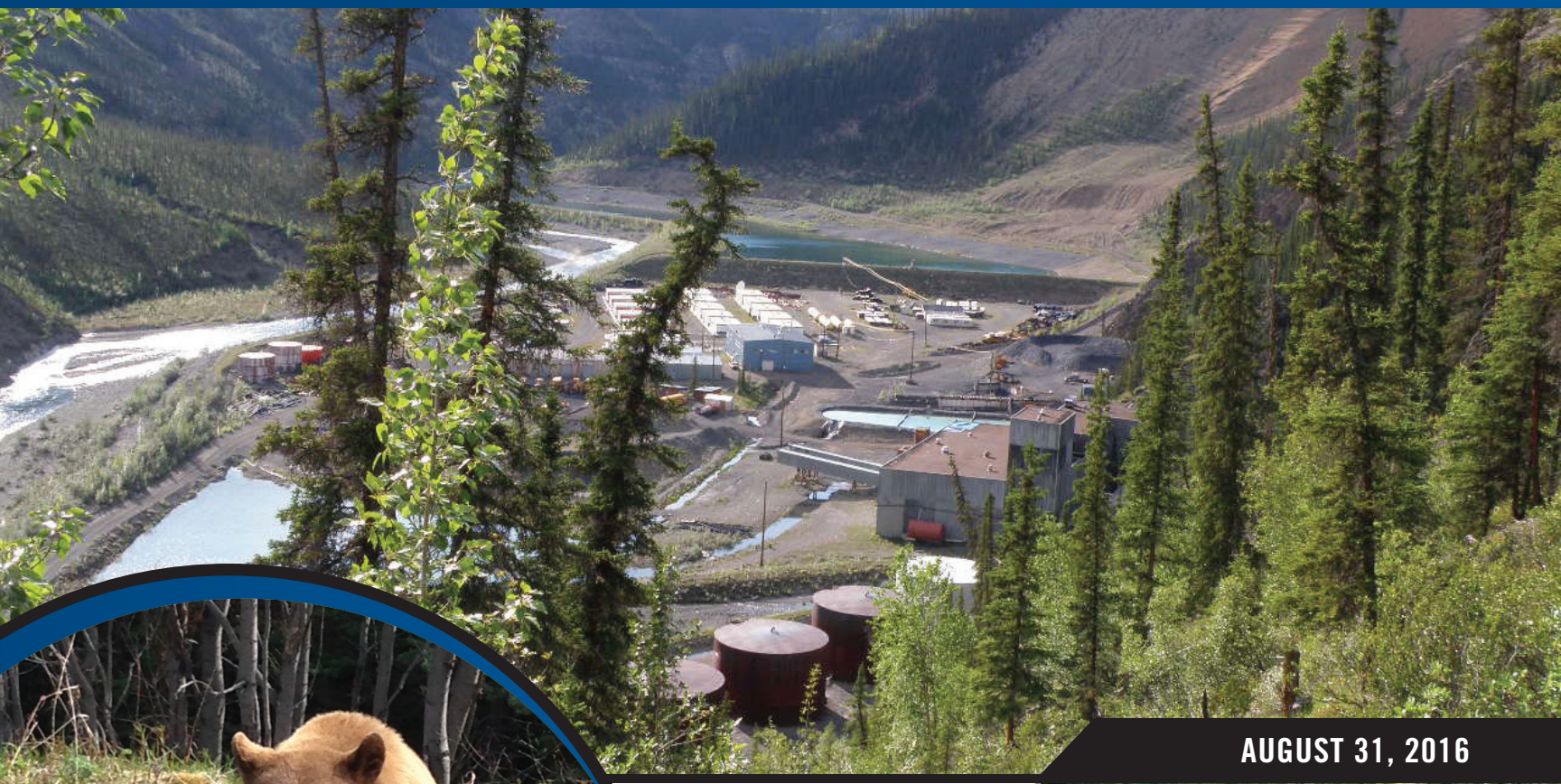
CANADIAN ZINC CORPORATION

UPDATED DRAFT
WILDLIFE MITIGATION AND MONITORING PLAN
Prairie Creek Mine and All-Season Road, Northwest Territories



AUGUST 31, 2016

TETRA TECH EBA

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EXECUTIVE SUMMARY

This updated Draft Wildlife Mitigation and Monitoring Plan (WMMP) retains the content of the earlier Draft prepared by Golder Associates (Golder) for wildlife mitigation and monitoring for the Prairie Creek Mine and winter access road, Northwest Territories on behalf of Canadian Zinc Corporation (CZN). Where necessary, and based on new information gained from the proposed all-season access road environmental assessment (EA) process, additional information is provided by Tetra Tech EBA Inc. (Tetra Tech EBA) as an update.

The WMMP consolidates the commitments to mitigate wildlife and wildlife habitat effects from the Prairie Creek Mine and all-season access road, and outlines strategies and monitoring plans to prevent and minimize potential effects to wildlife, and evaluate the effectiveness of mitigation measures. This updated Draft WMMP is intended for use as a practical tool for CZN employees, contractors, and site visitors in day-to-day use. CZN will use information gained through the implementation of the WMMP to track Project-related wildlife effects, and ultimately to continuously work to improve its wildlife mitigation and monitoring practices.

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This updated version of the Draft Mitigation and Monitoring Plan and its contents are intended for the sole use of Canadian Zinc Corporation and their agents. Tetra Tech EBA Inc. (Tetra Tech EBA) does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Canadian Zinc Corporation, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech EBA's Services Agreement. Tetra Tech EBA's General Conditions are provided in Appendix A of this report.

1.0 INTRODUCTION

This updated Draft Wildlife Mitigation and Monitoring Plan (updated Draft WMMP) is an amalgamation of:

- The earlier Draft Wildlife Mitigation and Monitoring Plan for the Prairie Creek Mine and winter road prepared by Golder Associates Ltd. (Golder 2012) for Canadian Zinc Corporation (CZN), presented in Appendix B; and
- Additions that complement and build on the Golder (2012) report that incorporate mitigation measures and monitoring for the proposed all-season access road prepared by Tetra Tech EBA Inc. (Tetra Tech EBA).

This updated Draft WMMP references the earlier Draft prepared by Golder for wildlife mitigation and monitoring, where applicable, and incorporates new information from the proposed all-season access road environmental assessment (EA) process, where necessary.

1.1 Purpose and Objectives

The earlier Draft WMMP (Golder 2012) was prepared for the permitting of the Prairie Creek Mine (the Mine) and winter access road. With the proposed upgrade of the road to all-season access, this updated Draft WMMP includes mitigation measures and monitoring of potential wildlife and wildlife habitat effects associated with the future operation of the all-season road, as presented in the Developer's Assessment Report (DAR; CZN 2015) and subsequent documents related to the EA process.

The updated Draft WMMP describes and consolidates mitigation measures and CZN's commitments made during the EA processes for the Mine and winter road as well as the proposed all-season road, as described in the following DAR reports, but also in other reports:

- Canadian Zinc Corporation. March 2010. Prairie Creek Mine Developer's Assessment Report. Submitted to the Mackenzie Valley Review Board in support of Environmental Assessment of Prairie Creek Mine EA 0809-002.
- Canadian Zinc Corporation. April 2015. Developer's Assessment Report All Season Road Project, Prairie Creek Mine. Submitted to the Mackenzie Valley Review Board in support of Environmental Assessment of Prairie Creek Mine EA 1415-01.

The updated Draft WMMP is to be used by CZN as a guidance document for on-site personnel (including contractors and visitors to site) regarding the appropriate conduct and management of wildlife and wildlife habitat that may be influenced by the Mine, associated facilities (e.g., airstrip, all-season access road, transfer facilities, temporary construction camps), and activities (e.g., day to day operations, vehicle traffic, air traffic). Mitigation measures and monitoring protocols are described to prevent, minimize, and evaluate predicted effects from Mine operations and associated activities.

The key objectives of the updated Draft WMMP are to:

- Consolidate CZN's commitments and strategies to mitigate potential wildlife and wildlife habitat effects;
- Describe pre-construction inspections to be conducted;
- Identify Standard Operating Procedures (SOPs) and Best Management Practices (BMPs) to be applied by Project personnel to protect people and wildlife, and to guide appropriate responses and actions to given human-wildlife situations by way of steps and/or decision-making trees;
- Outline CZN's approach to monitor mitigation effectiveness and contribute to broader wildlife monitoring programs; and

- Summarize CZN's reporting and community engagement approaches to transmit results to Aboriginal groups and stakeholders.

This plan is designed to be dynamic to allow further evaluation through engagement with appropriate stakeholders and adjustments based on the principles of adaptive management.

2.0 PROJECT DESCRIPTION

CZN intends to produce zinc and lead concentrates from the Prairie Creek underground mine (the Mine) located along Prairie Creek, 95 kilometres (km) northwest of Nahanni Butte, Northwest Territories and transport the concentrates along a proposed 174 km (approximate) all-season access road to the Nahanni Access Road (Figure 1). The Mine is accessible using a permitted winter road and an existing airstrip located approximately 1 km from the Mine site. The proposed all-season access road essentially follows the currently permitted winter road alignment.

Infrastructure at the Mine site includes surface buildings, underground workings, and mine infrastructure including a camp and storage/polishing ponds within the Prairie Creek valley that were originally constructed in 1982 (refer to CZN 2010). The Mine was placed into receivership three months prior to production due to market conditions. CZN has since acquired updated permits to initiate mining and milling at the Mine site, as well as to transport concentrates along the winter access road.

The Prairie Creek Mine and the first 17 km and last 72 km of the access road are located on lands outside the Nahanni National Park Reserve (NNPR) (Figure 1). Approximately 85 km of the 174 km proposed all-season access road is located within the expanded NNPR, as well as proposed borrow sources, temporary construction camps, and the proposed Tetcela Transfer Facility (TTF), which, at this time, is not likely to be required.

The temporal scope for the Mine includes a two year construction period, 14 year Mine operating life, a two year closure period during which time reclamation activities will occur (including the decommissioning of the all-season access road), and a five year post-closure monitoring period..

The nearest developments (within 200 km) include:

- Community of Nahanni Butte: population of approximately 100 (2014 data, includes all age groups) (NWT Bureau of Statistics 2014);
- Nahanni National Park Reserve (NNPR): includes six designated campsites and seven aircraft landing sites, that each year, bring in an average of 980 visitors, principally in July and August; and
- Liard Highway (Highway 7): gravel road considered to be a low traffic highway by the Department of Transportation with average annual daily traffic volumes ranging from 30-50 vehicles (2002-2011).

2.1 Other Management Plans

Other CZN operating and management plans, developed as part of the Project's overall environmental management system, further detail mitigation and monitoring approaches that are relevant to the protection of wildlife and wildlife habitat. These should also be reviewed in conjunction with this updated Draft WMMP and include:

Bear Management Plan: The EA for the Mine and winter road predicted a low but manageable risk to the regional Grizzly Bear population from bear-human encounters and related bear mortality (Golder 2010). Similarly, potential adverse effects on Grizzly Bear movements were predicted from the all-season road (Tetra Tech EBA 2015). To manage these identified risks, CZN committed to developing a Bear Management Plan, which incorporates the Waste Management Plan, Spill Contingency Plan, and this updated Draft WMMP to outline mitigation specific to Grizzly Bears.

Road Construction and Maintenance Plan: A short and long-term road maintenance program will be further developed at the detailed road design stage that specifies road clearing, construction, maintenance, and inspection activities, as well as general maintenance requirements for the all-season road, ditches, cross drainages, culverts, and bridge structures. This plan will also provide recommendations regarding the safe disposal of cigarettes along the road and at transfer facilities, coordination with Parks Canada and Environment and Natural Resources (ENR) for fire response, and snow removal practices to minimize wildlife entrapment from high snow banks. Road maintenance activities will be aligned with the specifications of the WMMP, particularly with respect to maintaining wildlife movements, maintenance/inspections of culverts to preserve natural drainage patterns to minimize indirect effects to habitat, and direct/indirect habitat effects related to dust generation and fire suppression/management practices.

Controlled Road Use Plan: This plan was approved for use of the winter access road however, it has been updated in the form of a draft Road Operations Plan to include all-season access, and it details safety and security measures, communications, road use monitoring, and wildlife response and reporting. Together with this updated WMMP, the Road Operations Plan is important for traffic safety, for minimizing non-Project related traffic, and to minimize the potential for increased harvesting pressures on wildlife.

Invasive Plant Management Plan: Vehicles pose a risk of introducing invasive plant species into previously un-colonized areas, particularly during the summer months of road operation. The Invasive Plant Management Plan will be developed to prevent the introduction, detect the presence, and control the establishment and spread of invasive plant species, if necessary, as well as restore/monitor off-site vegetation communities adjacent to the all-season road. Controlling the potential introduction and spread of invasive plants will help to minimize the indirect effects invasive plants may have on wildlife habitat.

Waste Management Plan: This plan is specific to waste management at the Mine, temporary construction camps, transfer facilities, and the all-season access road. It outlines prohibitions such as littering, purposely feeding wildlife, and storing attractants accessible to wildlife, procedures for the storage and incineration of wastes, daily addition of bleach in the dishwater and/or grease trap, and lime or crystal lye in the sumps at temporary camps, and other waste management practices.

Spill Contingency Plan: Following the Spill Contingency Planning and Reporting Regulations of the *Environmental Protection Act* (GNWT 2011), this plan sets out steps for spill reporting, clean-up, and disposal, staff training, inventory and location of spill response equipment, and other appropriate management systems to minimize the risk of accidental spills and readiness to respond to them. The existing spill management plan prepared for the Mine and winter road will be reviewed and updated, as necessary, to reflect the requirements of an all-season road, prior to road construction.

Sediment and Erosion Control Plan: The implementation of erosion and sediment control measures will be required during any activity involving ground disturbance, but are of particular importance during construction of the proposed all-season road. The Sediment and Erosion Control Plan sets out strategies to control soil erosion and sediment generation, methods, and spatial and temporal risks. The successful implementation of this plan will assist in minimizing potential effects to wildlife habitat.

Closure and Reclamation Plan: A draft of this plan has been prepared in support of the Water Licence process. A draft Road Closure and Reclamation Plan has been developed. This plan will need to be reviewed and updated for the requirements of an all-season road. This plan also is relevant to the WMMP with respect to minimizing potential effects to and/or restoring wildlife habitat.

Borrow Pit Management Plan: It is assumed that each borrow location requires a specific plan. Each plan will outline the planned borrow and quarrying activities, site management measures (e.g., drainage, dust, noise management), and closure activities. The plans will also incorporate a monitoring strategy to minimize the risk to nesting bank swallows and general wildlife habitat and habitat loss.

Contaminant Loading Management Plan: Existing as a draft Contaminant Loading Management Plan, soil sampling along the road bed both before and during haul operations is outlined. The intent is to confirm that levels of metals are within acceptable levels (as agreed upon during the licensing phase of the project) and are not being negatively affected by concentrate dust. Adaptive management strategies will be applied to adjust practices (e.g., truck cleanliness, concentrate cover options during transport) if and as required.

2.2 Environmental Setting

The Prairie Creek Mine site is located within the southern Mackenzie Mountains in an area characterized by stunted spruce with limited undergrowth and open areas dominated by lichen. The Mine is connected to the Liard Highway via an access road that leaves the Mine site heading north along the Prairie Creek valley for about 7 km before turning east to cross the Mackenzie Mountains (Figure 1). As the access road climbs out of the Prairie Creek valley it enters Sub-Alpine Shrub and Alpine Tundra from an elevation of approximately 1,000 m above mean sea level at KP 10. The road continues to climb through the Alpine to the summit of 1,530 m at KP 17, then drops down and leaves the Sub-Alpine again at the 1,000 m elevation mark around KP 25. As the road decreases in elevation to approximately 900 m, it passes through a spruce-lichen Alpine forest zone similar to that found at the Mine site and then into Riparian Alluvial habitat in the Sundog tributary valley bottom.

As the road crosses the Ram Plateau, it passes through an open forest Black Spruce/Pine Parkland setting between 830 and 930 m elevation, before dropping down into the Tetcela River valley. This valley consists of mixed coniferous/deciduous closed forest. The road then passes through a short distance of muskeg and open shrub/sedge wetland at the headwaters of Fishtrap Creek, and climbs up and over the Silent Hills, again a closed mixed coniferous/deciduous forest. The road then crosses an area of black spruce muskeg and wetlands near the Grainger River headwaters before passing through mixed coniferous-deciduous pine parkland at Grainger Gap (Second Gap).

Once through the Grainger Gap, the road heads south along the foothills of the Front Range through mixed deciduous coniferous forest towards Nahanni Butte, thus avoiding the Grainger Till plain. The road crosses the Liard River approximately 6 km north of the community of Nahanni Butte and continues through forest to the Liard Highway.

Climate data collected at the Prairie Creek Mine station is generally consistent with data reported at Fort Simpson, NWT, indicating that the Mine site is slightly more temperate than Fort Simpson; cooler in the summer but warmer in the winter (CZN 2015). The Mine site experienced two flood events in recent times, in June 2006 and August 2007, both in response to intense rainfall (CZN 2015). Since 1982, there have been at least three documented forest fires along the all-season road alignment. The first was located near KP 66, the second in 1994 covered an area immediately east of the Nahanni Range, and a third and smaller burn occurred just east of Mosquito Lake in 2008. Several additional smaller burns are also known to have occurred since.

The existing Mine, and proposed all season access road cross habitats occupied by species with special conservation status. Across the Dehcho region, the Species at Risk Committee (2012) report that there has been minimal change to habitat since the 1970's, and many seismic lines have since grown in, except in the Cameron Hills and Mackenzie Bison Sanctuary. Similarly, traditional knowledge studies conducted by the Species at Risk Committee (2012) and the Dehcho Land Use Planning Committee's (ND) report relatively intact wildlife habitat throughout the region.

2.3 Regulatory Setting

Several applicable federal and territorial legislations/regulations provide guidance for wildlife and wildlife habitat protection. These are briefly described below.

2.3.1 Migratory Birds Convention Act

Most species of birds in Canada are protected under the federal *Migratory Birds Convention Act*, 1994 (MBCA; Government of Canada 1994). Subsection 12 (1h) of the MBCA "prohibits the killing, capturing, injuring, taking, or disturbing of migratory birds or the damaging, destroying, removing, or disturbing of nests". Although Environment and Climate Change Canada (2016) provides timing restrictions as general guidelines for industry to protect the majority of birds, the onus remains with the proponent to comply with the legislation even when working outside the suggested timing restrictions. To minimize disturbance to migratory birds in Bird Conservation Region B7 (the Bird Conservation Region in which the Project is located), the suggested period for avoiding clearing activities is May 1 to August 20 (Environment and Climate Change Canada 2016).

2.3.2 Species at Risk Act

The federal *Species at Risk Act* (SARA) protects plant and wildlife species from becoming extinct or lost from the wild, provides for the recovery of species that are at risk, and promotes stewardship (Government of Canada 2016). On federal land, the SARA applies to all wildlife species that are listed on Schedule 1 as Extirpated, Endangered, or Threatened. General prohibitions under the *Act* do not apply to species listed on Schedule 1 as Special Concern. Section 32(1) of the SARA states that "no person shall kill, harm, harass, capture, or take an individual of a wildlife species that is listed as an extirpated species, an endangered species, or a threatened species". There are additional provisions (Section 34[2]) that allow the federal government to apply SARA regulations (e.g., via an Emergency Order) to Schedule 1 species located on private or territorial lands should they determine that the territorial government is not fulfilling their commitments (e.g., under the national Accord for the Protection of Species at Risk) to protect federally listed species.

2.3.3 Northwest Territories Wildlife Act

Territorial legislation under the Northwest Territories (NWT) *Wildlife Act* provides protection to raptors (e.g., owls, eagles, hawks, and falcons) and upland game birds (e.g., grouse), which are not covered under the MBCA as well as mammals, amphibians, and all other vertebrates and invertebrates in the NWT. The NWT *Wildlife Act* states in Section 38 that no person shall, without a permit, persistently chase or disturb wildlife and damage, destroy, or take a nest, egg, dam, lodge, or den of wildlife. However, a person shall chase a bear away from a camp or its immediate area if necessary for the protection of human life or property. Similarly, a person may injure or kill wildlife if necessary for the protection of life or property; the *Act* also outlines reporting requirements in the event of injuring or killing wildlife for this purpose. No person shall feed or place/leave/deposit food, food waste or other substances that could attract wildlife. The *Act* also outlines provisions including the protection of habitat, requirements for a Wildlife Management and Monitoring Plan, and inspections of waste management practices and attractants to dangerous wildlife.

2.3.4 Canada National Parks Act

The *Canada National Parks Act* enables Parks Canada to establish, manage (including enforcement), and maintain national parks and national park reserves. Prohibitions against hunting (except traditional subsistence harvesting) and possession of listed wildlife (or their parts, including eggs) are included. The management and maintenance of parks outline pollution mitigation and clean-up expenses, and powers of the Minister for the issuance, amendment,

renewal, suspension, and or cancellation of land use permits and water licences for the Prairie Creek Mine access road.

2.4 Wildlife Species

The WMMP focuses on wildlife species occurring in and near the Project area that are important harvestable species, have specific regulatory requirements, and/or are protected by legislation through the *NWT Wildlife Act*, *Canada Wildlife Act*, federal *Species at Risk Act* (SARA), *Species at Risk* (NWT) *Act*, and the *Migratory Birds Convention Act*. Together, these Acts and associated Regulations prohibit disturbing, injuring, or killing wildlife and destroying their nests, dens, lodges/dams, and designated critical habitat. The species considered in this updated Draft WMMP are presented in Table 1.

