within the forest. Line cutting can also lead to growth of early successional species such as deciduous trees and shrubs, which can convert the forest composition to conditions less suitable for caribou.

- In seasonal ranges, minimize the amount of line cutting when avoidance is not possible and avoid cutting lines greater than 1.5 m.
- If in the remaining area of range, minimize the amount of lines greater than 1.5 m.
- Establish cut lines using hand tools only (e.g. machete, fern hook, axe, chainsaw).
- Flag and peg lines less than 1.5 m when possible.
- Stagger base lines and leave vegetation breaks to limit predator travel and search efficiency.

Ground Geophysical Surveys Requiring Generator

Geophysical surveys use power generators to measure differences in electromagnetic properties in bedrock to find areas that likely contain minerals or ores. Ground surveys can involve laying out kilometres of wire and driving metal rods into the ground. At the end of the survey companies will recover all of the wire, rods, and materials used and remove them from the site (MNDM 2013c).

Wires can be difficult to see and may harm caribou.

- Ensure survey wires are kept close to the ground to avoid caribou from becoming entangled; remove wires as soon as possible after the survey is completed.

Drilling

There are several types of drilling; Diamond produces cylindrical pieces of rock called core, reverse circulation or rotary drilling produces chips of rock, overburden drilling is conducted to sample glacial deposits, auger drilling is used to sample soils for geotechnical purposes. Drilling can be conducted with small units to drill rigs the size of a small house, which are typically mounted on skids or runners and are dragged through the bush behind bulldozers or timber skidders.

For larger scale drilling, small areas of land must be cleared to make a drill pad. It must be large enough for safe operation of the drill and bulldozer or skidder. A typical drill pad is 20 to 40 meters in diameter. Helicopters are sometimes used, especially in remote areas. The drill pad for helicopter supported drilling is typically 40 to 50 meters in diameter.

Some types of drilling, including diamond drilling, pump water to the drill and down the hole. The water pumps may be placed on the shores of lakes, rivers and streams. The water is pumped through heavy hoses to the drill rig (MNDM 2013d).

- An exploration plan is required for drilling that uses a drill that weighs less than 150 kilograms.
- An exploration permit is required for drilling that uses a drill that weighs more than 150

kilograms.

Drilling activities near known or potential high use areas may deter caribou from using those areas due to habitat loss and fragmentation, and increases in sensory disturbance (i.e. noise).

- Minimize noise and frequency of activities from drill rigs and drilling equipment.
- At pump set-up sites, minimize the number of trails to the shoreline and set-up areas (i.e. use the same pump set-up as much as possible).

Manual and Mechanical Stripping

Manual Stripping is washing the overburden off of rocks with pressurized water pumps and hand drilling for samples. Mechanized surface stripping uses heavy equipment to remove vegetation and soil from areas of rock. Next, pressurized water pumps with water hoses, similar to those used to fight forest fires, may be used to wash soil and debris off of the rock. The exposed rock can give information about the type of rock and the minerals present. Equipment such as bulldozers, backhoes or excavators may be used. Washing the outcrops requires water to be pumped to the location (MNDM 2013e).

- Mechanized stripping with a total surface area of less than 100 square metres within a 200-metre radius needs an exploration plan.
- Mechanized stripping with a total surface area of more than 100 square metres within a 200-metre radius needs an exploration permit.

Surface soil horizons removed during mechanical stripping contributes to the disturbance footprint and amount of habitat loss. It can also provide favourable areas for the growth of deciduous shrubs and trees, resulting in increased availability of browse for moose and deer and potential wolf and bear predation.

- Leave large trees standing, if possible.
- All stripped overburden stockpiled on site should be backfilled and contoured to a stable angle of repose.

Test Pitting and Trenching < 1.0 hectares

Pitting and Trenching are used to see a more complete picture of the rock. Heavy equipment is used to remove the surface soil and expose the bedrock. Trenches or pits are then excavated or blasted into the rock to expose mineralized zones for sampling and testing. Pits are shallow, square shaped holes while trenches are longer, linear and variable in depth (MDMD 2013f).

- An activity that removes less than one cubic metre of material within a 200-metre radius does not need an exploration plan or permit.
- An activity that removes one cubic metre of material and up to three cubic metres within a 200-metre radius needs an exploration plan.
- An activity that removes more than three cubic metres of material within a 200-metre radius needs an exploration permit.