Table 1: Wildlife Species and Applicable Legislation

Species	SARA[1] Listing	COSEWIC[2] Listing	GNWT[3] Ranking/Listing
Beaver (*Castor canadensis*)	None	Not Assessed	Secure
Collared Pika (*Ochotona collaris*)	Special Concern (proposed as of June 18, 2016)	Special Concern	May Be At Risk
Northern Mountain Caribou (*Rangifer tarandus caribou*)	None	Special Concern	Secure
Boreal Woodland Caribou (*Rangifer tarandus caribou*)	Threatened	Threatened	Threatened
Wood Bison (*Bos bison athabascae*)	Threatened	Threatened	Threatened, Under Consideration
Moose (*Alces alces*)	None	Not Assessed	Secure
Dall's Sheep (*Ovis dalli*)	None	Not Assessed	Secure
Grizzly Bear (*Ursus arctos*)	None	Special Concern	Sensitive
Black Bear (*Ursus americanus)* and Grey Wolf (*Canis lupus*)	None	Not At Risk	Secure
Wolverine (*Gulo gulo*)	None	Special Concern	Not At Risk
Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*M. septentrionalis*)	Endangered	Endangered	May Be At Risk
Western Long-eared Myotis (*Myotis evotis*)	None	Not Assessed	May Be At Risk
Waterfowl	Various		
Trumpeter Swan	Not At Risk	Not At Risk	Secure

Species	SARA[1] Listing	COSEWIC[2] Listing	GNWT[3] Ranking/Listing
Harlequin Duck (*Histrionicus histrionicus*)	None	None	May Be At Risk
Horned Grebe (*Podiceps auritus*)	Special Concern (proposed as of June 18, 2016)	Special Concern	Sensitive
Raptors	Various		
Peregrine Falcon (*Falco peregrinus anatum*)	Special Concern	Special Concern	Sensitive
Short-eared Owl (*Asio flammeus*)	Special Concern	Special Concern	Sensitive
Passerines	Various		
Olive-sided Flycatcher (*Contopus cooperi*)	Threatened	Threatened	At Risk
Bank and Barn Swallows (*Riparia* and *Hirundo rustica*, respectively)	None	Threatened	Secure and May Be At Risk, respectively
Rusty Blackbird (*Euphagus carolinus*)	Special Concern	Special Concern	Sensitive
Non-Passerines	Various		
Common Nighthawk (*Chordeiles minor*)	Threatened	Threatened	At Risk
Yellow Rail (*Coturnicops noveboracensis*)	Special Concern	Special Concern	May Be At Risk
Western Toad	None	Special Concern	Threatened

1. *Species at Risk Act* (SARA) (Government of Canada 2016)
2. Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (2016)
3. Government of Northwest Territories (GNWT) (2016)

3.0 POTENTIAL PROJECT EFFECTS

The existing Mine and proposed all-season access road may result in adverse effects on wildlife and wildlife habitat (CZN 2015) in the absence of mitigation measures, SOPs, and adherence to BMPs. A summary of the anticipated effects and associated effects mechanisms is presented in Table 2.

Table 2: Summary of Potential Project Effects

Effect Category	Project-Related Mechanism of Effect	Mine Site	Airstrip	All-Season Road (includes camps, transfer facilities, and barge)
Habitat Alteration and Loss	Site clearing and forest fires			✓
	Spills, erosion, and deleterious substances	✓	✓	✓
	Dust and dust suppression		✓	✓
	Invasive plants			✓
Wildlife Injury and Mortality	Human-wildlife conflicts and attracting/habituating wildlife	✓	✓	✓
	Collision with equipment/traffic	✓	✓	✓
	Traffic/access and hunting/ trapping			✓
Wildlife Abundance and Movement Changes	Sensory disturbances (i.e., visual and noise) and avoidance	✓	✓	✓
	Obstruct or reduce movement			✓

4.0 WILDLIFE MITIGATION

Mitigation measures for wildlife and wildlife habitat presented in the Project DAR reports are designed to avoid and/or minimize potential Project-related effects, to the extent possible and to within an acceptable level, using SOP's, BMP's, and Project-specific approaches. Wildlife mitigation measures follow commitments made by CZN as part of EA processes and reflect applicable territorial and federal regulations.

SOP's are CZN's standardized instructions to perform tasks in a consistent and safe manner. BMP's are practices usually developed by regulatory bodies and provided to the public as information sources to the desired activities and/or outcomes on public lands. SOP's and BMP's included in the WMMP are intended to reduce and/or avoid common effects considered across industry, and are generally accepted by regulatory agencies.

Mitigation measures that facilitate the avoidance of disturbances (and thus associated effects) are largely based on the adherence to timing restrictions and setback distances, such as those developed by Aboriginal Affairs and Northern Development Canada (AANDC 2011). These measures help avoid periods that are particularly sensitive to wildlife (e.g., nesting, denning) and are provided for various wildlife species in Appendix C.

Staff training is also a key component in the successful implementation of the mitigation measures presented in the WMMP. All staff (and preferably all visitors) will participate in a detailed site orientation that will include general

wildlife education and more specific discussion regarding the WMMP, minimizing human-wildlife encounters, and rules pertaining to wildlife right-of-way and traffic management. Further details are provided in Appendix B.

4.1 Responsibilities

Key individuals responsible for the successful management and implementation of the WMMP are identified below.

CZN's Site Superintendent (or General Manager): is the responsible authority to ensure wildlife mitigation measures, including SOP's and BMP's, are followed and that applicable staff, contractors, and visitors are appropriately trained in the WMMP.

CZN's Environmental Monitors: report to the Site Superintendent and are responsible for carrying out monitoring activities for the Project and reporting results. They will also identify whether activities associated with potential effects are being conducted in accordance with the mitigation measures, commitments, and applicable regulations, and whether the WMMP requires adjustment based on monitoring results in support of the adaptive management approach. Environmental monitors will be suitably qualified and trained for the position, as per the details in Appendix B.

CZN Employees, Contractors, and Visitors: all are expected to respect and follow, where applicable to them, the mitigation measures outlined in this updated Draft WMMP.

4.2 Wildlife Mitigation Measures

Mitigation measures are summarized in Table 3 for wildlife and wildlife habitat for the Mine site and proposed all-season road (including temporary construction camps, borrow sources, and access roads). These mitigation measures were drawn from the 2015 All Season Road DAR (CZN 2015), Wildlife and Vegetation Information Request response (Tetra Tech EBA 2016a), other EA-related documents, and Appendix B.

Table 3: Wildlife Mitigation Measures

Activity/Concern	Project Component	Mitigation
General ▪ Hunting/Fishing/Trapping ▪ Pets ▪ Barn and Bank Swallow Nest Monitoring ▪ Vehicle Operation ▪ Timber Recovery ▪ Borrow Pit Management Plans	All	▪ Final site inspections and clean-up will be conducted at least annually and at temporary shutdown at each work place ▪ Hunting, fishing, trapping, and harvesting by on-duty CZN employees and contractors will be prohibited ▪ Pets will be prohibited on site ▪ CZN's Environmental Monitors to annually confirm and/or monitor Barn and Bank Swallow nesting sites (refer to Section 5.3.6)
	All-season road	▪ All Project and non-Project related vehicles to be operated on designated footprints ▪ The Site Superintendent to notify the community of Nahanni Butte of the opportunity to undertake timber recovery, when safe to do so ▪ Borrow sources will be closed as soon as they are no longer required, and reclaimed in a progressive manner, following the Borrow Pit Management Plans
Managing site clearing and forest fires ▪ Training ▪ Bird Restricted Activity Period for Clearing ▪ Bear Den Pre-Construction Monitoring ▪ Collared Pika Pre-Construction Monitoring	All	▪ Train staff with respect to fire prevention protocols and emergency response procedures ▪ Clearing activities to occur outside the breeding bird nesting season (May 1 – Aug. 20) to the extent possible, or preceded by a survey as needed ▪ Forest Fire Prevention and Suppression Guidelines for Industrial Activities will be followed, as appropriate (Appendix D – BMP 1)
	All-season road	▪ CZN Environmental Monitor to survey for the presence of Collared Pikas in suitable habitat and report to Mine management prior to Project-related clearing and construction disturbances (refer to Section 5.1.1) ▪ CZN Environmental Monitor to complete a bear den reconnaissance survey in habitat favourable for natal denning prior to clearing activities
Managing spills, erosion, and deleterious substances ▪ Management Plans ▪ Fuel Storage, Handling, and Management ▪ Equipment/Vehicle Maintenance, Supplies ▪ Training ▪ Tire Chains ▪ Erosion Control	All	▪ Applicable Management Plans (e.g., Road Construction and Maintenance Plan, Spill Contingency Plan, Sediment and Erosion Control Plan), as well as the GNWT dust suppression guidelines (Appendix D - BMP 2) will be followed by all CZN employees and contractors at all applicable work places ▪ All fuel will be stored at least 100 m from any waterbody. Refueling and equipment servicing will occur a minimum of 100 m away from any waterbody ▪ Use industry standard fuel containment and explosive storage and handling techniques ▪ Maintain appropriate materials management to minimize the risk of accidental spills or leakage of concentrate, diesel fuel, other hydrocarbons, and other hazardous materials being shipped to the Mine site ▪ All equipment and trucks will be equipped with industry-standard emission control systems ▪ All equipment and trucks will be equipped with industry-standard spill kits ▪ All equipment and trucks will be regularly maintained in good working condition with no leaks ▪ Train staff to quickly respond to an accidental spill, including rapid deployment and containment approaches
	All-season road	▪ Implement a winter driving policy requiring tire chains to be used on haul trucks in the mountains (KP 0-29) to increase traction and minimize the risk of accidents and/or spills ▪ Implement erosion control measures during construction (and operations) if and as required, such as on steep banks with exposed soils and watercourse crossings during high water levels until sufficient vegetation is established
Managing dust and dust suppression, and camp water sources ▪ Dust Management ▪ Suppression Guidelines ▪ Training ▪ Road Maintenance ▪ Water Pumping Restrictions	All	▪ Dust will be controlled with water, as required, at all Project-related work sites throughout the life of the Project ▪ Dust suppression will be in conformance with the GNWT dust suppression guidelines (Appendix D – BMP 2) ▪ Train staff on dust suppression guidelines and procedures to quickly respond to dust re-suspension
	All-season road	▪ Equipment and truck speeds will be kept to a maximum speed of 60 km/hr along the all-season road and 30 km/hr at borrow sources and transfer facilities to minimize dust ▪ All portions of the all-season road and its associated facilities will be regularly maintained to minimize dust re-suspension ▪ Water withdrawals (changes in water level) will conform with permit conditions and the DFO Water Withdrawal Protocol (Appendix D - BMP 3) if pumping water from a known Beaver pond in the fall and winter periods ▪ Prohibit pumping water from ponds if Trumpeter Swans are visible within 800 m and during the breeding period (Apr. 1 – Sept. 30)
Managing invasive plants ▪ Disturbance Area Management ▪ Training	All	▪ Maintain and/or actively manage disturbed areas to facilitate natural encroachment of native species ▪ Train CZN Environmental Monitors to identify, monitor, and control invasive plant species following CZN's Invasive Plant Management Plan ▪ Monitor disturbance sites (i.e., camps, borrow sources, access roads) annually for invasive plant species following the Invasive Plant Management Plan (refer to the Invasive Plant Management Plan for details)

Activity/Concern	Project Component	Mitigation
▪ Invasive Plant Monitoring	All-season road	▪ Ensure vehicles travelling, or equipment being transported to the Mine are not dirty before leaving the Liard Transfer Facility to prevent the potential dispersal of invasive plant propagules that may be embedded in mud
Managing human-wildlife conflicts, and wildlife attraction/ habituation ▪ Dangerous Wildlife Encounters/Incidents ▪ Shelter from Dangerous Wildlife ▪ Waste Management and Waste Management Plan ▪ Salt Prohibition ▪ Carcass Removal	All	▪ Follow steps outlined in the early Draft (Golder 2012; Appendix B) to respond to various scenarios for bear encounters, including deterrent procedures, and dealing with an injured animal or carcass. CZN's SOP for all on-site personnel identifies what actions should be taken in the event of a wildlife encounter and incident. The SOP is based on guidance documents developed by the GNWT (e.g., Bear Incident Response Guideline; Safety in Grizzly and Black Bear Country). These and the Yukon Environment (Guidelines for Industrial Activity in Bear Country, for the Mineral Exploration, Placer Mining, and Oil & Gas Industries) are provided in Appendix D - BMPs 4, 5, and 6) ▪ All employees/contractors are to remain in the vehicle and/or shelter if potentially dangerous wildlife are observed on or near the proposed Project footprint ▪ Apply CZN's Waste Management Plan developed for the all-season road and facilities, and follow the GNWT Camp Waste and Wildlife Attraction Guideline (Appendix D – BMP 7) ▪ Littering is strictly prohibited ▪ Food and food wastes and other putrescible matter will be collected and stored in a manner inaccessible to furbearers. The waste will either be incinerated locally, or taken to the Mine or other approved facility ▪ Salt will not be used for road/camp maintenance to avoid potential wildlife attraction
	All-season road	▪ Immediately remove any carcass on or near the road (e.g., traditional harvesting or vehicle-collision), once reported, to reduce attractants. Disposal of large-bodied carcasses are to follow the directions of Parks Canada or a GNWT ENR Officer, depending on the jurisdiction
Managing collisions with equipment/traffic ▪ Driving Stipulations and Enforcement ▪ Reporting Accidents ▪ Wildlife Alert System ▪ Signs ▪ Airstrip Check/Clearance	All	▪ All wildlife will have the right-of-way if crossing, or attempting to cross, the Project footprint. Drivers will be obligated to stop (when safe to do so) for all wildlife seen on, or immediately adjacent, to roadways, giving wildlife the opportunity to move off. If wildlife are seen in poor light conditions, vehicles should stop, turn off headlights, and wait for them to move off before resuming travel ▪ Implement and enforce speed limits. Vehicle traffic speed limit maximum 60 km/hr along the all-season access road and 30 km/hr at camps, borrow sources and transfer facilities ▪ All wildlife mortality (including known subsistence harvests) will be reported immediately to CZN's Environmental Monitor ▪ CZN's Environmental Monitor will report all big game and species at risk accidentally killed or injured as a result of the Project to Parks Canada or a GNWT ENR Officer within 24 hours (*Wildlife Act* Regulations) ▪ A wildlife advisory system to communicate and alert nearby Project-related users that wildlife are on, or visible near, the Project via radio so that extra precautions and or avoidance can be taken. Sightings of large-bodied animals (e.g., caribou, Moose, Dall's Sheep, Wolverine, Grizzly Bear, Wood Bison, Grey Wolf) and Trumpeter Swan are to be reported to CZN's Environmental Monitor to be recorded and Project-wildlife interactions monitored for possible adaptive management ▪ Highly visible signs will be installed along the access road to alert drivers of "wildlife caution zones". CZN will update signage as new wildlife observations and incidents are reported. ▪ The airstrip will be checked of wildlife prior to aircraft landing or taking off. If wildlife are observed on, or in proximity, to the airstrip prior to aircraft take-off or landing, CZN will implement deterrent procedures (as outlined in Appendix B) in an attempt to move the animal(s) from the airstrip ▪ Mitigation measures for Managing Sensory Disturbances And Avoidance (presented below) are also applicable here
	All-season road	▪ Post speed limit signage, enforce speed limits, and randomly monitor traffic speed ▪ If Caribou, Moose, Dall's Sheep, Mountain Goat, Grizzly Bear, and Wolverine are reported on the road or are within 500 m of the Project footprint, traffic or activity will cease at least 500 m from (or at first observation of) the animal(s) and all headlights turned off (poor light) until the animal moves off at least 100 m or 5 minutes after last visual. If the animal remains on or near the road, traffic should resume at very low speed. In any event, once traffic resumes, speeds will be reduced to half the posted speed limit within 1 km of the sighting ▪ If Wood Bison are reported on or near the road, traffic speeds are to be reduced to half the posted speed limit within 1 km of the sighting or as soon as the animal is sighted
Managing access control, hunting and trapping ▪ Hunting/Trapping/Fishing Restrictions ▪ Vehicle Restrictions ▪ Checkpoint Station and Access Restrictions ▪ Signage	All	▪ On duty project-related employees and contractors are prohibited from hunting, fishing, and harassing wildlife ▪ Recreational use of off-road vehicles will be prohibited along the all-season road and other roadways/trails/access points associated with the Project, to the extent possible
	All-season road	▪ During summer operations, CZN will operate a private barge on the Liard River for authorized traffic (i.e. Mine-related and local Aboriginal use). Private crossing signs will be erected informing the general public ▪ Restrict the use of the Prairie Creek Mine access road by gating on lands set-aside for Aboriginal use ▪ Manage a checkpoint station, manned by NDDB members, located north of the Liard River crossing ▪ Install a sign at the NNPR eastern boundary to notify road users they are entering the NNPR, in collaboration with Parks Canada

Activity/Concern	Project Component	Mitigation
Managing sensory disturbances and avoidance ▪ Aircraft Operation ▪ Vehicle Traffic Restrictions ▪ General Construction ▪ Blasting ▪ Peregrine Falcon pre-construction monitoring	All	▪ Aircraft flying over NNPR are to maintain a minimum flying altitude of 600 m above ground level (agl) or greater (except for approaches and take offs) as set under Transport Canada's Aeronautical Information Manual for flying over National Parks. Outside the NNPR, the GNWT Flying Low guideline is appropriate (Appendix D – BMP 8) ▪ If Caribou, Moose, Dall's Sheep, Mountain Goat, Wolverine, Grizzly Bear, and Trumpeter Swan are reported beyond 500 m of the Project footprint, traffic speeds are to be reduced to half the posted speed limit within 1 km of the sighting or as soon as the animal is sighted ▪ ENR's Woodland Caribou Best Management Practices for Industrial and Commercial Activities (once developed) are to be incorporated into the wildlife monitoring program, where feasible, to manage or mitigate sensory disturbances on caribou
	All-season road	▪ Focus construction activities temporally and spatially by adopting a sequential development strategy (including blasting, if required) ▪ If possible, road and quarry blasting will occur in winter, however it may also occur during snow free conditions as access permits. All blasting outside of the winter season would conform to standard mitigation procedures regarding occupation of wildlife (e.g., Dall's Sheep, caribou, Trumpeter Swans) ▪ In-stream construction work in Sundog Creek occurs outside Harlequin Duck occurrence period or when no water flow. However, in the unlikely event of in-stream works during this period of time, the CZN Environmental Monitor will conduct a reconnaissance survey for the presence of Harlequin Ducks within 500 m of the activity. All in-stream work will cease if a Harlequin Duck is present ▪ Blasting in Boreal Caribou range should be minimized to the extent possible from December to April, should it be deemed necessary for road construction ▪ If blasting is required within Boreal Caribou range, prohibit blasting from May 1 to July 15 to avoid disturbance to potential Boreal Caribou calving and post-calving ▪ Avoid blasting within a minimum distance of 800 m when Trumpeter Swans are observed on breeding ponds from April 1 to September 30 (AANDC 2011). Other construction activities (if critical for development) may occur within 800 m of observed Trumpeter Swans (from April 1 to September 30) with the assistance of a CZN Environmental Monitor. The CZN Environmental Monitor has the authority to stop work if construction is determined to be adversely affecting swans ▪ Blasting will be prohibited if Caribou, Dall's Sheep, Wolverine, and Grizzly Bear are observed within 1 km of the blast site until the animal moves out of the area ▪ Prohibit blasting when Dall's Sheep lambs are within 2 km of the proposed Project from May 1 to June 15 ▪ Conduct Peregrine Falcon scrape survey (if required) to determine presence within 1.5 km of construction in the Sundog Creek road sections (KP 34.5-40). Such a survey would only be required if construction-related activities are proposed within the species sensitive period (Apr. 15 to Aug. 31)
Managing obstructions to movement	All-season road	▪ Maintain snow removal practices approved for the winter road to manage high snow banks (e.g., less than 1 m high) and create breaks in snow berms (e.g., berm breaks every 500 m), so that wildlife can readily move off the road and through breaks as vehicles approach and aircraft flyover ▪ Cease barging activities if Wood Bison are observed crossing the river near the barge location ▪ Install appropriate signage along the road warning drivers of high wildlife use areas ▪ Mitigation measures for Managing Sensory Disturbances and Avoidance (presented above) are also applicable here

5.0 WILDLIFE MONITORING

Appendix B outlines the appropriate qualifications and overall responsibilities of CZN's Environmental Monitor. These remain applicable for all Project-related footprints and activities.

5.1 Pre-Construction Monitoring

Pre-construction monitoring programs are to be conducted with the objective of avoiding wildlife mortality and/or disturbance to species with special conservation status (refer to Table 2) during construction.

Species may be disturbed by construction activities if construction occurs during their sensitive periods and/or within the recommended setback distances (Appendix C). The Environmental Monitor will conduct site-specific species monitoring to assess any disturbance to the target species.

5.1.1 Collared Pika

Table 4: Collared Pika Monitoring Plan Summary

Objective	Monitoring	Frequency	Timing	Rationale
Avoid disturbance to talus currently occupied by Collared Pika	Walking transects across talus to determine Collared Pika presence	Once prior to construction	Mid-July to snowfall	▪ Collared Pikas are listed under the SARA as Special Concern ▪ Risk of mortality without monitoring/ mitigation

A Collared Pika survey is to be completed in favourable habitat along Sundog Creek with the objective of determining their presence, before construction, at borrow sources and new all-season access road alignments (where these differ from the existing winter road), and if detected, modify the development plan if possible (i.e., select a different borrow source or portion thereof, consider a minor change to the road alignment) to avoid disturbing Collared Pikas, or determine a supplementary adaptive management strategy. Collared Pikas are proposed by SARA as Special Concern and are ranked as May Be At Risk in the NWT.

Who: CZN's Environmental Monitor is responsible for completing the Collared Pika surveys, and reporting results to the Site Superintendent prior to Project-related clearing and construction disturbances. CZN's Site Superintendent is responsible for notifying CZN's Vice President of Environment and Permitting Affairs of any results that may require modification of the construction plan or implementation of adaptive management procedures.

What: Collared Pika surveys include a walking transect across the talus, which involves walking slowly across the full length of the talus to be disturbed, meandering to cover the first 1 to 20 m of the talus from the toe edge. Signs of pikas (i.e., haypiles and urine/pellets) must be searched under large overhanging rocks and openings within the rock matrix. Any pikas heard and/or seen during the transect survey will be recorded. Coordinates of locations where pika presence has been confirmed will be collected using a Global Positioning System (GPS).

When: Surveys should be completed anytime from mid-July to immediately prior to snowfall. Surveys are only to occur prior to construction.

Where: A Collared Pika survey is required along all road re-alignment areas that directly disturb talus habitat from KP 23-39, including borrow sources planned for development (Figure 2). Particularly, these surveys must be completed at Borrow Sources 35 and 38 if these borrows are intended to be developed, since evidence of past use by pikas has been documented (Tetra Tech EBA 2016b). In July 2016, pikas were also detected occupying Borrow Sources 33 and 34, and these borrows should not be developed.

Tools: Field guides are now available on smartphone applications (apps) (e.g., Mammals of North America). These are a recommended tool to prepare for the survey, which provide informative life history descriptions, photographs, and audio recordings of Collared Pika. A camera and GPS are also required.

Datasheets: Survey data will be documented on datasheets and will include, at a minimum, the date, surveyor's name, number of Collared Pikas observed/heard, number of haypiles, number of pellet groups (i.e., piles), observation location (GPS location and development area), survey start and stop times, and weather.

Reporting: Talus sites will be considered occupied by Collared Pikas if at least one calling individual and/or fresh haypiles and pellets are detected. Sites occupied by Collared Pikas will be reported to CZN's Site Superintendent, who will then notify CZN's Vice President of Environment and Permitting Affairs.

Adaptive Management: Modifications to the construction plan or advancement of the adaptive management process will be required at locations identified to be occupied by Collared Pikas that are proposed to be disturbed. Modifications or adaptive management strategies are not required at development sites with no recorded Collared Pikas (i.e., no individuals seen or heard and no fresh haypiles and pellets observed).

5.1.2 Peregrine Falcon

Table 5: Peregrine Falcon Monitoring Plan Summary

Objective	Monitoring	Frequency	Timing	Rationale
Avoid disturbance to any Peregrine Falcon nests	Aerial survey along appropriate cliff habitat to determine presence of nest site(s)	Once prior to construction, only if construction occurring from Apr. 15 to Aug. 31	Apr. 15 to Aug. 31	▪ Peregrine Falcons are listed under the SARA as Special Concern ▪ Construction may disturb nesting birds if conducted during the species sensitive period and within the recommended setback distance

Peregrine Falcons nest on ledges of cliffs that are 50 to 200 m in height and commonly near water. Nests, called scrapes, are simple indentations on a cliff ledge, typically surrounded by grasses, moss, and orange lichen indicative of past use. Construction of the road from Km 34.5-40 along Sundog Creek is proposed in the late fall when water levels are low and Peregrine Falcons have fledged from any nearby nests. However, should the construction occur within the species-specific sensitive period and within the setback distance from a known scrape (1.5 km), then ongoing monitoring at the nesting sites will be required for the duration of construction to assess nest site disturbance. A survey was completed in the area in mid-July 2016 and did not locate any active Peregrine Falcon nests or suspected old nests. However, further checks are considered necessary closer to construction.

Who: Responsibilities include:

- CZN's Environmental Monitor and/or a professional biologist (Consultant) will complete the Peregrine Falcon scrape survey (if required) to determine presence within 1.5 km of construction in the Sundog Creek road sections (KP 34.5-40). Such a survey will only be required if construction related activities are proposed within the species sensitive period Apr. 15 to Aug. 31. In any event, a follow-up survey may be undertaken as part of other pre-construction surveys along the alignment;
- Results of the survey will be reported to the Site Superintendent. The CZN Environmental Monitor will assist in planning the timing of construction activities in this area;
- In the event that a scrape is observed and is occupied by a Peregrine Falcon, the Site Superintendent will notify CZN's Vice President of Environment and Permitting Affairs to determine if construction within 1.5 km of the nest site could be delayed until the Peregrine Falcon naturally departs from the nest site and/or until September 1:
  - If construction must continue, the CZN Environmental Monitor, with support from the Site Superintendent, will acquire applicable permits under the *NWT Wildlife Act* and/or *National Parks Act* to carry out construction activities; and
  - CZN's Environmental Monitor will implement the conditions set out under the permit, and monitor the nest site using binoculars to record Peregrine Falcon behaviour and possible disturbance from construction activities.
  - The CZN Environmental Monitor, Site Superintendent, and Vice President of Environment and Permitting Affairs will determine whether construction activities should be temporarily suspended in the event that Peregrine Falcons are showing signs of disturbance.

What: A Peregrine Falcon scrape survey involves a helicopter-based survey across the cliff face. Multiple passes across tall cliff faces are required to effectively cover the entire cliff face. All Peregrine Falcons and their nests observed are recorded. An occupied nest is determined if at least one adult bird was present at the nest site, two adults observed together, finding a scrape containing eggs or young, or an adult having flushed from a scrape (RIC 2001). Scrapes with no adult bird, eggs, or young detected are considered unoccupied.

Disturbance monitoring methods will be established based on permit conditions and in consultation with applicable regulatory agencies.

When: Surveys may be completed anytime from mid-April to late August, with preference being later in the season (e.g., mid-June to mid-July). Surveys are only to occur prior to construction, and should not be conducted during poor weather conditions (e.g., rain, cold temperatures, high winds). Nest site monitoring, should it be required, will occur during construction until August 31.

Where: Sundog Creek from KP 34.5-40 provides the highest quality Peregrine Falcon cliff-nesting habitat with the potential for construction during the species sensitive period. A Peregrine Falcon scrape survey is required along appropriate north and south facing cliffs from KP 34.5-40.

Tools: At a minimum, field datasheet, GPS, camera, maps of the proposed Project-footprint, and pencil. A helicopter will be required to conduct the survey. Information to be compiled prior to the field survey include accounts of Peregrine Falcon nesting habitat requirements and descriptions of scrapes so they are readily identifiable in the field.

Datasheets: Survey data will be documented on datasheets and will include, at a minimum, the date, surveyor's name, the species detected, the number of individuals observed (adults and young), GPS location, nests/scrape characteristics, eggs/young presence, aerial transect elevation(s), and weather.

Reporting: Scrapes occupied by Peregrine Falcons will be reported to CZN's Site Superintendent, who will then notify CZN's Vice President of Environment and Permitting Affairs.

Adaptive Management: Construction-related activities are mostly planned to occur in the winter; however, some may be required in the late summer/fall including from KP 35-39 along the Sundog Creek when nesting Peregrine Falcons may be present. To avoid possible disturbance, efforts will be made to implement construction activities occurring within 1.5 km of known scrapes after August 31 when Peregrine Falcon nesting sites are less sensitive.

5.1.3 Bear Dens

Table 6: Bear Den Monitoring Plan Summary

Objective	Monitoring	Frequency	Timing	Rationale
Avoid destruction of and disturbance to occupied carnivore den(s)	Ground-based survey	Once prior to winter clearing that is proposed from Sept. 30 to Mar. 30	Sept. 20 to Oct. 31	▪ Carnivore dens are protected under the NWT *Wildlife Act* ▪ Clearing is scheduled to occur during Black and Grizzly bear overwintering and natal denning periods

Clearing activities that occur from October 1 to May 31 have the potential to disturb and/or harm denning bears. Bears and their occupied dens are protected under the NWT *Wildlife Act*.

Black Bears are active from approximately late April/late May to early/mid-October. Black Bears typically excavate dens; however, hollow logs/trees, rock caves, and piles of human-made debris are also used (Kolenosky and Strathearn ND; Clarkson 1993; Larivière 2001). Excavations are commonly under the base of standing trees or stumps, under fallen logs, or directly into the soil (Kolenosky and Strathearn ND). Black Bear denning habitat is considered common in the area of the proposed Project-footprint (refer to the Black Bear Hibernating Habitat Potential map; Tetra Tech EBA 2016).

Grizzly Bears are active from approximately mid-April to late October. Excavated dens are located predominantly on southeast facing slopes in alpine habitat between 1,400 to 1,800 m in elevation; however, a few dens are reported in sub-alpine habitat, and even fewer in white spruce forest habitat (Miller et al. 1982). Golder (2010) indicated potential denning areas may occur on the eastern slopes of the Mackenzie Mountains.

CZN's current winter road permit does not include a requirement for a bear den survey or monitoring, nor was it considered during the EA or permitting process for that permit. For the all-season road, the first part of the development will include construction of a winter road within the all-season road alignment. That road alignment and borrow sources will be accurately surveyed in the field, likely in the summer. As part of that process, survey crews, together with local and environmental monitors, will be tasked to identify previously used Black Bear dens proximal to road sections that will deviate from the winter road originally constructed in the 1980's. Old dens that are located during this ground-based reconnaissance will help focus the search area for a more thorough survey in the late fall, prior to denning, as bears are commonly known to re-den in the same general area (Clarkson 1993).

An aerial bear den survey will be completed in the late fall before clearing activities commence, with the objective of determining the location of potentially active dens. The survey will encompass an area within 800 m of Project-related footprints that significantly diverge from the current winter road alignment and 1.5 km from borrow sources

planned for blasting during the winter period. The aerial survey will include flying evenly spaced transects across the area of interest, with a higher survey intensity (either aerial and/or ground based) in areas of previously identified dens. If active dens are detected, modifications to the development plan (e.g., selection of a new borrow source) will be considered with the input of an Inspector to minimize disturbance and/or harm to hibernating bears.

Bear den monitoring surveys are not required should clearing activities occur (and finish) prior to bear den entry (early October). For example, the Project-related footprints that are proposed to be cleared in the late summer/fall (e.g., KP 0 to 39 and KP 95 to 102) will not be included in the bear den monitoring survey if they are cleared before October 1.

Who: Monitors, in conjunction with the field crew, are responsible for completing the ground-based bear den reconnaissance survey, and will report the location of observed dens to the Site Superintendent. In addition, Monitors, with support from a professional biologist, will be responsible for completing the aerial survey prior to Project-related clearing.

What: Bear den surveys include both aerial and ground-based surveys within and beyond the proposed Project footprint. The aerial survey includes flying parallel transects equal distance along the road right-of-way and across all other Project footprints within areas considered high quality hibernating habitat. The ability to investigate potential denning habitat features off transect but within the Project footprint are permitted.

The ground-based reconnaissance survey involves two to three people walking the proposed Project footprints within high potential bear hibernating habitat in transects evenly spaced 30 m apart.

When: Black Bears are expected to enter their dens from early to mid-October, and Grizzly Bears by late October. In the week(s) prior to entering the den, bears (particularly Black Bears) often concentrate their activity near the den site (Clarkson 1993; Kolenosky and Strathearn ND). The aerial survey should be completed from approximately September 20 to October 31 (a thin covering of snow on the ground may aid in locating newly dug dens).

Where: The bear den monitoring surveys are to be conducted in areas of high and moderate predicted denning habitat, within 800 m of the Project footprint where it deviates from the current winter road alignment, and within 1.5 km of borrow sites requiring blasting. The Black Bear hibernating model (Tetra Tech EBA 2016) has identified high, moderate, and low predicted denning habitat and will be used to determine the survey area.

Tools: At a minimum, a field datasheet, GPS, camera, maps of the proposed Project-footprint and Black Bear hibernating model, safety gear (e.g., bear spray), and pencil. An understanding of bear denning habitat requirements and appearance is required prior to the field surveys. A helicopter will be required to complete the aerial survey.

Datasheets: Survey data will be documented on datasheets and include, at a minimum, the date, surveyor's name, the transect start and end GPS locations, den GPS location, description of the bear den (e.g., surrounding habitat), description and location of fresh bear sign near the den, and weather including percent snow cover.

Reporting: Dens are considered active by a bear if fresh sign (e.g., nearby scat, tracks, freshly turned soil, beds) is detected. Active dens will be immediately reported to CZN's Site Superintendent, who will then notify CZN's Vice President of Environment and Permitting Affairs to advance the adaptive management process and notify the appropriate regulatory agency (e.g., GNWT ENR and/or Parks Canada) of the active dens presence.

Adaptive Management: If an active den is found, mitigation will be considered depending on the circumstances and location. If an occupied den is found during winter clearing, all activities will be suspended within the applicable restricted activity zone (to the extent possible), and the appropriate regulatory agency will be contacted to determine

appropriate mitigation. Adaptive management strategies are not required at development sites where no or inactive Black or Grizzly bear dens are observed.

5.2 Construction Monitoring

The Environmental Monitor(s) are responsible for overseeing construction and confirming that it is being completed in accordance with permit conditions, established setback distances, and sensitive wildlife period guidelines (as per Appendix C). Seasonal avoidance is the primary means of mitigation (e.g., clearing activities outside breeding bird nesting season). If activities cannot be scheduled to avoid sensitive periods and/or setback distances cannot be met, the Environmental Monitor will undertake site-specific construction monitoring.

During construction, blasting is considered the most disturbing to wildlife. The Environmental Monitor is responsible for carrying out wildlife reconnaissance surveys, prior to blasting, to determine the presence of Caribou, Dall's Sheep, Wolverine, Grizzly Bear, and Trumpeter Swans within applicable setback distances.

As appropriate, the Environmental Monitor will scan adjacent slopes, ponds, and surrounding areas with binoculars prior to blasting at any time of the year. Blasting is prohibited if a target species is observed within the applicable setback distance of the blast site until the animal moves out of the area. At the beginning of each day, blasting may commence at the approval of the Environmental Monitor.

5.3 Operations and/or Mitigation Monitoring

5.3.1 Wildlife Observation and Incidents Log

CZN's "observe, record, and report" policy for wildlife observed (including wildlife incidents and near misses) on and near the Project, as detailed in the earlier Draft (Golder 2012; Appendix B), remains applicable. A summary of Appendix B is provided below.

The general wildlife monitoring program involves recording the observations from all employees, including the Environmental Monitor, truck drivers, and on-site consultants. Collectively, these observations:

- identify species presence and abundance on and near the Project;
- identify locations where species most often interact with the Project to highlight areas of potential risk to wildlife and staff and those requiring mitigation and/or adaptive management;
- determine the occurrence of predators at the facilities and camps to emphasize areas of risk to prey species and staff, and possible waste management concerns;
- over time, identify locations of animal-vehicle near misses and mortality (including defense of life and property) to determine possible barriers to movement and areas requiring mitigation and/or adaptive management; and
- over time, when combined with the checkpoint station data (refer to Section 5.3.2) provide an indication of possible Project-related avoidance effects along the all-season access road.

Table 7: Wildlife Observation and Incident Log Summary

Objective	Monitoring	Frequency	Timing	Rationale
Identify species presence and abundance on and near the Project to better evaluate areas requiring mitigation and/or adaptive management	Ground-based incidental observations while carrying out daily activities	Daily	Year round	Alerts to areas requiring mitigation and/or adaptive management

The Wildlife Observation and Incident Log can be an effective method to identify and monitor Project-wildlife interactions, and alert CZN's Environmental Management team to potential conflict areas requiring mitigation and/or adaptive management. The logs can provide a temporal (i.e., seasonal) and spatial understanding of Project-wildlife interactions, and when mapped collectively over time, can highlight areas requiring specific mitigation. CZN's Environmental Monitors are responsible for logging wildlife observations and incidents to discern any possible temporal and spatial trends in species presence near the Project and Project-wildlife interactions and conflict areas.

Who: CZN's Environmental Monitor is responsible for completing, recording, and reporting from the Wildlife Observation and Incident Log. The Environmental Monitor is also mobile and proactively investigates wildlife activity, such as recent tracks (Golder 2012). However, all personnel are responsible for reporting wildlife observations to the Environmental Monitor.

What: The monitoring program includes documenting all wildlife observations (including sign) and incidents while carrying out daily work activities.

When: Daily, year round.

Where: On and near all Project footprints.

Tools: Variable; however, may include a GPS, camera, datasheets, radio, pencil, and appropriate mapping software.

Datasheets: General observation data are documented on datasheets and include, at a minimum, the date, observer's name or initials, the animal species and number observed, GPS location or nearest road kilometre post, and a description of what the animal was doing and how it may have responded to the possible disturbance. Wildlife incidents are reported on a separate datasheet and include, at a minimum, the Environmental Monitor's name and the person reporting the incident, location of the incident, type of incident, species involved, details of the incident and actions taken, possible reason for the incident (e.g., possible waste management concerns), an indication if the incident was resolved, the date the GNWT ENR and/or Parks Canada were notified, and the name of the person notified.

Reporting: The following wildlife incidents are to be reported to the GNWT ENR and/or Parks Canada officer without delay (Table 8):

- Any defense of life and property kills;
- Injured and suspected diseased wildlife;
- Wildlife carcass;
- Incidence of human-wildlife conflict and anytime property is damaged by wildlife; and
- Anytime deterrents are used.

Table 8: Wildlife Incident Contacts for Prairie Creek Mine Project*

Name	Company/Agency	Title	Phone Number	Email
Wildlife Emergency Line	GNWT ENR (Ft. Simpson)	-	1-867-695-7433	-
Wildlife Emergency Line	GNWT ENR (Yellowknife)	-	1-867-767-9238	-
24-Hour Spill Report Line	GNWT ENR	-	1-867-920-8130	-
Report a Wildland Fire	GNWT ENR	-	1-877-698-3473 or 1-877-NWT-FIRE	-
Report a Poacher	GNWT ENR	-	1-866-762-2437	-
Floyd Bertrand	GNWT ENR (Dehcho Region, Fort Liard)	Manager, Wildlife & Environment	1-867-770-4300	Floyd_Bertrand@gov.nt.ca
Nic Larter	GNWT ENR (Dehcho Region, Fort Simpson)	Manager, Wildlife Research and Monitoring	1-867-695-7475	Nic_Larter@gov.nt.ca
Douglas Tate	Parks Canada	Ecologist Team Leader	1-867-695-7751	Doug.Tate@pc.gc.ca

* Updated from Golder (2012).

Adaptive Management: Depending on the incident, the Environmental Monitor will notify the Site Superintendent (and applicable regulatory agencies, as required) of a conflict, and will determine appropriate response strategies that may include:

- Increase frequency of surveillance/monitoring;
- Investigate if mitigation, SOP's, and BMP's are being followed appropriately;
- Increase staff training;
- Consider cause of incident and evaluate how and why mitigation failed;
- Review traffic management; and
- Contact appropriate regulatory agencies to discuss options.

5.3.2 Checkpoint Station

CZN has proposed a controlled checkpoint station along the proposed access road to control access. This also provides an opportunity to track road use activities. The proposed access road provides the only road access into the area, and all road traffic entering the area must pass through the checkpoint station.

The checkpoint monitoring program, when combined with the Wildlife Observation Logs and other monitoring programs, will allow a quantitative analysis relating road traffic levels with wildlife observations along the road over time.

Wildlife Harvest Questionnaire

The proposed access road has the potential to affect harvestable species abundance and distribution, and change harvesting pressure and harvesting areas. The potential effects from harvesting activities relating to hunting and trapping will be monitored through a voluntary Wildlife Harvest Questionnaire issued verbally at the checkpoint station.

The objective of the Wildlife Harvest Questionnaire is to track harvester observations and harvest pressure along the all-season access road, and use this knowledge to better understand the possible effects of increased access. At the manned checkpoint, hunting, trapping, and gathering activities will be monitored using the questionnaire through the life of the Project. This will be a voluntary survey completed by the checkpoint station attendant, where the participant's name is not recorded.

The questionnaire will be verbal with the checkpoint monitor reading the questions to the participants and recording their responses. This will provide a manageable means of monitoring harvester access over the Project life in conjunction with potential changes in wildlife observations along the access road. The questions relate to: what hunting, trapping, and gathering practices would be/have been undertaken, approximate effort (number of hours/days spent harvesting), quantity of harvested species, apparent health and/or body condition of the animal harvested, general location of harvest effort (portioned into 10 km blocks and/or map delineation), and the participants impression of hunting/trapping pressure (i.e., high, medium, low, negligible) on harvest species.

Results from the Wildlife Harvest Questionnaire, including total number of voluntary responses collected at the manned checkpoint, will be discussed annually by the proposed Technical Advisory Committee, and possible adaptive management strategies, if required, will be determined collectively.

5.3.3 Western Toad Fall Movement

Table 9: Western Toad Monitoring Plan Summary

Objective	Monitoring	Frequency	Timing	Rationale
Avoid harm to Western Toads during mass-movements from breeding ponds	Slow driving survey along the access road	Twice daily	July 1 to Aug. 31	▪ Western Toads are listed as Threatened in the NWT ▪ Risk of road mortality dispersing from breeding pond(s)

Western Toads are listed as Threatened in the NWT. Although their distribution across the NWT is not well known, the access road is located at the northern-most extent of their expected range. CZN committed to conducting a Western Toad breeding pond survey along portions of the all-season access road south of the Liard River as part of the baseline program and to further the understanding of the species' presence and distribution. If present, Western Toads are susceptible to road mortality particularly during fall mass-movement from breeding ponds. Spring movements from overwintering areas to breeding ponds occur at a time when Mine-traffic is suspended until barging operations commence.

Should Western Toad be identified breeding in ponds near the access road, a fall monitoring program will be initiated to detect aggregations across the access road. The objective of the Western Toad fall monitoring program is to determine the timing of mass movement, location of road crossing corridor(s), and re-evaluate the mortality risk from road traffic.

Who: CZN's Environmental Monitor is responsible for completing and reporting on the Western Toad surveys. The survey requires the slow driving of a vehicle along the access road. Survey results will be reported to CZN's Site Superintendent. CZN's Vice President of Environment and Permitting Affairs will be notified of any Western Toad presence and/or carcasses by the Site Superintendent.

What: The survey involves slowly driving a vehicle (approximately 30 km/hr) twice daily each July and August (period following metamorphosis and expected dispersal from breeding ponds; Species at Risk Committee 2014) to observe and record Western Toads crossing the road and/or carcasses. Portions of the access road near identified breeding pond(s) will be a particular focus for the surveys. Any Western Toad observed during the driving survey, or incidentally throughout the year, will be recorded.

When: The specific timing of dispersal from breeding ponds is relatively unknown in the NWT, but is expected to occur between July and August (July 1 to August 31).

Where: The Western Toad survey is to be conducted along all portions of the all-season access road from the Liard River to the Nahanni Access Road.

Tools: At a minimum, field datasheet, map of known breeding pond(s), GPS, camera, and pencil. An understanding of Western Toad identification is required prior to the field survey.

Datasheets: Survey data will be documented on datasheets and will include, at a minimum, the date, surveyor's name, start and end time, GPS location, number of Western Toads observed, and weather.

Reporting: All observations of Western Toad carcasses are to be reported to GNWT ENR within 24 hours. The Environmental Monitor will report all observations of Western Toads crossing the all-season access road to CZN's Site Superintendent who will then notify CZN's Vice President of Environment and Permitting Affairs. Mitigation to minimize traffic-related risks will then be advanced, as required. Mitigation measures should be developed in consultation with the GNWT ENR.

Adaptive Management: Adaptive management strategies will be developed in consultation with the GWNT ENR, and triggered in the event of one Western Toad mortality from Project-related activities.

5.3.4 Dall's Sheep Lambing

The earlier Draft WMMP (Golder 2012; Appendix B), details a Dall's Sheep monitoring program to document sheep distribution and habitat use, and to locate lambing areas using aerial and ground-based reconnaissance surveys. In addition, ground-based behavioural surveys, from mid-April to mid-June (lambing and post-lambing periods) are outlined to determine if overflight events are affecting Dall's Sheep behaviour.

5.3.5 Northern Mountain Caribou

ENR (2016) indicates that the Mine and all-season road are in an area where few Northern Mountain Caribou occur (reported as "trace occurrence"). This is consistent with observations made during surveys conducted for CZN, and with CZN's own anecdotal reports.