Activities near known or potential high use may deter caribou from using those areas due to habitat loss and fragmentation leading to increased predator efficiency in the area or increases

in sensory disturbance (i.e. noise).

- Construct trenches to allow for easy escape of wildlife.
- Fence excavations until they are backfilled.
- Backfill and/or contour pits and trenches to a stable angle of repose.

Blasting activities near known or potential high use areas may deter caribou from using those areas due to habitat loss and fragmentation, and increases in sensory disturbance (i.e. noise).

- Minimize noise from drill rigs and drilling equipment.

Advanced Exploration

To be employed in addition with General Best Management Practices:

Advanced exploration refers to the excavation of an exploratory shaft, adit or decline; the extraction of material in excess of 1000 tonnes; the installation of a mill for test purposes; or any other prescribed work. The purpose of this stage is to establish the feasibility of developing a full-scale mine for material extraction and processing. This phase may involve removal of significant amounts of rock for testing (bulk sample), underground exploration, and stripping or trenching of large areas (MNDM 2008).

Trenching > 1.0 hectare

Trenching is conducted to see a more complete picture of the rock. Heavy equipment is used to remove the surface soil and expose the bedrock. Trenches or pits are then excavated or blasted into the rock to expose mineralized zones for sampling and testing. Trenches are longer, linear and variable in depth (MNDM 2013f).

Activities near known or potential high use may deter caribou from using those areas due to habitat loss and fragmentation leading to increased predator efficiency in the area or increases in sensory disturbance (i.e. noise).

- Construct trenches to allow for easy escape of wildlife.
- Fence excavations until they are backfilled.
- Backfill and/or contour pits and trenches to a stable angle of repose.

Development and Production

To be employed in addition with General Best Management Practices:

The development stage of a mining facility that produces any mineral or mineral-bearing substance for immediate sale or stockpiling for future sale entails development of the infrastructure required to support an operating mine. Potential activities include: infrastructure of roads, mill, surface buildings, power lines, mine development (underground or open pit), construction and operation of tailings impoundments (MNDM 2008).

The production phase in the mining process is the implementation of the project operating plan. Potential activities for mine operation include: soil and overburden removal; blasting; mineral

extraction (processing); tailings disposal and management; monitoring of air, wastewater and solid waste materials; construction of or modifications to existing infrastructure (MNMD 2008).

Infrastructure

Permanent land clearing for development including infrastructure such as mine shafts, tailings ponds, open pits, buildings, etc. may negatively impact caribou and their habitat by increasing disturbance, amount of habitat loss and fragmentation.

Construction sites, infrastructure, mine shafts, etc. may be hazardous and lead to an increase in risk of mortality to caribou.

- Install fencing of an appropriate height around potential hazards (e.g. infrastructure, footprint, settling ponds, tailings ponds, open pits, mine shafts, etc.) during and after construction.

Closure and Rehabilitation

To be employed in addition with General Best Management Practices:

The closure plan for a mine development site will see site rehabilitation to approximate pre-development conditions. This means removal of site facilities, restoration of soil cover materials, vegetation and surface water features to a quality, quantity and appearance that is as close as feasible to pre-development conditions or the baseline environmental conditions measured and described at the advanced exploration stage. It also includes monitoring for physical safety and environmental risks, and returning lands to the Crown. This stage involves the cessation of mineral materials extraction, processing and transportation activities and a closure of the project site which supported these activities (MNMD 2008).

Road/Trails Rehabilitation

Roads and/or trails no longer required for development, operations or maintenance add to disturbance, amount of habitat loss and fragmentation within the range; can provide favourable areas for the growth of deciduous shrubs and trees, resulting in increased availability of browse for moose and deer, and potential wolf and bear predation; and may leave additional travel corridors for predators.

- Restrict vehicular access (e.g. berm, water crossing removal, etc.).
- Scarify road or trail to alleviate gravel or soil compaction that has occurred as a result of use to aid in proper vegetative regeneration.

Infrastructure and Site Reclamation

Infrastructure that no longer required for development, operations or maintenance adds to disturbance, amount of habitat loss within the range. It can also provide favourable areas for the growth of deciduous shrubs and trees, resulting in increased availability of browse for moose and deer, and potential wolf and bear predation; and may leave additional travel corridors for predators.

- Remove any infrastructure (e.g. buildings).

References and Other Information Sources

Legislation and Policy

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