The earlier Draft WMMP (Golder 2012; Appendix B) proposed the establishment of a log for observed Caribou and any Caribou aggregation locations along the access road. Tetra Tech EBA concurs with this approach.

During the EA process for the proposed all-season access road, Parks Canada suggested an annual aerial Northern Mountain Caribou survey to determine a population index and composition during rut as a long-term monitoring approach to evaluate the potential effects from road avoidance and disturbances, increased predation risk, and

road-related mortality. Parks Canada also indicated that these annual surveys may be supplemented with seasonal track and scat surveys or the use of remote cameras. However, caribou densities near the proposed all-season road are considered to be too low for these methods to be effective in measuring changes associated with road avoidance or disturbances, increased predation risk, and/or road-related mortality. Sutherland (2000) suggests that if only a few individuals occur in the area, or are detected during the survey, then any change detected over time could be attributed to chance.

In addition, while surveys during the rut are considered to be appropriate to monitor population abundance and composition, it would be difficult to draw a correlation to possible effects from the all-season road. During the fall rut, caribou gather into small to large aggregations in traditionally used open alpine/subalpine habitats at higher elevations (Weaver 2005; Government of Yukon 2014). Weaver (2005) indicated that 84% of caribou aggregations from the Upper Nahanni herd, detected from fall surveys, contained fewer than 15 individuals. No such aggregations have been noted proximal to the road alignment. However, even if aggregations were documented near the proposed all-season road, this would not be representative of their year-round distribution, and possible avoidance effects with respect to the road are likely immeasurable.

Parks Canada et al. (2009) suggests that current recruitment for caribou herds in the NNPR is low and the herds may be in decline. Therefore, this regional natural range of variability would further make it difficult to attribute potential effects related to road operations.

Based on the rationale provided, the surveys proposed by Parks Canada are considered suitable for broader park and caribou management objectives, but not appropriate for the specific effects monitoring requirements for the proposed all-season road. We believe the monitoring requirements described by Golder 2012 are appropriate.

CZN has offered to provide logistical and monetary support to Parks Canada for the continuation of Northern Mountain Caribou monitoring for broader management. CZN continues to offer support to Parks Canada, together with the recording of Caribou observations, as an effective monitoring program appropriate for the low numbers of Caribou in the area. Parks Canada's current monitoring programs provide a greater understanding of overall Caribou abundance and distributions across the region. It is recognized that Parks Canada is better equipped to develop and/or continue such surveys.

It is recommended that further discussions between CZN and Parks Canada be held to work out the details of an acceptable monitoring program for Caribou going forward, including roles, responsibilities, and financing.

5.3.6 Barn and Bank Swallow Nesting

Table 10: Barn and Bank Swallow Plan Summary

Objective	Monitoring	Frequency	Timing	Rationale
Avoid disturbance at nest sites and avoid destruction of Barn and Bank swallow nests during operations	Visual checks in building rafters, under bridges, and in borrow source gravel piles	Twice yearly	Late May to late July	▪ Barn Swallows are ranked as May Be At Risk in the NWT, and both species are assessed as Threatened by COSEWIC ▪ Maintenance and general operations at the Mine, and all-season road have the potential to disturb and/or destroy nests

Barn and Bank swallows have special conservation status and are known to select anthropogenic structures for nesting, and are thus at greater risk of nest disturbances and destruction during Project-related operations and maintenance activities. Barn Swallows are known to build mud nests inside buildings and anthropogenic structures (including bridges). Bank Swallows excavate nests by burrowing in exposed soil banks along eroded watercourses and lakeshores; however, they may also nest in sand and gravel pits/quarries. Both species may reuse nests in subsequent years.

Who: Each year, CZN's Environmental Monitors will be responsible for conducting Barn and Bank swallow nest surveys under bridges, inside buildings, and at borrow sources to determine the presence of nests. If nests are present, all employees and contractors will be notified and prohibited from disturbing occupied nests and destroying the nest at any time of the year. CZN's Environmental Monitors are responsible for notifying the presence of nests to the Site Superintendent and appropriate maintenance staff. The Site Superintendent will notify CZN's Vice President of Environment and Permitting Affairs of any Barn or Bank swallow activity and/or nests.

What: The reconnaissance survey involves the visual inspection of rafters, under bridges, and in the soil/gravel stockpiles at borrow sources for nests.

When: The reconnaissance survey will be completed when swallows are present at the nests to determine if birds are returning to the same nests in subsequent years. An early and late season survey (total of two surveys per year) will be completed from late May to late July.

Where: Under bridges, inside buildings, and at active borrow sources (borrows that remain open for road maintenance work).

Tools: At a minimum, a field datasheet, GPS, camera, and pencil.

Datasheets: Survey data will be documented on datasheets and will include, at a minimum, the date, surveyor's name, GPS location, and/or name of the building inspected, species observed (includes adult and nest observations), number of nests and/or excavated burrows, and weather.

Reporting: All observations of Barn and Bank swallow nests are to be reported to CZN's Site Superintendent and maintenance staff, and appropriate staff must be informed of the mitigation measures to avoid disturbing occupied nests (to the extent possible, depending on their location) and or destruction of nests. CZN's Site Superintendent will notify CZN's Vice President of Environment and Permitting Affairs of any Barn or Bank swallow activity and/or nests.

Adaptive Management: Adaptive management strategies will be developed in consultation with the appropriate regulatory authorities, and will be triggered in the event of one Barn and or Bank swallow mortality and nest destruction from Project-related activities.

6.0 ADAPTIVE MANAGEMENT

CZN will use wildlife and wildlife habitat information gained through the implementation of the WMMP to evaluate the success of wildlife and wildlife habitat mitigation measures implemented during all phases of the Project (e.g., pre-construction to closure), and will work to continuously improve management practices, using pre-set management thresholds and response strategies. As the Project progresses, and through the process of adaptive management, this updated Draft WMMP will be adjusted to incorporate modifications and/or additions to monitoring programs, methods, and corporate SOPs.

The WMMP includes a review process which will help evaluate the effectiveness of mitigation measures developed for the Project. Results of the review will be used to adjust mitigation measures in order to improve site-specific performance. As a starting point, the policies and recommended protection measures described in this updated Draft WMMP have been developed based on existing regulatory agency and other northern mining projects best management practices.

This updated Draft WMMP is a living document. The wildlife monitoring procedures and on-site mitigation measures will be evaluated regularly (e.g., during established reporting cycles) and reviewed with Parks Canada, GNWT ENR, Environment and Climate Change Canada, and Aboriginal partners, as appropriate. Recommendations for improvement based on science, local and traditional knowledge, and new lessons learned from the Project and others will be incorporated into subsequent editions of the WMMP. Should there be a situation or incident that could not be predicted, CZN's Site Superintendent will contact the responsible authorities for guidance on associated protective measures, deterrents, or other actions.

Appendix B details CZN's approach to adaptively manage wildlife and wildlife habitat on and near the Project, including mortality thresholds and non-fatal disturbances. In particular, the mortality threshold, which acts as a trigger to initiate specific management responses, for all species with special conservation status (Table 1) is zero. When the mortality threshold is crossed (i.e., one animal with special conservation status is killed) it will initiate review and possible changes to the existing mitigation measure and/or result in the creation of a new mitigation measure. An immediate and thorough review of the triggering incident, evaluation of why and how mitigation may have failed, and if mitigation measures were being followed correctly, will be undertaken.

7.0 REPORTING

As outlined in the earlier Draft WMMP (Golder 2012; Appendix B), regular reporting and analysis of the wildlife monitoring program is a component of the adaptive management process, whereby the data are analyzed for issues or potential problems, such as seasonal concentration areas or sections along the access road that have a high incidence of collisions or near miss occurrences. CZN's Environmental Monitor(s) will contribute to quarterly and more detailed annual reports of wildlife observations and incidents that occurred during the monitoring period. The reports will be submitted to Aboriginal partners, GNWT ENR, and Parks Canada to solicit review of the effectiveness of mitigation measures and, following discussion in Technical Advisory Committee meetings, to suggest modifications to mitigation and monitoring plans, as necessary. Monthly reporting schedules, as suggested in the earlier Draft WMMP (Golder 2012; Appendix B) are replaced by the mitigation measure to immediately report to Parks Canada or a GNWT ENR Officer (within 24 hours) dangerous human-wildlife encounters and all mortality or injury involving big game and/or species at risk.

The annual reporting schedule includes yearly engagement with members of local Aboriginal groups to present results from each of the monitoring programs, and to discuss issues and considerations for adaptive management, if required.

8.0 CLOSURE

We trust the information contained in this updated Draft Wildlife Mitigation and Monitoring Plan meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech EBA Inc.

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REFERENCES

Aboriginal Affairs and Northern Development Canada (AANDC). 2011. Northern Land Use Guidelines – Volume 9a Seismic Operations. Web access: http://publications.gc.ca/collections/collection_2012/aadnc-aandc/R2-226-9-1-2011-eng.pdf

Canadian Zinc Corporation (CZN). March 2010. Prairie Creek Mine Developer's Assessment Report: Main Report. Submitted in support of Environmental Assessment of Prairie Creek Mine EA 0809-002. Submitted to Mackenzie Valley Review Board. 339 pp.

Canadian Zinc Corporation (CZN). April 2015. Developer's Assessment Report, All Season Road Project, Prairie Creek Mine: Main Report. Submitted in support of Environmental Assessment of Prairie Creek Mine EA 1415-01. Submitted to Mackenzie Valley Review Board. 288 pp.

Clarkson, P. 1993. The Ecology and Management of Problem Black Bears at Norman Wells, NWT, 1985 – 88. Department of Renewable Resources, Government of the Northwest Territories, Manuscript Report No. 70. Pp. 46.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2012. COSEWIC assessment and update status report on the Western Toad in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa, Ontario. 71 pp.

Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2016. Wildlife Species Search. Web access: http://www.cosewic.gc.ca/eng/sct1/index_e.cfm [accessed August 2016];

DehCho Land Use Planning Committee (DCLUPC). ND. Cumulative Effects Management in the Deh Cho Territory: preliminary assessment and results. Fort Providence, NT. 18 pp.

Environment and Natural Resources (ENR). 2015. The Northwest Territories Wildlife Act: Plain Language Version. Web access: http://www.enr.gov.nt.ca/sites/default/files/wildlife_act_plain_language_document_1_february_2015.pdf

Environment and Natural Resources (ENR). 2016. Species at Risk in the NWT: 2016. Government of the Northwest Territories. 97 pp.

Environment and Climate Change Canada. 2016. General Nesting Periods of Migratory Birds in Canada. Web access: http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1

Golder Associates Ltd. (Golder). 2010. Vegetation and Wildlife Assessment Report, Prairie Creek Mine, Northwest Territories. Prepared for Canadian Zinc Corporation.

Golder Associates Ltd. (Golder). August 2012. Draft Wildlife Mitigation and Monitoring Plan, Canadian Zinc Corporation Prairie Creek Mine, Northwest Territories. Prepared for Canadian Zinc Corporation.

Government of Canada. 2016. Species at Risk Public Registry. Web access: http://www.sararegistry.gc.ca/sar/index/default_e.cfm [accessed August 2016].

Government of Yukon. 2014. Yukon Wildlife Key Area Inventory User's Manual. Habitat Programs, Fish and Wildlife Branch, Department of Environment. Web access: http://www.env.gov.yk.ca/publications-maps/documents/WKA-Manual-2013.pdf.

Kolenosky, G.B and S. M. Strathearn. ND. Winter Denning of Black Bears in East-Central Ontario. Int. Conf. Bear Res. and Manage, 7: 305-316.

Larivière, S. 2001. Ursus americanus. American Society of Mammalogists. 647: 1-11.Northwest Territories (NWT) Bureau of Statistics. 2014. Nahanni Butte Statistical Profile. Web access: http://www.statsnwt.ca/community-data/Profile-PDF/Nahanni%20Butte.pdf [July 2015].

Miller, S.J., N. Barichello, and D. Tait. 1982. The Grizzly Bears of the Mackenzie Mountains, Northwest Territories. Completion Report No. 3. NWT Wildlife Service, Yellowknife, NT. 118 pp.

Parks Canada, Nahʔą Dehé Consensus Team, and Deh Cho First Nations. 2009. Nahanni National Park Reserve of Canada, Nahʔą Dehé State of the Park Report 2009. 77 pp.

Resources Inventory Committee (RIC). 2001. Inventory Methods for Raptors. Web access: https://www.for.gov.bc.ca/hts/risc/pubs/tebiodiv/raptors/version2/rapt_ml_v2.pdf

Species at Risk Committee. 2012. Species Status Report for Boreal Caribou (Rangifer tarandus caribou) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.

Species at Risk Committee. 2014. Species Status Report for Western Toad (Anaxyrus boreas) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.

Sutherland, W.J. 2000. Ecological Census Techniques, a Handbook. Cambridge University Press, Cambridge, United Kingdom. 336 pp.

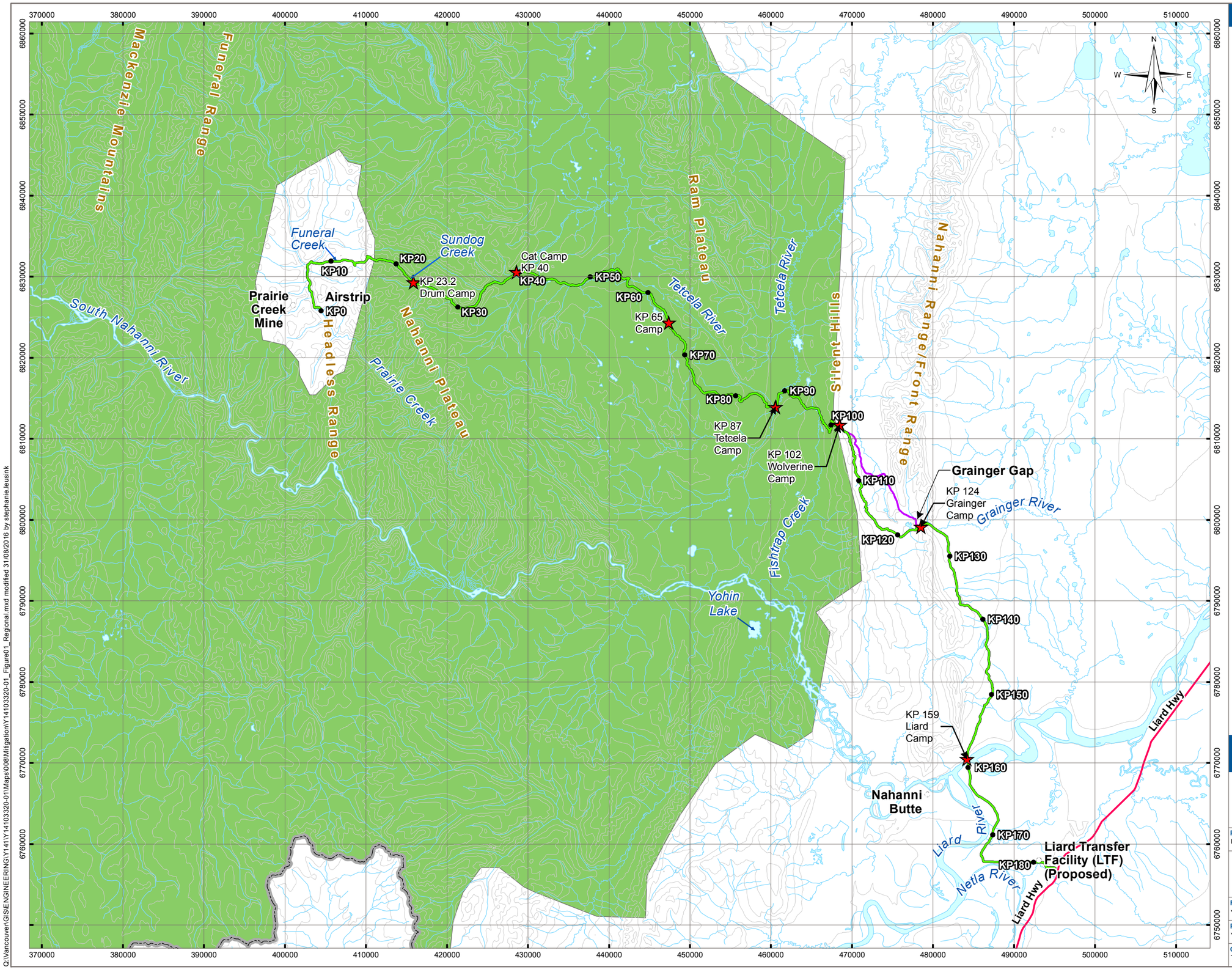
Tetra Tech EBA Inc. (Tetra Tech EBA). September 2015. Vegetation and Wildlife and Wildlife Habitat: Developers Assessment Report Sections, Prairie Creek All Season Road and Airstrip, Northwest Territories. Prepared for Canadian Zinc Corporation. 269 pp. + Appendices.

Tetra Tech EBA Inc. (Tetra Tech EBA). April 2016a. Wildlife and Vegetation Information Requests Rev. 02. Prepared for Canadian Zinc Corporation.

Tetra Tech EBA Inc. (Tetra Tech EBA). 2016b. July 2016 Vegetation and Wildlife Baseline Surveys, Prairie Creek All Season Road. Prepared for Canadian Zinc Corporation.

Weaver, J.L. 2005. Big Animals and Small Parks: Implications of Wildlife Distribution and Movements for Expansion of Nahanni National Park Reserve. Conservation Report No. 1. Wildlife Conservation Society Canada, Toronto, Ontario. 98 pp.

FIGURES



LEGEND

- Construction Camp
- Contour (200 m)
- Prairie Creek Access Road (Apr 5, 2016)
- Alternative Alignment (Apr 5, 2016)
- Watercourse
- Waterbody
- Current Nahanni National Park Reserve Boundary
- Yukon / NWT Border

NOTES
Road alignment provided by AllNorth (April 5, 2016).
Base data source: NTS 1:250,000

STATUS
ISSUED FOR USE

PRAIRIE CREEK ALL-SEASON ROAD WILDLIFE MITIGATION AND MONITORING PLAN

Project Description

PROJECTION UTM Zone 10		**DATUM** NAD83		**CLIENT** CANADIAN ZINC CORPORATION
Scale: 1:450,000 (5 2.5 0 5 Kilometres)				TETRA TECH EBA
FILE NO. Y14103320-01_Figure01_Regional.mxd				
PROJECT NO. Y14103320-01.008	**DWN** MEZ	**CKD** SL	**APVD** KL	**REV** 0
OFFICE Tt EBA-VANC	**DATE** August 31, 2016			**Figure 1**

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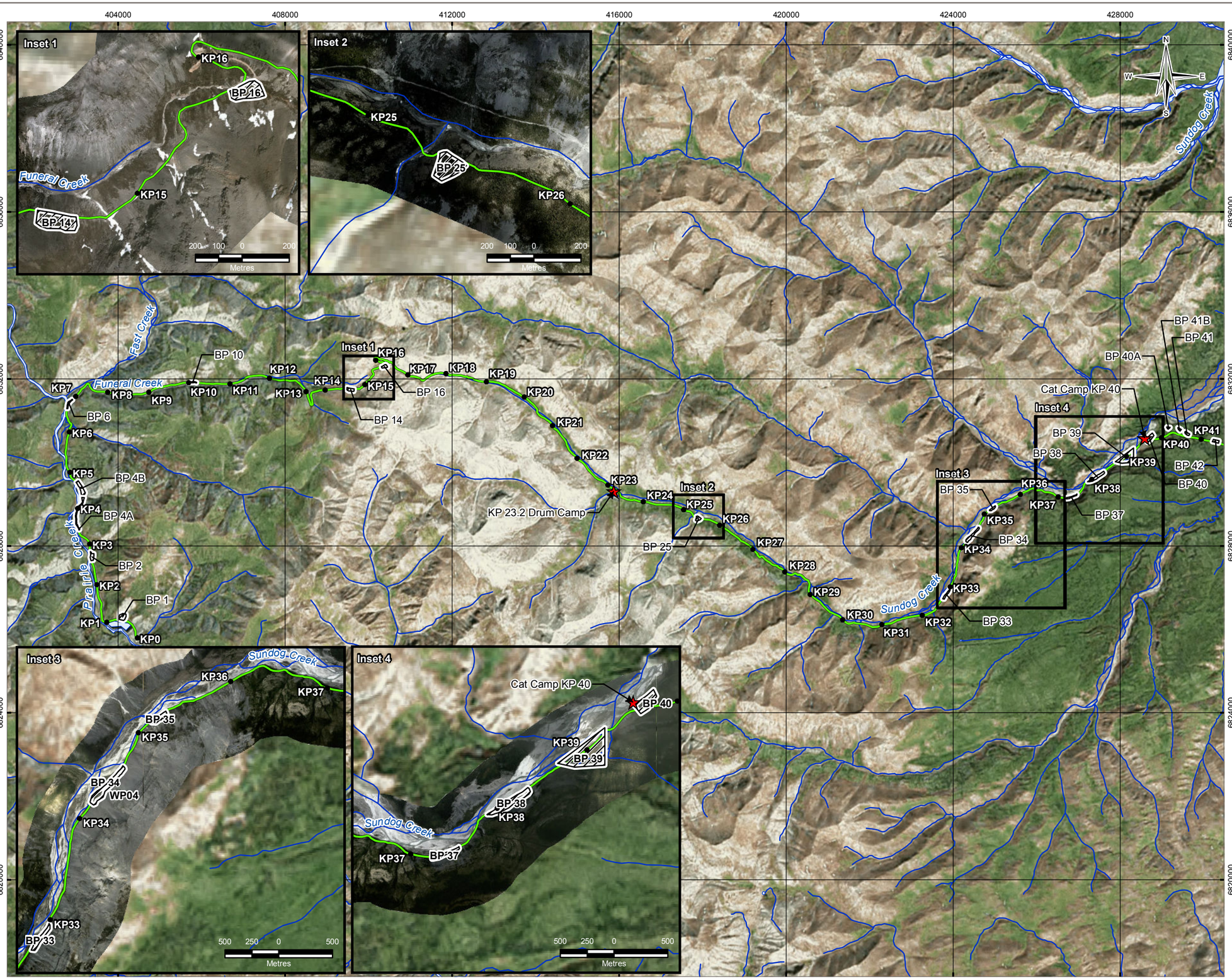

LEGEND

- Construction Camp
- Prairie Creek Access Road (Apr 5, 2016)
- Proposed Borrow Pit (preferred and alternate)
- Watercourse
- Waterbody

DRAFT

NOTES
Base data source:
Imagery, alignment and camps provided by AllNorth
Additional Imagery from ESRI; Earthstar Geographics (1999)

STATUS
ISSUED FOR USE

PRAIRIE CREEK ALL-SEASON ROAD WILDLIFE MITIGATION AND MONITORING PLAN

Collared Pika Survey Locations

PROJECTION UTM Zone 10	**DATUM** NAD83			**CLIENT** CANADIAN ZINC CORPORATION
Scale: 1:90,000 (1 0.5 0 1 Kilometres)				TETRA TECH EBA
FILE NO. Y14103320-01_Figure02_Pika.mxd				
PROJECT NO. Y14103320-01.008	**DWN** MEZ	**CKD** SL	**APVD** KL	**REV** 0
OFFICE Tt EBA-VANC	**DATE** August 31, 2016			**Figure 2**

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APPENDIX A
TETRA TECH EBA'S GENERAL CONDITIONS

GENERAL CONDITIONS

NATURAL SCIENCES

This report incorporates and is subject to these "General Conditions".

1.0 USE OF REPORTS AND OWNERSHIP

This report pertains to a specific site, a specific development or activity, and/or a specific scope of work. The report may include plans, drawings, profiles and other supporting documents that collectively constitute the report (the "Report").

The Report is intended for the sole use of Tetra Tech EBA's Client (the "Client") as specifically identified in the Tetra Tech EBA Services Agreement or other Contract entered into with the Client (either of which is termed the "Services Agreement" herein). Tetra Tech EBA does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Report when it is used or relied upon by any party other than the Client, unless authorized in writing by Tetra Tech EBA.

Any unauthorized use of the Report is at the sole risk of the user. Tetra Tech EBA accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Report.

Where Tetra Tech EBA has expressly authorized the use of the Report by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these General Conditions as well as any limitations on liability contained in the Services Agreement with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these General Conditions and the Services Agreement prior to making any use of the Report. Any use made of the Report by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Report and any other form or type of data or documents generated by Tetra Tech EBA during the performance of the work are Tetra Tech EBA's professional work product and shall remain the copyright property of Tetra Tech EBA.

The Report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of Tetra Tech EBA. Additional copies of the Report, if required, may be obtained upon request.

2.0 ALTERNATIVE REPORT FORMAT

Where Tetra Tech EBA submits both electronic file and hard copy versions of the Report or any drawings or other project-related documents and deliverables (collectively termed Tetra Tech EBA's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed version archived by Tetra Tech EBA shall be deemed to be the original. Tetra Tech EBA will archive the original signed and/or sealed version for a maximum period of 10 years.

Both electronic file and hard copy versions of Tetra Tech EBA's Instruments of Professional Service shall not, under any circumstances, be altered by any party except Tetra Tech EBA. Tetra Tech EBA's Instruments of Professional Service will be used only and exactly as submitted by Tetra Tech EBA.

Electronic files submitted by Tetra Tech EBA have been prepared and submitted using specific software and hardware systems. Tetra Tech EBA makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

3.0 STANDARD OF CARE

Services performed by Tetra Tech EBA for the Report have been conducted in accordance with the Services Agreement, in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Report.

Tetra Tech EBA professionals are bound by their ethical commitments to act within the bounds of all pertinent regulations. In certain instances, observations by Tetra Tech EBA of regulatory contravention may require that regulatory agencies and other persons be informed. The client agrees that notification to such bodies or persons as required may be done by Tetra Tech EBA in its reasonably exercised discretion.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of Tetra Tech EBA.

4.0 ENVIRONMENTAL ISSUES

The ability to rely upon and generalize from environmental baseline data is dependent on data collection activities occurring within biologically relevant survey windows.

5.0 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with Tetra Tech EBA with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for Tetra Tech EBA to properly provide the services contracted for in the Services Agreement, Tetra Tech EBA has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

6.0 INFORMATION PROVIDED TO TETRA TECH EBA BY OTHERS

During the performance of the work and the preparation of this Report, Tetra Tech EBA may have relied on information provided by persons other than the Client.

While Tetra Tech EBA endeavours to verify the accuracy of such information, Tetra Tech EBA accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

7.0 GENERAL LIMITATIONS OF REPORT

This Report is based solely on the conditions present and the data available to Tetra Tech EBA at the time the data were collected in the field or gathered from publically available databases.

The Client, and any Authorized Party, acknowledges that the Report is based on limited data and that the conclusions, opinions, and recommendations contained in the Report are the result of the application of professional judgment to such limited data.

The Report is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present at or the development proposed as of the date of the Report requires a supplementary investigation and assessment.

It is incumbent upon the Client and any Authorized Party, to be knowledgeable of the level of risk that has been incorporated into the project design or scope, in consideration of the level of the environmental baseline information that was reasonably acquired to facilitate completion of the scope.

The Client acknowledges that Tetra Tech EBA is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of property, the decisions on which are the sole responsibility of the Client.

8.0 JOB SITE SAFETY

Tetra Tech EBA is only responsible for the activities of its employees on the job site and was not and will not be responsible for the supervision of any other persons whatsoever. The presence of Tetra Tech EBA personnel on site shall not be construed in any way to relieve the Client or any other persons on site from their responsibility for job site safety.

APPENDIX B

DRAFT WILDLIFE MITIGATION AND MONITORING PLAN (GOLDER 2012)

August 9, 2012

DRAFT WILDLIFE MITIGATION AND MONITORING PLAN

Canadian Zinc Corporation Prairie Creek Mine, Northwest Territories

Submitted to:
Canadian Zinc Corporation
Suite 1710, 650 West Georgia Street
Vancouver, BC
V6B 4M9

REPORT

Report Number: 09-1422-5007/1000/1030

Distribution:

1 Copy - Canadian Zinc Corporation

2 Copies - Golder Associates Ltd.

Executive Summary

This report presents an outline of a draft Wildlife Mitigation and Monitoring Plan (WMMP) prepared on behalf of Canadian Zinc Corporation (CZN) for its Prairie Creek Mine located in the Northwest Territories (the Project). The current mine development includes surface buildings and mine infrastructure as well as underground workings that extend into the adjacent slopes of the Prairie Creek valley. Current access to the mine site is by air to an airstrip located 1.5 km north of the mine site. A previously used access route connects the mine site with the Liard Highway east of Nahanni Butte. Several realignments to the route have been proposed to avoid difficult ground conditions and more sensitive environmental areas. The Prairie Creek Mine is located on land surrounded by the Nahanni National Park Reserve (NNPR), which includes approximately 80 km of the western portion of the 174 km access road.

A "Vegetation and Wildlife Assessment Report" was prepared by Golder Associates Ltd. (Golder) in 2010, which was included with CZN's Developers Assessment Report (DAR) and submitted to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) in 2010. Subsequent to a review of the DAR, a series of Information Requests (IRs) were sent to the MVEIRB and subsequently to CZN for response. Technical Meetings were held in October 2010 wherein additional comments were provided by federal government agencies, specifically Parks Canada Agency (PCA) and Environment Canada (EC). Several of the IRs centered on additional information being provided by CZN on aspects related to mitigation and monitoring of potential impacts on wildlife from operation of the mine and access road. A WMMP was, therefore, developed as a follow-up to these requests.

This WMMP is based on adaptive management principles and consists of two major components: *Wildlife Mitigation* that guides mine site and access road operation, and *Wildlife Monitoring* that measures the effectiveness of mitigation measures (with specific sections on caribou and Dall's sheep monitoring). A third component, *Wildlife Encounters,* outlines specific approaches to follow when dealing with human-wildlife interactions and to reduce the potential for human-wildlife conflict. The WMMP is a dynamic document that will be further developed and evaluated as the Project proceeds, with input from First Nations, Parks Canada, and the Government of the Northwest Territories.

Study Disclaimer

This Draft Wildlife Mitigation and Monitoring Plan was prepared by Golder Associates Ltd. for Canadian Zinc Corporation and is intended as a framework for implementing mitigation and management practices related to potential impacts on wildlife from the Prairie Creek Mine project. The Draft Wildlife Mitigation and Monitoring Plan outlined herein is based on the principle of adaptive management whereby approaches to management of potential impacts on wildlife will be modified over the years of mine operation, on the basis of new information provided through monitoring of the mine and access road operation. The material in this report reflects Golder's best judgment in light of information available to it at the time of preparation, with the understanding that the procedures and practices will change over time.

Any use which a third party makes of this report or any reliance on or decisions to be made based on it, are at the sole risk and responsibility of such third party. Golder accepts no responsibility for damages, if any, suffered by any third party as a result of decision made or action based on this report.

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TABLES

APPENDICES

1.0 INTRODUCTION

1.1 Project Background

Canadian Zinc Corporation (CZN), based in Vancouver, British Columbia (BC), has proposed to reopen the Prairie Creek Mine for production (the Project). The mine is located at approximately 61° 33' north latitude and 124° 48' west longitude adjacent to Prairie Creek, a tributary of the South Nahanni River, Northwest Territories (NT). Prairie Creek flows into the South Nahanni River approximately 43 km downstream of the Prairie Creek Mine.

The current mine development includes surface buildings and mine infrastructure as well as underground workings that extend into the adjacent slopes of the Prairie Creek valley. Current access to the mine site is by air to an airstrip located 1.5 km north of the mine site. A previously used access route connects the mine site with the Liard Highway. The access route is to be reinstated with several realignments to avoid difficult ground conditions and more sensitive environmental areas. The length of the realigned access road is approximately 174 km. The Prairie Creek Mine is located on land surrounded by the Nahanni National Park Reserve (NNPR). Approximately 80 km of the western portion of the 174 km access road crosses the NNPR.

Golder Associates Ltd. (Golder) prepared a baseline data summary and assessment of the potential effects of reopening the access route and bringing the mine to full production capacity on vegetation and wildlife. This report was incorporated by CZN into its Developer's Assessment Report (DAR) for the proposed mine reopening. Golder (2010) reviewed the potential effects associated with full operation of the mine site on wildlife, and concluded that for most species, significant effects from mining, processing ore to concentrate, and transporting the concentrates out on the access road are not expected to occur. However, sensory disturbance and human presence may result in avoidance of the mine site by some wildlife species or attraction and resulting interaction, notably by caribou (*Rangifer tarandus*), Dall's sheep (*Ovis dallli*), wolverine (*Gulo gulo*), gray wolf (*Canis lupus*), and grizzly bear (*Ursus arctos*).

An assessment of Project-related effects on wildlife and wildlife habitat results in predicted outcomes. Therefore, it is important to develop effective mitigation and monitoring programs and incorporate monitoring results into wildlife management in order to minimize impacts and measure if Project-related effects exceed predicted impacts. This Draft Wildlife Mitigation and Monitoring Plan (WMMP) is based on adaptive management principles and consists of three major components: Project *Mitigation* that guides mine and access road operation, Project *Monitoring* that measures the effectiveness of mitigation measures, and *Wildlife Encounters,* that outlines specific approaches to reduce the potential for human-wildlife conflict.

1.2 Objectives

The WMMP for the Prairie Creek Mine is designed as a comprehensive plan that incorporates site activities, reviews potential site impacts and outlines measures to mitigate potential effects. The overall purpose of the WMMP is to prevent, minimize, or mitigate adverse effects of the Mine, access road, and associated infrastructure on wildlife and wildlife habitats. The *Wildlife Mitigation* section outlines specific strategies to mitigate impacts on wildlife and wildlife habitat, while the *Wildlife Monitoring* section outlines the steps considered necessary to determine the effectiveness of mitigation strategies, verify the accuracy of predictions, and respond to expected or unexpected conditions. A third section, *Wildlife Encounters,* outlines specific approaches to follow when dealing with human-wildlife interactions and to reduce the potential for human-wildlife conflict.

1.3 Adaptive Management Approach

An important component of any WMMP is to develop effective mitigation and monitoring programs and incorporate monitoring results into wildlife management. The WMMP is based on the principles of adaptive management. Adaptive management is a structured, iterative process of decision making over time as experience is gained and new information is obtained. The objective of adaptive management is to reduce uncertainty through monitoring, or 'learning by doing'. In the case of the Project, the 'doing' is the wildlife monitoring program and the 'learning' is continual improvements to the WMMP. This requires the WMMP to be adaptive and flexible. As such, the results of the wildlife mitigation strategies will be periodically reviewed, focusing on identifying any areas in which mitigation strategies fail to effectively minimize impacts to wildlife and wildlife habitats, or where Project impacts to wildlife and wildlife habitat are exceeding predictions identified in the *Vegetation and Wildlife Assessment Report* (Golder 2010). This review process will, therefore, provide real time, effective data upon which to base decisions with respect to wildlife incidents and measures for reducing risks to wildlife and to workers.

The WMMP must also be flexible enough to incorporate comments, suggestions, and information based both on science and local ecological and traditional knowledge. Feedback and suggestions from employees, First Nations, and Government representatives will be a key element in minimizing the potential for human-wildlife interactions and conflicts. Collaborative mitigation and monitoring initiatives will be supported where necessary. If Project-related effects to wildlife are detected by the monitoring program, the most suitable course of action will be determined by CZN, in consultation with local communities and the appropriate regulatory agencies. The WMMP is, therefore, a 'living' document that will be further developed and evaluated as necessary during mine operation.

2.0 PROJECT DESCRIPTION

The Prairie Creek Mine site has been in place since 1982, including all surface facilities required for full scale mining operations, with the exception of the 6 ha waste rock storage area that will be needed at mine start-up. Once fully operational, the mine will encompass approximately 65.5 ha, a relatively small and compact area of disturbance. Mine facilities are located immediately adjacent to the underground portal and mine shops, including the camp, fuel storage, and water storage pond (WSP), while the airstrip is located 1.5 km north of the mine site.

The original Prairie Creek Mine access road has been in existence since 1980. Proposed improvements to the access road, including 63 km of realignments in the first winter of operation, will result in a total length of 174 km. This will be accomplished with equipment working along the alignment from November to mid-January. The new route will cross the Liard River via an ice bridge in the vicinity of Swan Point. After crossing the ice bridge, the route joins an old logging road which follows the east side of the Liard River to join into the existing Nahanni Butte all season road to its junction with the Liard Highway. The Liard ice bridge will be available for concentrate haulage traffic on average from mid-January to the end of March.

Canadian Zinc will operate two transfer facilities along the access road: one near the mid-point of the road called the Tetcela Transfer Facility (TTF; 2.0 ha in area) and one near the junction of the Liard Highway, called the Liard Transfer Facility (LTF; 2.8 ha in area). The TTF will operate from December to early March each year. The haul of concentrates by the Mine truck fleet will commence from the Mine once the portion of the road from the Mine to the TTF is open, which is expected to be in early December. When the remainder of the road opens, which is expected to be by mid-January, contractor trucks will collect the concentrates in storage and truck them out to the LTF, with an expected completion by early March. The Cat Camp is presently located along the access road to the east of the Mackenzie Mountains and consists of trailers and small fuel storage tanks (less than 1 ha in total).

3.0 SCOPE OF THE WMMP

3.1 Background

The WMMP is intended to provide a blueprint for wildlife impact mitigation and monitoring at the Prairie Creek Mine site and along the access road. This document applies to everyone working, visiting or inspecting the mine site and operation of the Project, regardless of their relationship to CZN. Ultimately, the WMMP will have two audiences: the community and government stakeholders who have concerns about Project effects to wildlife; and mine environmental staff who carry out the monitoring. This document should provide background rationale and information on data collection and analysis to assess if the plan will adequately monitor Project effects to wildlife.

The WMMP will attempt to:

- Provide information to assess anticipated Project impacts;
- Outline mitigation to reduce the risks and disturbance to wildlife and wildlife habitat;
- Determine the effectiveness of wildlife mitigation;
- Meet regulatory requirements and corporate commitments for monitoring as outlined in the DAR and subsequent correspondence during the EA review period;
- Design studies and data collection protocols that are consistent with initiatives for impact mitigation and monitoring in the region;
- Propose thresholds and adaptive management triggers that can be used as early warning signs for reviewing and considering the implementation of additional wildlife mitigation measures;
- Describe a process for regularly reviewing Project operation, mitigation, monitoring and management;
- Outline a means to provide results to communities, governments, and the public; and
- Receive and incorporate input from First Nations and government agencies.

3.2 Study Area

The study area for the WMMP includes the Prairie Creek Mine site footprint, the airstrip, and the access road. The Prairie Creek Mine site is located in the Mackenzie Mountains that locally comprise low mountains with moderate to steep sides and intervening valley bottoms. The mine site is located within the Spruce/Lichen vegetation unit (Beak 1981) at an elevation of approximately 850 m. Above the mine site, this unit grades into the Sub-alpine Shrub zone (dwarf birch and willow with scattered, stunted black spruce), which in turn grades into the Alpine Tundra zone at higher elevations. As is typical of this region, the sparse tree and shrub cover associated with the lower valley slopes is due to cold air drainage within valley bottoms, which limits growth of trees.

The access road crosses a number of vegetation units as described by Beak (1981). From the Mine site in the Mackenzie Mountains, the access road traverses Spruce/Lichen, Sub-alpine Shrub, Alpine Tundra, Black Spruce Parkland, Riparian Alluvial, Pine Parkland, Mixed Coniferous-Deciduous, Black Spruce Muskeg, Grainger Tillplain, Floodplain/Tillplain, and finally Aspen-Liard Floodplain at the Liard River.

3.3 Valued Components

The WMMP, while covering the broad range of species occurring within the Project area, focuses on wildlife Valued Components (VCs) that were identified in the supplemental *Vegetation and Wildlife Assessment Report* to the

DAR. Wildlife VCs represent species and species habitats considered to be important to local First Nation, social, cultural, economic, or aesthetic values and scientific community concerns. Factors considered when selecting VCs included the following:

- Species of First Nation concern with respect to traditional use;
- Species known to be important to residents, managers, and regulators (*e.g.,* harvested species);
- Species of special status in which management or conservation action is required by or compatible with regulatory requirements and existing initiatives (*e.g.,* wildlife listed under the NWT Status Ranks, Schedule 1 of the Species at Risk Act, and wildlife assessed by the Committee on the Status of Endangered Wildlife in Canada [COSEWIC]); and
- Species having ecological significance from a conservation perspective (*i.e.*, 'umbrella' species).

An important aspect of the VC selection process is that it reflects concerns raised by First Nations and government agencies. The following table (Table 1) presents identified VCs and the rationale for their inclusion.

Table 1: Wildlife Valued Components (VCs) Identified in the Prairie Creek Mine and Access Road Project Area

VC	Rationale for Inclusion	SARA Listing	COSEWIC Listing	GNWT Listing
Woodland caribou (*Rangifer tarandus*)	*Northern Mountain Ecotype* ■ Confirmed present in the Project area during winter. ■ Designated as Special Concern under SARA. ■ Designated as Special Concern under COSEWIC. ■ Highlighted by GNWT as at-risk for access road related mortality during winter hauling operations. ■ Species of local economic importance to hunters/outfitters.	Special Concern	Special Concern	Secure
	Boreal Ecotype ■ Confirmed present at the eastern portion of the Project area. ■ Designated as Threatened under SARA. ■ Designated as Threatened under COSEWIC. ■ Highlighted by GNWT as at-risk for access road related mortality during winter hauling operations.	Threatened	Threatened	Sensitive

VC	Rationale for Inclusion	SARA Listing	COSEWIC Listing	GNWT Listing
Grizzly bear (*Ursus arctos*)	■ Confirmed present in the Project area. ■ Designated as Special Concern under COSEWIC. ■ Highlighted by GNWT as at-risk for wildlife encounters at mine site during spring, summer, and fall.	None	Special Concern	Sensitive
Wolverine (*Gulo gulo*)	■ Confirmed present in the Project area. ■ Designated as Special Concern under COSEWIC. ■ Highlighted by GNWT as at-risk for wildlife encounters at mine site during all seasons.	None	Special Concern	Sensitive
Wood bison (*Bos bison athabascae*)	■ Confirmed present in the Project area. ■ Designated as Threatened under SARA. ■ Designated as Threatened under COSEWIC. ■ Designated as At Risk under GNWT General Status Ranks of Wild Species. ■ Highlighted by GNWT as at-risk for access road related mortality during winter hauling operations.	Threatened	Threatened	At Risk
Dall's sheep (*Ovis dalli*)	■ Confirmed present in the Project area. ■ Highlighted by GNWT as at-risk for aircraft related disturbance at the mine site during the spring lambing season. ■ Species of local economic importance to hunters/outfitters.	None	None	Secure
Moose (*Alces americanus*)	■ Confirmed present in the Project area. ■ Highlighted by GNWT as at risk for access road related mortality during winter hauling operations. ■ Identified as important to First Nations as traditional food source. ■ Source of local economic importance to hunters/outfitters.	None	None	None
Raptors	■ Peregrine falcon (*Falco peregrinus anatum*) designated as Threatened under SARA. ■ Short-eared owl (*Asio flammeus*) designated as Special Concern under SARA and COSEWIC.			
Waterfowl	■ Horned grebe (*Podiceps auritus*) designated as Special Concern under COSEWIC.			
Passerines	■ Rusty blackbird (*Euphagus carolinus*) designated as Special Concern under SARA and COSEWIC, designated as May Be at Risk under GNWT Status Ranks. ■ Olive-sided flycatcher (*Contopus cooperi*) designated as Threatened under SARA and COSEWIC.			
Non-passerines	■ Common nighthawk (*Chordeiles minor*) designated as Threatened under SARA and COSEWIC.			

4.0 PROJECT ISSUES AND CONCERNS

The WMMP considers the potential for effects to wildlife associated with mine site and access road activities during Project operation. The WMMP considers impacts to wildlife habitat, movement, behaviour, and abundance. Direct impacts to wildlife habitat include any Project activities that may compromise, create or alter habitat or result in wildlife mortality. Indirect impacts alter wildlife movement, behaviour, or abundance through sensory disturbance. Impacts can result from Project activities or features that:

- Attract wildlife;
- Disrupt, impede or reduce movement;
- Alter behaviour; or
- Cause direct or indirect wildlife mortality.

The impacts and associated mitigation strategies described herein are applicable to a broad range of wildlife. Potential Project-related impacts to wildlife include:

- Direct and indirect effects to wildlife health and mortality;
- Changes in behaviour from attraction or avoidance by wildlife from adjacent areas;
- Direct and indirect wildlife mortality due to an increase in trapping and hunting activities associated with the access road (related to improved access and increased effectiveness of those activities);
- Impediment, disruption, or reduction of movement for individuals in local populations along traditional travel routes;
- Alteration in wildlife behaviour or wildlife mortality from human, vehicle, or aircraft interactions and collisions; and
- Disturbance related (*e.g.*, noise) and physical barriers from access roads.

Detailed descriptions of impact pathways and potential effects on wildlife are found in Golder 2010. It is not the intent of this document to provide an impact assessment, but to provide a plan to manage and reduce risks to wildlife.

5.0 WILDLIFE MITIGATION

Mitigation aims to prevent adverse impacts from occurring and keeps those that do occur within an acceptable level. The elements of mitigation are generally organized into a hierarchy of actions, including:

- Avoidance of adverse impacts as much as possible by use of preventative measures; and
- Minimizing adverse impacts to "as low as practicable" levels.

The mitigation practices outlined below will be implemented to accommodate the natural behaviours of wildlife, where possible. Where not possible, mitigation practices will focus on deterring wildlife from actively using project sites. The protection of human life must be paramount; however, the preservation of wildlife health and natural behaviours (patterns of migration, reproduction, *etc.*) is also important.

5.1 General Procedures and Practices

General mitigation includes rules and procedures for employees and contractors necessary to ensure worker safety and limit attraction and disturbance of wildlife. The Government of Northwest Territories has developed guidelines to protect wildlife during resource development activities. For this Project, guidelines found in the "Safety in Grizzly and Black Bear Country" document will be followed to prevent and mitigate bear-human interactions. In addition, the following general mitigation strategies are intended to reduce or avoid effects to wildlife and wildlife habitat during Project operation:

- All relevant observations of wildlife (particularly of Dall's sheep, caribou, grey wolf, wolverine and grizzly bear) will be reported to mine environmental staff;
- If a bird nest is found on site and eggs are present, monitoring will be conducted and efforts will be made to avoid the area. Any raptor nesting activity observed within 1.5 km of the Project will be reported to Government of the Northwest Territories (GNWT) Department of Environment and Natural Resources (ENR);
- An effective Waste Management Plan will be implemented, particularly as it relates to the disposal of food waste;
- A Flight Impact Management Plan (FIMP) will be implemented to address the potential for disturbance to Dall's sheep from operation of aircraft;
- Hunting, trapping, harvesting, and fishing by site employees and contractors will be prohibited;
- Non-mine vehicles, including all terrain vehicles (ATVs) and snowmobiles will be prohibited on site;
- Pets will be prohibited on site; and
- The appropriate regulatory agencies (*i.e.,* GNWT ENR and Parks Canada) will be contacted to receive additional direction regarding new issues that arise.

5.2 On-Site Education

To limit impacts to wildlife, an education strategy will be implemented that consists of a detailed site orientation session for all site personnel and visitors. The orientation session will include a general wildlife education component in addition to Project-specific rules related to wildlife right-of-way, traffic management, and minimizing employee-wildlife interactions. Prior to participation in field activities associated with the Project, site personnel and visitors must attend the detailed orientation session and must review all operating procedures appropriate to their tasks and responsibilities.

The following will be incorporated into an employee education and awareness program:

- On-site personnel will receive basic bear awareness and safety training, including information on bear behaviour, how to avoid bear encounters, and how to respond to bears in the case of an encounter. The existing bear management plan should be reviewed to ensure it includes the following elements:
  - A designated system for reporting and recording bear sightings at and near the mine site and access road. All bear observations will be recorded with geographic locations and entered into a database;
  - A bear warning system to instantly warn workers of the presence of bears in the immediate vicinity of the mine site (*e.g.*, two-way radio broadcast, loudspeakers);
  - A structure for reporting bear-human encounters and resulting incidents to inform mine management and GNWT ENR staff;
  - A protocol for dealing with problem bears, with a designated chain of responsibilities for ensuring worker safety and efficient and speedy resolution of incidents; and
  - Annual reporting of bear observations, movements, incidents and how incidents were resolved.
- On-site personnel will be educated on the applicable policies and practices contained within this WMMP and other Project commitments, particularly waste management practices and avoiding encounters with wildlife;
- On-site personnel will be educated on wildlife issues and monitoring activities in the Project area and will be able to identify and report any of the animal species listed in Table 1; and
- On-site personnel will be discouraged from using areas outside of immediate work sites.

5.3 Wildlife-Human Conflict Management

A key concern in all aspects of the Prairie Creek Mine project is the protection of humans and wildlife. General wildlife-human conflict management policies are aimed at minimizing or preventing wildlife problems through the training of employees, treatment of problem animals, the management of food and garbage, and the establishment of procedures and policies on wildlife management.

5.3.1 Employee Safety

- On-site personnel will be provided with access to bear deterrents, such as air horns, bear spray and/or bear bangers. Personnel working in remote areas should carry personal bear deterrents and two-way radios at all times. Pilots must be informed when transporting personal bear deterrents by aircraft and the transport of such materials must be in accordance with Transport Canada requirements. Noise devices should not be used unnecessarily to avoid unwarranted disturbance to other wildlife;
- Personnel working outside will be made aware of visual or auditory barriers that may contribute to surprising bears and other wildlife (*e.g.*, noise of running water, high winds, *etc.*);
- If an employee encounters an animal exhibiting signs of aggression or if the employee feels that the animal represents a legitimate threat to their health and safety, employees will immediately vacate the area and immediately report the incident to the Mine Manager; and
- If a wildlife threat is identified in an area (*e.g.*, a problem bear), warnings will be broadcast by two-way radio, loudspeaker and signage will be posted at specific sites to inform personnel of the potential risk.

5.3.2 Prevention and Treatment of Problem Animals

- Wildlife sightings in proximity to the Mine site and access road will be recorded in a wildlife sightings log, including location, number observed, and reactions (see Section 6.2);
- Dead wildlife encountered in proximity to the mine site and access road will be recorded and geo-referenced (see Section 7.4). Mine environmental staff will alert GNWT ENR and Parks Canada, and at their discretion, carcasses will be transferred to Nahanni Butte, or incinerated;
- All buildings and stairs will be designed to preclude nesting and roosting sites for avian predators (including ravens) or den sites of small mammals or mammalian predators. If an animal has gained internal access to camp facilities and infrastructure, immediate action will be taken to remove the animal and secure the site from re-entry by wildlife;
- A Wildlife Monitor will be responsible for conducting regular surveillance of site facilities, infrastructure and waste sites for the presence of nuisance wildlife and to ensure that nuisance wildlife and predator control measures are effective;
- If a nuisance animal remains in camp and is showing clear signs of being rabid (thereby presenting a risk to workers), the animal should be destroyed by a trained Wildlife Monitor. Killing an animal will be a matter of last resort. The Wildlife Monitors will contact GNWT ENR and Parks Canada immediately following the incident and tissue samples will be submitted upon request. If necessary, the carcass will be transferred to GNWT ENR or Parks Canada;
- The storage of soda ash on site will be secured and contained so that spillage does not occur. Dall's sheep are presently attracted to this source and this will be prevented in the future;
- The appropriate regulatory agencies (*e.g.*, GNWT ENR and Parks Canada) will be informed of any incidents with problem bears or other wildlife prior to action, unless imminent worker safety is at risk (see Section 6.2);

- Bear use of habitats near mining infrastructure (*e.g.* spring foraging by bears in disturbed areas) will be documented (see Section 6.2). Additional monitoring and mitigation measures may be developed in response to this information;
- Several on-site employees will be trained in methods of deterring and moving animals away from hazardous areas (such as roads, camp, and other mine infrastructure). At least one trained employee will be on-site at all times. All deterrent actions taken will start with the least intrusive method, and then increase in intensity until wildlife may need to be relocated or destroyed (see Section 7.0). Each deterrent action will stop as soon as the animal moves away from the potentially hazardous site or activity. Records of deterrent action will be included in a wildlife incident report that will be forwarded to the appropriate regulatory agencies; and
- Only designated on-site personnel will be authorized to carry firearms, which may be employed if human life is at risk; however non-lethal management techniques aimed at avoiding the destruction of wildlife will be employed first whenever possible (see section 7.0).

5.3.3 Waste Management and Camp Infrastructure Organization

Waste management is a key element of effective wildlife conflict management. A Waste Management Plan provides a framework for minimizing and disposing of attractants such as garbage, food wastes, and other edible and aromatic substances. A Waste Management Plan outlined in the DAR provided an outline of measures to reduce the attractants of bears and wolverines to the mine site and transfer stations, with active management of food materials and food and other camp wastes. The overall Waste Management Plan should be based on the following key principles:

- Health and safety of all site employees, visitors, and environment;
- Reduction, reuse, and recycling of waste materials;
- Proactive management of wastes that may attract wildlife or result in the interaction between humans and wildlife; and
- Environmental awareness and waste management training.

The existing Waste Management Plan will be updated and will incorporate the following:

- A Solid Waste Facility that will consist of four different cells: belts and tires; incinerator; hydrocarbon contaminated material; and, sewage sludge. Of these, only the sewage sludge is expected to be an attractant to wildlife. This cell will be fenced, chain link, non-electrified with a minimum 6 foot height. The fence will include solid, reinforced posts. The fence will be placed along the centre-line of a containment berm (see Figure 6-16 in the DAR), and there will be a gate of similar height on wheels to allow for truck entry. The elevated location of the fence and low annual snow depth will keep out bears in snow free seasons and wolves and wolverine in the winter;
- Food waste will be collected and incinerated on a daily basis. This is done at present, and no animal attraction issues have been encountered to date. Limited food supplies will be stored inside the Transfer Stations, and waste will also be collected for transfer to the Mine. As noted above, the road construction and operating period will be within the period of bear hibernation. These measures will follow northern industry practices;
- A no littering policy, specifically with respect to food materials;
- A no feeding of wildlife policy;

- Separation of food waste and non-food waste at source;
- Not permitting food and beverages and their containers in any outdoor areas;
- Assigning designated contained areas for lunch and coffee breaks;
- Storing all food and garbage in bear-proof areas or bear-proof containers;
- Storing all grease, oils, fuels or antifreeze in bear-proof areas or containers; and
- Storing incinerator spare parts on-site to prevent lengthy breakdowns and subsequent extended waste storage.

5.4 Management of Toxic Substances

Management measures that are or will be in place with respect to potential contaminated substances include:

- Appropriate materials management systems to minimize the risk of accidental spills or leakage of concentrate, diesel fuel, other hydrocarbons, and other hazardous materials being shipped to/from the mine site;
- The existing Spill Management Plan will be reviewed and improved as necessary prior to full operation of the Prairie Creek Mine. This plan will include provision for rapid deployment of cleanup crews and for containment and clean up of spilled material and contaminated surfaces;
- Fuel storage at the mine site will be in tanks and within a bermed area to contain any potential spill or leak (already on site since 1981). Fuel will be brought to the mine along the access road from the Liard Highway and will be shipped on backhauls by the concentrate haul fleet;
- Other hydrocarbons (*e.g.*, lubricants, oils, solvents) will be transported in approved drums or other containers and stored at the mine site in such approved containers and within designated locations for hydrocarbon storage. Spill containment will be implemented and spill contingency plans will be established. Minor spillage of hydrocarbons may occur on an infrequent basis but mostly inside at the mine shops, and occasionally outside in the mine and camp complex;
- Chemicals used in the ore milling process, explosives manufacture or for shop or maintenance purposes will be transported and stored in approved containers and will be handled with care to prevent loss of material to outside areas (*e.g.,* the mill, warehouse and shops);
- Explosives used will be emulsions produced in an on-site plant. Storage of explosives in the plant area will be strictly controlled to prevent accidental detonation. Only authorized personnel will be allowed to transfer explosives in a specific truck dedicated to the task;
- Sewage sludge will be stored at the waste rock pile area in a dedicated solid waste facility. The sludge cell will be fenced to deter wildlife entry;
- A contaminated soil land-farm will also be established in the solid waste facility to bio-remediate contaminated soil and will not constitute an attractant to wildlife;

- Used lead batteries and other batteries used for mining, ore milling, shops, or camp activities will be collected at the hazardous waste storage location and will be returned by surface shipment to a recycle facility on an annual basis;
- Concentrate from the ore milling process will be bagged in a bagging plant with dust control. Bagging will be in a dedicated location. Bags will be stored in a concentrate shed until the winter haul period; and
- Measures aimed at reducing the number of birds that use the water storage pond (WSP) will be implemented. Measures may involve the use of scare tactics to dissuade birds from landing on the WSP, such as fake raptors or markers (streamers, flags, long stringers of flagging, *etc.*). Noise deterrents (*e.g.*, scare cannons, pyrotechnics, *etc.*) will be used as a last resort, as they could disrupt other wildlife in the area. All observations of birds at the WSP will be reported to mine environmental staff. Information on species, number, age, activity, and success of scare tactics will be recorded. The results of the monitoring will be summarized in reports and submitted to the appropriate regulatory agencies (see section 6.2).

5.5 Management of Sensory Disturbance

The mine site is compact, and there are limited opportunities to reduce equipment use, vehicle traffic, surface light sources, or other activities associated with the Prairie Creek Mine. Management measures that are or will be in place with respect to sensory disturbances to wildlife include:

- Power generating equipment will be fitted with industry standard muffler systems;
- Where feasible, lighting sources will be designed to minimize fugitive light emissions onto adjacent wildlife habitat;
- To reduce noise along the access road, the use of engine retarders will be discouraged;
- Flights paths to and from the mine will be considered according to recommended guidelines for flying in sheep country (MERG 2002) and flying in caribou country (MPERG 2008), where feasible and within topographic and safety constraints. Refer to the existing FIMP (Appendix A) for more detail; and
- A Dall's sheep and caribou monitoring program will be implemented to ensure that Project-related effects on those species are minimized (see Section 6.2). Based on results of the monitoring programs, the existing FIMP (Appendix A) may be updated to develop operational flight guidelines that can be safely implemented.

5.6 Vehicle Procedures and Practices

Vehicle-wildlife collisions can result in injury or mortality to workers and/or wildlife, as well as damage to vehicles. The following mitigation strategies will be used to reduce the potential for negative interactions.

5.6.1 Traffic Management

- The airstrip will be checked and cleared of wildlife prior to aircraft landing or taking off. If an animal or group of animals is observed on or in proximity to the airstrip prior to aircraft take off and landing, a Wildlife Monitor

trained in deterrent procedures will be responsible for moving the animal(s) from the airstrip (see Section 7.2);

- Maximum traffic speeds for all sections of the access road will be implemented accounting for road grade, curvature, adjacent sensitivities and sight-lines. Lower maximum speeds may be posted in the vicinity of sensitive wildlife areas, such as areas of high probability of occupancy by caribou and known crossing locations identified during the winter aerial surveys and the ongoing monitoring program;
- Vehicle operators will yield right-of-way to wildlife and will take all reasonable measures to avoid vehicle-wildlife incidents. If wildlife are visible on the access road and are moving in a direction indicating that they will cross the road, then vehicle activity may cease (*i.e.*, speeds reduced to zero) until the animals have moved a safe distance away or are no longer visible, where practical. If wildlife are within the area cleared for the roadbed but are not moving in the direction of the road, or not moving at all, then traffic will reduce speed and proceed with caution;
- If an animal or group of animals is observed on or in immediate proximity to the access road, and they remain along or near the road (thereby presenting a danger to workers or wildlife), a Wildlife Monitor trained in wildlife deterrent procedures will be responsible for moving the animal(s) from the roadway or from immediately adjacent to the roadway (see Section 7.2). If a trained Wildlife Monitor is not available to immediately move animal(s), drivers will be instructed to contact the Journey Management System (JMS) Coordinator by radio who will contact a Wildlife Monitor to obtain specific instructions on how to proceed;
- A highly visible signage system will be installed at the mine site and the south-eastern terminus of the access road to alert drivers of "caution zones" and recent wildlife activity along the access road. A Wildlife Monitor will ensure that signage is updated as new wildlife observations and incidents are reported. Caribou activity will be highlighted on these signs;
- A temporary (movable) signage system will be employed along the access road to inform vehicle operators of temporary vehicle/wildlife conflict areas (information on which would also be provided to drivers before their journeys);
- All vehicles will be equipped with two-way radios. Relevant new wildlife sightings along the access road will be geo-referenced (according to the posted road km markers) and reported to the Road Operations Supervisor who will issue travel alerts to drivers. The report will include the species, number, geographic location and approximate road km marker;
- Road salt will not be used on the access road alignment;
- Snow removal along the access road should ensure that high banks (> 1 m) are avoided to provide adequate sightlines for drivers and so wildlife do not become "trapped" on the roadway as vehicles approach. In locations where build up of snow is an issue for wildlife, lower snow banks and the creation of gaps/push-outs every 100 m will be beneficial so that wildlife can readily move off the roadway. This can be confirmed during the first year of operation of the access road, specifically with respect to locations where wildlife has been recorded crossing the access road;
- If avalanche control is required along the access road (pending an avalanche risk assessment), a wildlife sweep will be conducted prior to any control being initiated. The sweep will be conducted by a Wildlife Monitor

by air. If a large mammal (*e.g.*, caribou, sheep, moose) is observed within 3 km of the control area, the avalanche control will be suspended until the animal or group of animals has moved out of the control area (maximum 24 hour suspension). The location of the animal(s) may be periodically reassessed throughout the 24 hour delay period at the discretion of the Wildlife Monitor; and

- Maintenance work on the existing all season section of the access road may occur over the period July to September. In areas where vegetation clearing is scheduled between May 7 and August 10 (the bird breeding season), a bird nest survey will be conducted by a qualified wildlife biologist prior to work commencing. If an active nest is found during the bird breeding season, a no-work buffer of 20 m will be established around the nest site until nesting is complete or the nest is no longer considered to be active.

5.6.2 Access Road Use Control

- Use of recreational vehicles will be prohibited;
- Signage at the south-eastern terminus of the access road will be installed to inform the public of the high utilization status of the road by heavy vehicles and to deter non-mine related use;
- Non-mine road traffic, including ATVs and snowmobiles will be deterred from using the road by installing a check-point and screening station near the south-eastern terminus of the access road, manned by representatives from the Nahanni Butte Dene Band;
- Public use of the access road and evidence of land use, such as hunting, fishing, camping, or firewood harvesting will be noted and reported to road and mine management staff and the appropriate regulatory agencies; and
- The south-eastern end of the access road will be blocked at specified locations after each hauling season with gates, berms, pits and/or boulders to discourage use.

6.0 WILDLIFE MONITORING

Wildlife monitoring and reporting is important to limit human-wildlife interactions. Effective monitoring and reporting can be used so that wildlife attractant issues are resolved, nuisance animals are dealt with effectively, and adaptive management may be applied to reduce the risk of future problems. The objectives of the monitoring portion of this WMMP are to:

- Determine the effectiveness of mitigation implemented through the WMMP;
- Present data collection techniques that contribute to understanding and managing Project-related effects to wildlife; and
- Establish action levels or triggers for early warning signs to implement adaptive management where appropriate.

6.1 Wildlife Monitor and Qualifications

CZN will retain Wildlife Monitors to conduct ground surveillance during the initial mine start up and production period. The Wildlife Monitor will be responsible for wildlife matters on the mine site and access road, and will have specific responsibilities for implementing the WMMP and communicating wildlife-related issues to CZN, First Nations, GNWT ENR and Parks Canada. It is expected that environmental staff on shift at the mine site will take on the Wildlife Monitor role, in addition to other duties. More than one person will be trained for the Wildlife Monitor position so that at least one monitor is available on site.

The mine site Wildlife Monitors must have the following qualifications and experience:

- Knowledge of regional wildlife life history and habitat relationships (particularly listed wildlife species and other VC species described in Table 1);
- Knowledge of regional wildlife behaviour (particularly listed wildlife species and other VC species described in Table 1), including seasonal feeding habits and movement patterns during the breeding, pregnancy, birthing, post-natal, and winter periods;
- Ability to observe, record, and report on wildlife activity and habitat use in the Project area and vicinity;
- Experience working with contractors in an industrial setting and knowledge of how heavy equipment is used on industrial construction sites; and
- Ability to communicate and resolve issues of concern with contractors, equipment operators, supervisory staff, and general workers.

It will be the responsibility of the Wildlife Monitors to assist with the following:

- Reduce the risk to workers from potential wildlife encounters;
- Routinely inspect physical wildlife deterrent practices and designs;
- Encourage wildlife to leave potentially dangerous locations, or when interfering with emergency operations;
- Guide field supervisors in limiting the impact of the Project on wildlife and wildlife habitat; and
- Maintain records of wildlife sightings and incidents in a computer database system.

The mine site Wildlife Monitors will be provided with:

- Equipment such as, high-visibility vests, two-way radios, binoculars, a 12-gauge shotgun (with scare cartridges, rubber bullets, bean bags), launchers with bangers, screamers signal flares, bear spray, and a field first aid kit;
- Specialized training on the safe use of firearms, launchers, and bear spray; and
- First aid and bear awareness safety training.

The Wildlife Monitors will have access to all Project activities, will interact daily with mine staff to plan activities, and will be in position to report back to the First Nations community, GNWT ENR, and Parks Canada on the effectiveness of mitigation and monitoring.

6.2 Wildlife Incidents and Reporting

A general wildlife monitoring program is proposed to identify the species, numbers and locations where interactions with wildlife occur, to identify risks to wildlife or work crews, and to describe Project-related effects to wildlife.

An "Observe, Record, and Report" policy for wildlife observations, wildlife incidents, and near misses will be implemented. For the purposes of this WMMP, a *wildlife incident* is defined as an interaction between an animal and human or human property where either:

- The animal is harmed;
- The person is harmed;
- The person is threatened; or
- Significant property damage occurs.

6.2.1 Monitoring

It will be the responsibility of the Wildlife Monitors to observe and record information on wildlife presence within and adjacent to the Project area. This will include wildlife interactions with mine infrastructure, observations of birds on the WSP, and observations of wildlife (direct sightings and tracks), particularly predators and ungulates, at the mine site and along the access road (aided by road operations supervisors and sightings by truckers). The Wildlife Monitor will be mobile and proactive in investigating wildlife activity (*e.g.*, direct observations, recent tracks or feces). This will be ground-based unless aircraft are available for occasional spot checks.

Incident forms and a wildlife observation log will be made available to all mine personnel. It will be the responsibility of all mine staff to document and report wildlife observations, wildlife incidents, and near misses to the Wildlife Monitors. The purpose of a reporting and observation logging process is to assist in monitoring local wildlife populations and to aid in identifying potential problems or areas of conflict between wildlife and Project components (*e.g.*, vehicles, humans, *etc.*).

It will be the responsibility of the Wildlife Monitors to collect and enter information from wildlife observations, wildlife incident forms and near misses into a tracking database. Specific attention will be given to observations of listed

wildlife species and wildlife VCs at the mine site and along the access road. For each relevant wildlife observation or incident, the following information will be reported by Project personnel, and recorded by the Wildlife Monitors:

- Date and time of the observation;
- Location of the observation, with UTM coordinates where possible;
- Species and apparent physical condition of individuals;
- Number and age of individual wildlife observed;
- Activity of animals (*e.g.,* direction of movement, birthing, feeding);
- Any other potentially relevant information, including any noticeable responses to Project activities; and
- Deterrent action taken (if any).

6.2.1.1 Caribou Monitoring

6.2.1.1.1 Background

Woodland caribou in this region include both the "Northern Mountain" and "Boreal" ecotypes. Northern Mountain caribou inhabit the Mackenzie Mountains and have distinct seasonal migrations from summer to winter ranges. The available information suggests that woodland caribou of the Prairie Creek area are of the Northern Mountain ecotype, but their population affinity is not clear (*i.e.,* they may be part of the Nahanni or the Redstone population). Boreal caribou are different in that they do not occur in discrete herds but live in small, dispersed, and relatively sedentary bands east of the Mackenzie Mountains.

Surveys conducted on behalf of Cadillac Explorations in the early 1980's indicated that caribou concentrations were not found in proximity to the access road (Beak 1981). Information from outfitters based in Nahanni Butte suggests that Northern Mountain caribou congregate in the Prairie Creek drainage well to the north of the road in the fall, and migrate east to winter range.

To examine current caribou distribution in the Project area, CZN has committed to undertaking three winter surveys for caribou and other wildlife in proximity to the Mine site and access road. A two-scale survey approach was developed for the Project area and includes 1) a sub-regional caribou occupancy survey of approximately 9,000 km^2 around the mine site and access road and 2) a reconnaissance survey of the mine access road alignment. The objective of the sub-regional occupancy survey is to determine the extent of winter habitat use by caribou in the defined study area. The objective of the access road survey is to identify possible caribou road crossing locations and identify areas where vehicle-caribou conflicts might occur.

In addition to the above noted caribou surveys, specific caribou monitoring activities will be implemented to provide the following real-time information during year-round mine operations and winter hauling activities:

- Information on caribou numbers, frequency of occurrence, and distribution in the Project area;
- Location of caribou and caribou aggregations in close proximity to mine infrastructure and the airstrip;
- Response of caribou to aircraft traffic in the vicinity of the Mine site; and
- Location of caribou and caribou aggregations in close proximity to the access road during winter concentrate hauling operations.
-

6.2.1.1.2 Approach

CZN will implement the following on-going wildlife monitoring procedures specific to caribou:

- The Wildlife Monitors will conduct ground-based surveys of the access road (during winter operation), mine infrastructure sites, and the airstrip to identify caribou aggregations in the Project area and assess behaviour;
- A radio call-in procedure will be implemented so that observations of caribou along the access road can immediately be relayed to the Road Operations Supervisor so that traffic alerts can be issued. Observations recorded by drivers during hauling will provide information about caribou crossing patterns and movement corridors along the access road; and
- A procedure will be implemented so that caribou observations made by aircraft pilots during transport of crews and materials will be reported to the Wildlife Monitors. Observations recorded during air transport will provide additional information about presence of caribou in the vicinity of the mine site and access road.

As part of an adaptive management strategy, if the above-noted caribou monitoring indicates a lack of success of mitigation actions, then mitigation actions will be reassessed and modified following consultation with First Nations, GNWT ENR, and Parks Canada.

6.2.1.2 Dall's Sheep Monitoring

6.2.1.2.1 Background

Ungulates may expend energy when disturbed by aircraft overflights or other human activities (MacArthur *et al.* 1982, Harrington and Veitch 1992, Stankowich 2008), which may potentially impact populations. Anecdotal information suggests that Dall's sheep at the Prairie Creek Mine site are relatively tolerant of human presence and equipment noise for much of the year, but the lambing period is a key life cycle period when disturbance can be problematic for sheep. Beak (1981) identified potential lambing areas to the west and east of the Fast Creek-Prairie Creek confluence and the Folded Mountain area (refer to Figure 1 in Golder 2010). Generally, female Dall's sheep demonstrate a high degree of fidelity to their lambing ranges (Geist 1971).

The numbers of sheep lambing in immediate proximity to the mine site has not been documented. Since sheep have been attracted to the immediate mine site area by the presence of salt on site, it is possible that sheep may be lambing in proximity to the mine site and airstrip (*i.e.,* the slopes above and to the east of the WSP). Frid (2003) reported that direct aircraft over-flights by fixed-wing aircraft caused fleeing behaviour and disrupted resting of Dall's sheep in the Yukon. However, there is no specific documentation of potential consequential effects on female habitat use during the lambing period. Therefore, the purpose of the Dall's sheep monitoring program is to:

- Determine the distribution, habitat use, and movements of sheep in the study area during the parturition period;
- Determine if female sheep use specific lambing areas in the study area;
- Determine the timing of lambing in the study area; and
- Describe and compare sheep activity, behaviour, and movements in relation to the frequency and proximity of mine-related air traffic.

6.2.1.2.2 Approach

Monitoring of Dall's sheep will be conducted by a qualified Wildlife Monitor. The Wildlife Monitor must have prior experience conducting extensive behavioural monitoring studies of wildlife. In addition, the Wildlife Monitor must be able to recognize and record sheep behaviour. The Dall's sheep monitoring program will need to be further developed; however a general approach to monitoring is outlined below.

6.2.1.2.3 Study Area

The study area for monitoring mine-related over-flight disturbance effects on Dall's sheep is defined by a 5-km radius around the mine site, airstrip, and airstrip approach to provide a broader picture than just the immediate Mine footprint.

6.2.1.2.4 Aerial Reconnaissance Surveys

- Prior to mine start-up, a reconnaissance-level Dall's sheep survey will be conducted by a qualified Wildlife Monitor during the parturition period (typically mid-April to mid-June) to document sheep distribution and habitat use in the defined study area.
- The survey will be conducted by helicopter according to methods previously used in the region to document sheep distribution and lambing success (Larter and Allaire 2005). Briefly, a spaghetti-type survey technique will be used to survey all cliffs in the designated study area, keeping a height of at least 100-150 m above terrain. According to Larter and Allaire (2005), this survey technique is the most efficient way to cover mountainous terrain, reduce the probability of counting sheep herds twice, and limit stress to sheep.
- The location of sheep observed during the survey will be geo-referenced using a Global Positioning System (GPS). Observed sheep will be classified by sex and age based on relative size and horn characteristics.
- During the first year of mine operation, a follow-up survey will be conducted during the lambing period to confirm the use of previously identified lambing habitat and to search for additional lambing areas that may have been missed during the initial survey.

6.2.1.2.5 Ground-based Reconnaissance Surveys

- Prior to mine start-up (and in addition to reconnaissance-level aerial survey), a ground-based reconnaissance survey will be conducted by a qualified Wildlife Monitor during the parturition period (typically mid-April to mid-June) to document age and sex classification, distribution, and habitat use in the defined study area; and
- If no lambing areas are identified in the study area during the reconnaissance level aerial survey and complementary ground survey, then no further mitigation measures would be implemented for mine-related overflight activity.

6.2.1.2.6 Ground-based Behavioural Surveys (if necessary)

- If sheep are recorded in the study area during the reconnaissance level aerial or ground surveys, a more extensive and detailed ground-based behavioural observation survey plan will be implemented to document sheep movements, activity, and behaviour in relation to aircraft activity for the duration of the parturition period. The survey needs to extend into the post-lambing period as females with lambs remain on lambing grounds for 3-4 weeks after birth (Geist 1971);
- Ground-based observation surveys will be conducted using binoculars and spotting scopes from designated observation points (distances of ≥ 1 km to avoid disturbance to animals);
- Observations will focus on determining if overflight events have significant impacts on Dall's sheep behaviour;
- If no significant impact is observed from overflight events during the first year of production, then no further mitigation measures would be implemented for mine-related overflight activity; and
- If a significant impact from overflights is observed, the FIMP (Appendix A) will be modified for the parturition period to minimize low overflights in lambing locations for the duration of mine operation.

The primary purpose of a Dall's sheep monitoring program is to track changes in sheep behaviour and location in relation to aircraft traffic over time. If disturbance is evident, then monitoring is expected to undergo modification over the years and should be seen as an evolving program. This requires the monitoring program to be adaptive and flexible. One possible outcome is that no effects from flights are indicated, in which case the monitoring program will stop. The monitoring program must also be flexible enough to incorporate comments, suggestions, and information based both on science and local knowledge. Adaptive management may lead to several changes to the monitoring program if an impact is detected. If negative effects are detected, the options available include:

- Increasing the monitoring effort;
- Implementing new monitoring programs to further understand Project-related effects; and
- Implementing changes to the FIMP (Appendix A) to ensure that Project-related effects on Dall's sheep are minimized.

6.2.2 Incident Management Strategy and Contacts

Historical survey data indicate that listed wildlife species and other wildlife VCs occurring in the area are not proximal to the mine or access road, with occasional exceptions. As a result, the impact assessment concluded that significant effects on listed wildlife species and other wildlife VCs are unlikely. This will be confirmed primarily by collecting and logging wildlife sightings and interactions, followed by review by a wildlife biologist.

In the case of an incident or potential incident involving direct contact with a listed wildlife species or wildlife VC, the Wildlife Monitor will ensure that the appropriate government agencies are contacted to inform them of the incident, and to prepare a plan of action. Table 2 lists suggested contacts for wildlife incidents.

Table 2: Wildlife Incident Contacts for Prairie Creek Mine Project

Name	Company/Agency	Title	Phone Number	Email
Wildlife Emergency Line	GNWT ENR (Ft. Simpson)	-	1-867-695-7433	-
Wildlife Emergency Line	GNWT ENR (Yellowknife)	-	1-867-873-7181	-
24 Hour Spill Report Line	GNWT ENR	-	1-867-920-8130	-
Report a Poacher	GNWT ENR	-	1-866-762-2437	-
Nic Larter	GNWT ENR	Dehcho Regional Biologist	1-867-695-7475	Nic_Larter@gov.nt.ca
Doug Tate	Parks Canada	Conservation Biologist	1-867-695-3151	Doug.Tate@pc.gc.ca
Mike Suitor	Parks Canada	Ecologist	1-867-695-3151	Mike.Suitor@pc.gc.ca

6.2.3 Data Analysis and Reporting

Regular reporting and analysis of the wildlife monitoring program is a component of the adaptive management process, whereby the Wildlife Monitor will review wildlife observations and incidents on a weekly basis. As a component of this review, the data will be analyzed for issues or potential problems such as seasonal concentration areas or sections along the access road that have a high incidence of collisions or near miss occurrences. The Wildlife Monitors will contribute to a detailed quarterly report of wildlife observations and incidents that occurred during the monitoring period. In addition to this quarterly report, caribou observations and incidents at the mine site and along the access road will be summarized in a monthly report. All wildlife reports will be submitted to First Nations, GNWT ENR, and Parks Canada to solicit review of the effectiveness of mitigation measures and, following discussion in Technical Advisory Committee meetings, to suggest modifications to mitigation and monitoring plans, as necessary.

6.2.4 Adaptive Management Process

Monitoring results will be reviewed and assessed annually to determine whether mitigation policies are having the expected results and are minimizing Project effects. If review determines that Project effects are exceeding expected impacts, revision of mitigation processes may be required. Revision of monitoring programs may also be required if mitigation processes are changed or if the review process finds the current monitoring activities are insufficient in determining Project effects. This review and revision process will include:

- Periodic review of monitoring reports by a qualified wildlife biologist that will assess results of monitoring programs to determine whether any thresholds (see section 8.0) have been crossed or whether monitoring results indicate a problem;
- If thresholds are crossed or if monitoring programs detect a significant impact to a particular species or group of species, mitigation measures relating to the species and Project activities involved will be reviewed and revised to correct the problem and minimize Project effects; and
- If at any time, those involved in the monitoring process notice that a Project threshold has been crossed, they should immediately bring it to the attention of the appropriate personnel. This should trigger a review of the threshold and revision of mitigation measures.

7.0 WILDLIFE ENCOUNTERS

Wildlife encounters are usually inadvertent, caused by wildlife disorientation or curiosity, or by improper waste management at a Project site. However, if encounters and problem wildlife persist, deterrent actions or further mitigation may become necessary. For wildlife deterrents to be effective there must be:

- Knowledgeable personnel who are able to select deterrent actions on a case by case basis for each unique wildlife situation;
- The consistent application of deterrent actions for similar situations;
- An evaluation of every encounter and deterrent action taken to determine the root causes and effectiveness of response; and
- Documentation of all deterrent actions prepared by the Wildlife Monitor and forwarded to GNWT ENR and Parks Canada upon request, and in the annual monitoring report.

7.1 Response to Bear Encounters

There is a potential for workers to encounter both black bears and grizzly bears. Bears may be active from April through to October in and near Project activities. In order to properly mitigate human-bear interactions it is important to differentiate between grizzly bears and black bears. Both species may appear similar in size and can vary in colour from black or brown to cinnamon or blonde. The response procedures below are provided as background only. For detailed directions on the most appropriate responses to grizzly bear and black bear encounters, refer to "Safety in Grizzly and Black Bear Country", available from GNWT ENR.

7.1.1 Response to a Bear at a Distance

If any worker observes a bear from a distance (more than 30 m away), the worker shall:

- Stop work immediately and walk slowly towards the nearest building or vehicle and prepare to take refuge, if it becomes necessary; and
- Alert the Wildlife Monitor and all other workers in the vicinity by two-way radio and inform the Mine Manager of the situation.

The distances noted in this section and those that follow are guidelines only and each encounter is to be evaluated based on time and site specific considerations. Mine personnel are expected to use their judgment to decide what a safe distance is in a particular situation.

7.1.2 Response to a Bear at Close Range

If any worker observes a bear at close range (within 30 m), the worker shall:

- Stop work immediately;
- Slowly back away from the bear while observing its behaviour (aggressive or non-aggressive), allow the bear to leave the area, and walk slowly towards the nearest building or vehicle and prepare to take refuge;
- Alert the Wildlife Monitor and all other workers in the vicinity. If a bear appears aggressive, workers should make themselves appear as large as possible and make noise to deter the bear from coming closer (as well as to alert nearby workers of the situation). Talking to the bear in a firm voice can also help the bear to identify humans; and
- Notify the Mine Manger immediately to arrive at a course of action. The Mine Manager will have ultimate authority in dealing with life threatening situations.

7.1.3 Response to "Bear in Camp" Scenario

For detailed directions on the most appropriate responses to grizzly bear and black bear encounters or bears in camp, refer to "Safety in Grizzly and Black Bear Country", available from GNWT ENR. The response to a bear encounter at camp will be as follows:

- A camp siren designated for emergencies will be sounded and a radio alert will be sent out to all workers at the camp and nearby worksites;
- The Mine Manager or designate will consult with the Wildlife Monitors to determine an appropriate response with the use of wildlife deterrents. The use of lethal force will be avoided to the extent possible as there may be a risk of injury (from gunfire) to workers taking shelter in the various camp buildings; and
- A post-incident analysis will be undertaken to identify any factors contributing to the 'bear in camp' situation and how well the response worked. These factors will be addressed as soon as possible to limit the potential for a re-occurrence of the incident.

7.1.4 Response of the Wildlife Monitor to an Incident

Upon arriving on the incident scene, the Wildlife Monitor will undertake the following actions:

- Assess the bear for signs of aggressive behaviour;
- Advise the Mine Manager and nearby workers of the potential threat and how to respond;
- Use non-lethal deterrents, as appropriate to prevent the bear from approaching to within 30 m of any worker;
- Use lethal force to protect the safety of workers only if the bear approaches within 30 m of worker(s), shows clear signs of aggression, and the worker(s) is/are unable to retreat to a safer location;
- Record details of the incident and take photographs, as appropriate, and report the incident to NWT ENR and Parks Canada; and
- Report incidents involving human injury and/or destruction of bears to NWT ENR, Parks Canada and RCMP immediately.

7.2 Wildlife Deterrent Procedures

Generally, wildlife should be left undisturbed. However, if the presence of an animal presents a risk to the animal or to humans, or causes material damage, deterrent action should be taken by trained Wildlife Monitors only. The use of projectile deterrents should be a rare event, as the preferred method of addressing wildlife encounters will be to avoid confrontation and to allow wildlife to disperse from an area voluntarily. Options available to Wildlife Monitors to encourage wildlife to disperse are discussed below.

7.2.1 Wildlife Herding Procedures

In general:

- Wildlife will be given the "right-of-way". If wildlife are crossing or attempting to cross the access road, site roads or airstrip, traffic will stop and wait for the animal(s) to cross; and
- Wildlife will not be blocked from crossing roadways and efforts will be made to accommodate natural movement patterns across the access road.

The Mine Manager and/or the Wildlife Monitors may authorize deterrent actions if an animal endangers itself or humans near roadways, mine infrastructure, or the airstrip. Deterrent actions to be taken will begin at the lowest level indicated below and may increase to higher levels, as appropriate to the situation. The objective is to have wildlife voluntarily move away from potentially hazardous situations without causing unnecessary stress or possible injury.

Herding strategies used by the Wildlife Monitors and the reactions of wildlife will be documented and included in the wildlife incident report. This record will also include information surrounding the incident, such as weather conditions, date/time, and justification for actions taken. GNWT ENR and Parks Canada should be provided with an incident report upon request.

The protocols listed below may need to be adapted or refined further before implementation based on feedback from regulatory agencies.

7.2.1.1 Level 1

Approach the animal(s) from inside a vehicle while announcing your presence:

- If the animal does not respond to the vehicle, the Wildlife Monitor may slowly approach the animal on foot (if it is safe to do so), while maintaining a safe distance. Do only what is necessary to encourage the animal to move;
- Approach no closer than 50 m. If the animal starts to move off, stop the approach;
- If the animal stops moving, continue the approach;

- If the animal does not respond to an approach on foot, it may be necessary to increase the disturbance to the animal. Clap and/or shout to alert the animal to your presence; and
- If clapping and shouting do not cause the animal to move off, use an air horn. When the animal leaves the area, continue to monitor until it has moved approximately 100 m away from the road, mine infrastructure, or airstrip.

7.2.1.2 Level 2

- If the Wildlife Monitor approaches to within approximately 50 m of the animal(s) and it still remains, the Wildlife Monitor will stop their approach;
- Noise-making or explosive deterrents may be used to try and scare off the animal. If it is after dusk, use a noise maker that also emits light. This helps to illuminate the animal and provides another level of deterrence;
- If the animal is not responding to noise-making deterrents at a distance, move to less than 50 m and use the appropriate deterrent given the distance between the monitor and animal (refer to Table 2);
- If the animal begins to move away, stop the deterrent action;
- If the animal stops moving, resume the deterrent action; and
- If the animal moves off, continue to monitor until it has moved approximately 100 m away from the road, mine infrastructure, or airstrip.

7.2.1.3 Level 3

- If the animal does not respond to the approach of people and deterrents, the animal may have become habituated to people or may be sick;
- If the animal does not respond to noise making deterrents, use other non-lethal projectiles. Select the type of non-lethal projectile based on the distance between the monitor and animal (refer to Table 3);
- If the animal starts to move away, stop deterrent actions;
- If the animal stops moving, resume the deterrent actions using non-lethal projectiles or noise makers;
- If the animal moves off, continue to monitor until it is approximately 100 m away from the road, mine infrastructure, or airstrip; and
- If the animal refuses to move after an extended period of time or becomes aggressive, it may be necessary to destroy the animal for safety reasons. The killing of an animal is a matter of last resort and will only be considered when all other methods of deterrent have failed.

Table 3: Guidelines for Use of Non-lethal Projectiles to Deter Wildlife (Adapted from Dolson 2002)

Projectile	Accuracy	Description
15 mm pistol launcher		
Bangers	25 m	Provide a very good noise stimulus and have a consistent range. The disadvantages are that they are slow to reload and cumbersome in low light conditions.
Screamers	75 m	Produce a loud screeching noise through complete travel, with a visual effect in low light. They can have an inconsistent range and be very unpredictable. They provide a very good noise stimulus but share the same disadvantages as the bangers.
12 gauge shotgun		
Bean Bags	25 m	Designed for close range encounters and should be fired from a distance of approximately 5 m.
Shell Crackers	75 m	Consistent in range and accuracy. They explode with a loud bang at the end of travel.
Rubber Slugs	75 m	Very accurate; however, there is the possibility of penetration if used at a distance of less than 25 m. Follow up shots can be made quickly.

7.3 Dealing With an Injured Animal

Upon encountering an injured animal:

- Stop work immediately and retreat to a safe distance;
- Alert the Wildlife Monitor and Mine Manager; and
- Visually assess the type of injury (predator, vehicle impact).

7.3.1 Prey Injuries

If the injuries appear to be caused by a carnivore:

- Assume that a bear is present in the vicinity until otherwise determined (this is the worst case scenario from a human safety perspective);
- Alert all workers in the vicinity; and
- Follow protocols for Bear Encounters in Section 7.1.

7.3.2 Injuries Caused by Human Activity

If the injures are the result of human activity:

- The Wildlife Monitor will visually assess the extent of injuries;
- Where the injuries are deemed critical, the animal may be killed for compassionate reasons; and
- A detailed report will be made to GNWT ENR and Parks Canada, as soon as possible.

7.4 Dealing with a Carcass

Carcasses are an indication that a predator may be nearby, so never approach a fresh kill. Also be cautious of loose piles of dirt, branches and vegetation, as predators sometimes cache carcasses.

Upon the discovery of a wildlife carcass:

- Alert the Wildlife Monitor and Mine Manager; and
- Avoid the immediate area until the Wildlife Monitor advises that it is safe to return.

The Wildlife Monitor shall:

- Assess the stage of decay and signs indicating a probable cause of death (predator kill, disease, drowning);
- Examine the immediate area for other evidence of recent wildlife activity;
- Collect biological samples, if requested by GNWT ENR and Parks Canada;
- Record the details of the incident, geo-reference the site, take photographs, and provide this information to the Mine Manager; and
- If necessary and with the assistance of workers, collect the carcass and incinerate it or transfer it to GNWT ENR, Parks Canada, or Nahanni Butte.

8.0 ADAPTIVE MANAGEMENT TRIGGERS AND RESPONSES

In order to gauge the extent to which mitigation and management objectives have been achieved, threshold values or statements have been set for specific indicators which, if reached, will trigger specific management responses.

8.1 Mortality Thresholds

Wildlife mortality thresholds for the Project were developed based on the findings of the supplemental *Vegetation and Wildlife Assessment Report* to the DAR. Wildlife mortality thresholds apply to VC species listed as "May Be at Risk" or "At Risk" under the NWT Status Ranks or "Special Concern", "Threatened", or "Endangered" on Schedule 1 of SARA. Should any of the wildlife mortality thresholds be crossed, an immediate review of the incident will be triggered. The review will examine the cause of the mortality and will re-evaluate the applicable mitigation measures to determine why and how they failed to prevent the mortality. Based on the results of the review, changes may be made to existing mitigation measures or new mitigation measures may be created to prevent further mortalities.

The following species-specific mortality thresholds will be used for the Prairie Creek Mine Project, including mine site operation and access road operation:

- Caribou, wood bison, grizzly bear, wolverine, peregrine falcon, short-eared owl, horned grebe, rusty blackbird, olive-sided flycatcher, and common nighthawk – mortality threshold is zero. Any mortality directly relating to the operation of the mine site or access road will trigger a review of mitigation strategies.

Project-related mortality of other VC wildlife species at the mine site or along the access road will be reviewed on a case-by-case basis, including the mortality of waterfowl and water birds relating to the WSP, and the mortality of important VCs such as moose and Dall's sheep. As outlined in section 6.2 of this document, all Project-related mortality will be included in a report submitted to First Nations, GNWT ENR, and Parks Canada. If review determines that project effects are exceeding expected impacts, revision of mitigation processes may be required and additional species mortality thresholds may be implemented under the adaptive management process.

8.2 Non-fatal Disturbance

In addition to direct mortality, activities at the mine site and along the access road may disturb wildlife behaviour and alter patterns of use of the local land base by wildlife. While no clear thresholds have been identified for disturbance effects on wildlife, the reporting of wildlife incidents and observations by mine staff will be important in the analysis of wildlife incident trends and in minimizing wildlife conflicts through the adaptive management process. If the results of the monitoring program indicate that Project-related effects are consistent with impact predictions outlined in the *Vegetation and Wildlife Assessment Report*, adaptive management will not be triggered. However, if monitoring reveals important new information, such as locations of caribou calving areas near the access road, locations of Dall's sheep lambing areas in proximity to the mine airstrip, or locations of wildlife movements that cross the mine site or access road, then adaptive management actions would be triggered to mitigate site-specific risks to wildlife.

Adaptive management of wildlife disturbance other than mortality will be developed on a case-by-case basis. Management responses could include some of the measures outlined in Table 4.

Table 4: Possible Adaptive Management Triggers and Responses for Wildlife Monitoring

Monitoring Strategies	Adaptive Management Trigger	Potential Adaptive Management Response
Incident Monitoring	■ Identification of new habitat use by VC species. ■ Identification of VC species in areas previously undetected. ■ Identification of new VC species movement routes. ■ Frequent wildlife-human interaction sites, times, or seasons.	■ Ensure proper education of mine staff and truckers. ■ Post appropriate signage at Mine site and along access road (where necessary). ■ Ensure proper management of access road traffic (speed restrictions). ■ Ensure proper snow removal along access road to prevent the entrapment of animals. ■ Review Mine Waste Management Plan and attraction of wildlife to mine site.
Incidental Observation Tracking	■ Identification of increased incidence of predation or disease. ■ Apparent shifts in a VC species habitat use/distribution across the landscape. ■ Identification of previously undetected VC species in Project area.	■ Additional investigations into causes for these changes if a discernable cause is suspected (*e.g.,* attraction of predators to mine site by food waste).
Ground-based and Aerial Observations by Mine Staff and Others	■ Apparent shifts in a VC species habitat use / distribution across the landscape. ■ Identification of declines in a VC species numbers.	■ Additional investigations into causes for these changes if a discernable cause is suspected (*e.g.,* increased vehicle mortality, aircraft disturbance).

9.0 CLOSURE

We trust the information contained in this report is sufficient for your present needs. Should you have any additional questions regarding the Project, please do not hesitate to contact the undersigned at 604-296-4200.

GOLDER ASSOCIATES LTD.

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10.0 REFERENCES

Beak Consultants Limited. 1981. Prairie Creek Project Vegetation & Wildlife Studies, 1981. Report prepared for Cadillac Explorations Ltd. September 1981. Prepared by Beak Consultants Limited, Richmond, BC.

Dolson, S. 2002. A guidebook: Non-lethal black bear management. J.J. Whistler Bear Society. Whistler, BC.

Frid, A. 2003. Dall's sheep response to overflights by helicopter and fixed-wing aircraft. Biological Conservation 110:387-389.

Geist, V. 1971. Mountain sheep: A Study in Behaviour and Evolution. The University of Chicago Press, Chicago, IL, USA.

Golder Associates Ltd. 2010. Vegetation and Wildlife Assessment Report, Prairie Creek Mine, Northwest Territories. Prepared for Canadian Zinc Corporation.

Harrington, F.H., and A.M. Veitch. 1992. Calving success of woodland caribou exposed to low-level jet fighter overflights. Arctic 45:213-218.

Larter, N.C., and D.G. Allaire. 2005. Sheep surveys of the Liard Range, Nahanni Range, and Ram Plateau in the Mackenzie Mountains, August 2003. Manuscript Report No. 166. Department of Environment and Natural Resources, Government of the Northwest Territories, Fort Simpson, NT.

MacArthur, R.A., Geist, V., and R.H. Johnston. 1982. Cardiac and behavioral responses of mountain sheep to human disturbance. The Journal of Wildlife Management: 46:351-358.

Mining and Petroleum Environmental Research Group (MPERG). 2008. Flying in caribou country: How to minimize disturbance from aircraft. Prepared by EDI Environmental Dynamics Inc., Whitehorse, YK.

Mining Environment Research Group (MERG). 2002. Flying in sheep country: How to minimize disturbance from aircraft. Prepared by Laberge Environmental Services, Whitehorse, YK.

Stankowich, T. 2008. Ungulate flight responses to human disturbance: A review and meta-analysis. Biological Conservation: 141:2159-217.

Working Group on General Status of NWT Species. 2006. NWT Species 2006-2010 – General Status Ranks of Wild Species in the Northwest Territories. Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT.

APPENDIX A

Flight Impact Management Plan

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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APPENDIX C

TIMING RESTRICTIONS AND SETBACK DISTANCE GUIDELINES (AANDC 2011)

Appendix C: Wildlife Recommended Restricted Activity Periods and Minimum Setback Distances[1]

Wildlife or Wildlife Habitat	Restricted Activity Period	Specific Conditions	Minimum Setback Distance
All wildlife and birds, general	Breeding and birthing seasons	Varies with region and species; contact local Government of the Northwest Territories – Environment and Natural Resources or Environment Canada office	0.25 km
Bear dens (grizzly, black)	Sept. 30 – Mar. 30	All species' dens, general industrial activities (e.g., clearing)	0.8 km
		All species' dens, if activity is blasting (e.g., borrow source)	1.5 km
		All species' dens, if activity is construction	1 km
	May 16 – Jul. 15	All bear species dens	0.3 km
Bears (grizzly and black)	Jul. 15 – Sept. 15	Berry habitat	0.3 km
Bison	Mar. 1 – Jul. 15	-	0.5 m
Caribou (boreal woodland caribou)	May 1 – Jul. 15	Blasting in boreal caribou range	-
	May 15 – Oct. 15	Water Crossings near blasting	10 km
	Year round	Shut-down distance if caribou are in the area	0.5 km
	Snow period	Snowmobile distance if caribou are in the area	0.25 km
Dall sheep lambing areas	May 1 – Jun. 15	-	2 km
	Jun. 15 – Aug. 15	-	Restricted activity in Wildlife Management Zones D/O/T* where sheep are known to lamb
Fox dens	May 1 – Jul. 15	-	0.15 km
Mineral/salt licks	Apr. 1 – Jul. 15	-	0.25 km
Mountain goat**	Year round	Target the habitat as well	2 km
Wolf dens	May 1 – Sept. 15	If entering by foot	0.5 km
		General development activities near dens	0.8 km
Wolverine dens	Oct. 15. – Jul. 15	-	2 km
Bird staging and nesting areas	When birds are present	Flight line distance to areas	1.5 km
Nests of bird species at risk	When nests are found	-	▪ Canada Warbler, Olive-sided Flycatcher, Rusty Blackbird, 300 m ▪ Common Nighthawk, 200 m

			▪ Yellow Rail, 350 m
Bald Eagle	Apr. 15 – Aug. 31	Nest sites	0.5 km
Golden Eagle	Apr. 15 – Aug. 31	Nest sites	0.8 km
Northern Goshawk and Sharp-shinned Hawk	Apr. 1 – Aug. 31	Nest sites	0.5 km
Osprey	Apr. 1 – Aug. 31	Nest sites	1 km
Peregrine Falcon	Apr. 15 – Aug. 31	Nest sites	1.5 km
Raptors, general	Mar. 1 – Sept. 1	Nest sites	1.5 km
	Sept. 2 – Feb. 28	Nest sites	0.5 km
Red-tailed Hawk	Apr. 15 – Aug. 31	Nest sites	0.8 km
Trees supporting stick and/or cavity nests	Year round	-	Do not cut down
Trumpeter Swan	Apr. 1 – Sept. 30	Breeding water body	0.8 km
Waterfowl	During migration	-	3 km
	Year round	Nest sites, staging areas and concentrations	0.25 km

1. Adapted from AANDC (2011)

* Refers to Outfitters Management Area in the Mackenzie Mountains; map can be found in the Northwest Territories Summary of Hunting Regulations.

** Mountain Goat uncommonly in the area

APPENDIX D
BEST MANAGEMENT PRACTICES (BMPS)

BMP 1	Forest Fire Prevention and Suppression Guidelines, July 2001
BMP 2	GNWT Guideline for Dust Suppression, June 2013
BMP 3	DFO Water Withdrawal Protocol, June 2010
BMP 4	Bear Incident Response Guidelines, 2013
BMP 5	Safety in Grizzly and Black Bear Country, May 2009
BMP 6	Guidelines for Industrial Activity in Bear Country, 2008
BMP 7	Camp Waste & Wildlife Attraction Guideline, 2013
BMP 8	Flying Low? June 2007

BMP 1

Forest Fire Prevention and Suppression Guidelines, July 2001

Forest Fire Prevention

And

Suppression Guidelines

For

Industrial Activities

Forest Fire Prevention and Suppression Guidelines for Industrial Activities

These ***Forest Fire Prevention and Suppression Guidelines for Industrial Activities*** (Guidelines) are issued as directions necessary for the carrying out of the ***FOREST PROTECTION ACT R.S.N.W.T. c.F-10*** under the authority of the **Forest Supervisor** pursuant to section 19(1) of the ***FOREST PROTECTION ACT R.S.N.W.T. c.F-10.***

The Government of the Northwest Territories provides forest fire management services on forested areas, including settlement areas within land claim agreements and within the terms of those agreements. The Guidelines have been prepared to provide direction to forest managers and industrial operators for forest fire prevention and suppression, in areas where operations are taking place during the **closed season** (***FOREST PROTECTION ACT, R.S.N.W.T. c.F-10***, section 10)

The intent of the Guidelines is threefold. First, industrial operations must be conducted so that they do not contribute to the seasonal forest fire load. Second, industrial operations must be able to control and extinguish any fires that occur as a result of their operations. Finally, industrial operators must be able to respond to wildfires that may affect human life and the property of their operations.

Please ensure that these guidelines receive appropriate consideration in operations under your jurisdiction or management.

R P Bailey

Robert P. Bailey
Forest Supervisor

FOREST FIRE PREVENTION AND SUPPRESSION GUIDELINES FOR INDUSTRIAL ACTIVITIES

Table of Contents

FOREST FIRE PREVENTION AND SUPPRESSION GUIDELINES FOR INDUSTRIAL ACTIVITIES

INTRODUCTION

The Government of the Northwest Territories provides forest fire management services on forested areas, including settlement lands within land claim agreements, and within the terms of those agreements. The following Guidelines have been prepared to provide direction to forest managers and industrial operators for forest fire prevention and suppression, in areas where operations are taking place during the closed season from May 01 to September 30. These Guidelines are issued under Subsection 19(1) of the *FOREST PROTECTION ACT.*

The intent of these Guidelines is threefold. First, industrial operations must be conducted so that they do not contribute to the seasonal forest fire load. Secondly, industrial operations must be able to control and extinguish any fires that occur as a result of their operations. Finally, industrial operators must be able to respond to wildfires that may effect human life and the property of their operations.

If there is a conflict between these Guidelines and the *FOREST PROTECTION ACT* (FPA), the FORE*ST MANAGEMENT ACT* (FMA), the *MACKENZIE VALLEY RESOURCE MANAGEMENT ACT* (MVRMA), or the regulations made under those Acts, the Acts and or regulations will prevail to the extent of any inconsistencies.

PART 1 – APPLICATION, AUTHORITY AND DEFINITIONS

1. Application

(1) PART 2 - PERSONNEL AND EQUIPMENT, PART 3 - FIRE PREVENTION, and PART 4 - FOREST FIRE SUPPRESSION apply

(a) from May 1 to September 30 each year or where ordered closed, and

(b) to persons and industrial activities in or within 1000 metres of a forest area.

2. Authority

(1) These Guidelines are issued as directions necessary for carrying out the FPA under the authority of the Forest Supervisor pursuant to section 19(1) of the FPA.

3. Definitions

The following terms apply to the Guidelines:

Closed District – means an area declared to be a closed district under paragraph 19(1)(f) of the FPA.

Closed Season – means the period beginning on May 1 and ending on September 30 as referred to in subsection 10(1) or the period established in an order made under subsection 10(2) of the FPA.

Fire Danger Rating – the process of systematically evaluating and integrating the individual and combined factors influencing fire danger represented in the form of fire danger indexes.

Fire Environment – the surrounding conditions, influences, and modifying forces of topography, fuel, and fire weather that determine fire behavior.

Fire Equipment Cache – A supply of fire fighting tools and equipment in planned quantities or standard units at a strategic point for the exclusive use in fire suppression.

Fire Extinguisher – means a fully charged and operable fire extinguisher bearing the Underwriter's Laboratories of Canada (ULC) label that rates the extinguisher as suitable for use on class A, B or C fires.

Fire Hazard – a general term to describe the potential fire behavior, without regard to the state of weather-influenced fuel moisture content, and/or resistance to fireguard construction, for a given fuel type. Such an assessment is based on physical fuel characteristics.

Fire Preparedness Plan – a plan outlining the condition or degree of being able and ready to cope with an anticipated fire situation.

Fire Prevention – activities designed to prevent the occurrence of fires caused by people. Fire prevention activities include public and school education, media campaigns, preparation of community forest fire management and protection plans, and the reduction of fire hazards and risks.

Fire Risk – the probability or chance of fire starting determined by the presence and activities of causative agents (i.e. potential number of ignition agents).

Fire Suppression – all activities concerned with controlling and extinguishing a fire following its detection and may include initial attack, sustained attack, limited action, delayed action, or observation and monitoring.

Fire Watcher – a designated person at a worksite to provide surveillance for forest fires as a result of work at that worksite.

Forest Area –any uncultivated land that, by reason of the existence of trees, grass or other vegetation on the land, possesses timber, forage, recreational, wildlife or other value.

Forest Fire – any wildfire or prescribed fire that is burning in a forested area.

Forest Officer – a forest officer appointed under subsection 17(1) of the FPA, members of the RCMP, or wildlife officers under the Wildlife Act as referred to in subsection 17(2) of the FPA.

Forest Supervisor – means the Forest Supervisor appointed pursuant to Section 16 of the FPA.

Fuel Break – an existing barrier or a change in fuel type or conditions, or a strip of land that has been modified or cleared, that acts as a buffer to prevent the spread of fire.

Heavy Equipment – crawler tractors, skidders, excavators or other similar equipment.

Hot Work – any work generating significant amounts of heat and includes the cutting, grinding, welding, the heating of metals and flaring of gases.

Industrial Activity - includes land clearing, timber harvesting, timber processing, mechanical site preparations and other silviculture treatments, gas or oil well operations, mining, highway maintenance and construction, engineering operations, plant harvesting, manufacturing, milling, railroad operations, trenching, the use of explosives and any prescribed activity within.

Initial Attack – the action taken to halt the spread or potential spread of a fire by the first fire-fighting force to arrive at the fire.

Large Engine – an engine having a power greater than 7.5 kW (10 hp) used in an industrial activity, excluding a water-borne engine, an engine in a vehicle primarily used for the transportation of people, or an engine in a helicopter.

Owner – in relation to an industrial activity means a person who has the right to conduct the industrial activity if the industrial activity is conducted on private land; or a licensee or permittee if the industrial activity is conducted on Crown Land in a Forested Area.

Permit – a permit issued under Section 21 of the FPA.

Person in Charge – a person who is present at the worksite and who is in charge of industrial activities conducted at the worksite, or a person who has been authorized by the owner to represent the owner at the worksite.

Pile – an accumulation of waste material not larger than 25 square metres (m^2) as referred to in section 18 of the *Exemption List Regulations* under the MVRMA.

Portable Pump Unit - means a water pump, not affixed to another machine, that is capable of maintaining a pressure of 1000 kPa (145 psi) while delivering 135 litres of water per minute from 30 metres of hose with

(a) a nozzle having a 9.5 mm (3/8") opening,

(b) a suction hose,

(c) at least 450 metres of discharge hose having a diameter not less than

  (i) 38 mm, (1 1/2") unlined, or

  (ii) 25 mm, (1") lined, and

(d) the tools and accessories necessary to operate and maintain the water pump and hoses.

Property – land or real estate, including both private and public land or real property.

Small Engine - an internal combustion engine having a power of 7.5 kW (10 hp) or less, excluding a water-borne engine or an engine in a vehicle primarily used for the transportation of people.

Sump – a depression in the ground constructed for the purpose of storing water.

Water Delivery System – a system consisting of a water supply, a water pump or equivalent means of pressurizing water, the ancillary hoses, attachments, and tools necessary for the operation and maintenance of the system, that can deliver to any place on a worksite or burn area,

(a) water at a pressure of 280 kPa (40 psi) and a rate of 90 litres per minute through a 9.50 mm (3/8") bore nozzle opening for 50 minutes or

(b) a 2500 litre stationary or mobile supply of water, of which 0.5 per cent is liquid surfactant concentrate that, when used with a pump, hose and nozzle, is capable of producing foam that will extinguish a fire in ordinary combustibles such as wood, paper or forest products.

Windrow – an accumulation of waste material not more than 330 metres in length and not more that 15 metres in width.

Worksite – in the case of an industrial activity other that timber harvesting, the site at which the work is performed, or in the case of timber harvesting, an area of land within which an operation relating to timber harvesting is performed.

PART 2 – PERSONNEL AND EQUIPMENT

4. Fire Watcher

(1) A Fire Watcher is required in all industrial operations to

(a) watch for sparks and fires,

(b) report any fires to a Forest Officer, a peace officer or the Person in Charge at the worksite at which the fire watcher is engaged, and

(c) assist in fighting any fire that occurs in the area being watched by the fire watcher.

(2) If the fire watcher reports a fire, the Person in Charge of an industrial activity must immediately report the forest fire to a Forest Officer, peace officer or person answering a forest fire reporting number.

(3) A Person in Charge of an industrial activity must ensure that a fire watcher has access to the following:

(a) one round-nosed shovel,

(b) one Pulaski tool or mattock,

(c) one hand-tank pump containing at least 18 litres of water, and

(d) a radio or telephone that can be used to report a fire and request assistance.

5. Fire fighting tools – general

(1) If the number of persons who normally work at a worksite is three (3) or less, the person carrying out the industrial activity must ensure that the following fire fighting tools are kept at the worksite:

(a) one round-nosed shovel,

(b) one Pulaski tool or mattock, and

(c) one hand-tank pump containing at least 18 litres of water.

(2) If the number of persons normally working at a worksite is more than three, the person carrying out the industrial activity must ensure that the following fire fighting tools are kept at the worksite:

(a) one round-nosed shovel, Pulaski tool or mattock for each person,

(b) one hand-tank pump containing at least 18 litres of water for every 3 persons, to a maximum of 8 hand-tank pumps.

(3) For the purpose of Guideline (2), the number of round-nosed shovels must, as nearly as possible, equal the combined number of Pulaski tools and mattocks.

6. Fire fighting tools - Large Engines

(1) A Person in Charge of an industrial activity must ensure that every Large Engine used in an industrial activity has the following fire fighting tools attached to it:

(a) one round-nosed shovel,

(b) one Pulaski tool or mattock,

(c) one fire extinguisher with a ULC rating of at least 1-A, 5-B,C, and

(d) one fire extinguisher with a ULC rating of at least 3-A, 10-B,C or an integral vehicle fire suppression system.

7. Fire fighting tools - Hot Work

(1) A Person in Charge of an industrial activity must ensure that the following fire fighting tools are kept at each worksite where Hot Work is performed:

(a) two fire extinguishers each with a ULC rating of at least 3-A, 10-B, C,

(b) one round-nosed shovel, and

(c) two hand-tank pumps containing at least 18 litres of water each.

8. Fire fighting tools – explosives

(1) If explosives are used in an industrial activity the Person in Charge must ensure that the following fire fighting tools are kept at the place from which the blast will be controlled:

(a) two round-nosed shovels and

(b) two hand-tank pumps containing at least 18 litres of water each.

9. Fire fighting tools – helicopters

(1) If one or more helicopters are normally used in an industrial operation to move personnel and equipment to and from a worksite, the Person in Charge must ensure that there is a landing spot kept near the worksite for the exclusive use of each helicopter, and that the helicopter is equipped with a water bucket that is

(a) of a type designed and adapted for aerial fire fighting,

(b) capable of being attached to a helicopter,

(c) capable of being both filled and emptied from a helicopter while the helicopter is airborne, and

(d) operated by pilots who are knowledgeable about the use of water buckets.

10. Water Delivery Systems

(1) A Person in Charge of an industrial activity that includes an activity in Risk Classification A or B under Schedule 1 must ensure that each worksite has

(a) one Water Delivery System if there are normally 4 to 10 workers working at the worksite, or

(b) two Water Delivery Systems if there are normally 11 or more workers working at the worksite.

(2) For the purpose of Guideline 10(1), if more than one activity is carried on at a worksite, the number of persons working at the worksite is considered to be the sum of the number of persons working at each activity.

(3) A Person in Charge of an industrial activity that is a sawmill must ensure that the sawmill has at least one Water Delivery System.

(4) If a Water Delivery System is required, the Person in Charge of the industrial activity must ensure that at least one person with the knowledge and competence to operate and maintain the Water Delivery System is at the worksite.

(5) If it is unreasonable to provide the Water Delivery System, notwithstanding Guideline 10(1), because of the terrain, size of a worksite, or the lack of available surface water on site, a portable pump unit and a water source of at least 4,500 litres may be substituted.

11. Fire Equipment Cache

(1) The Person in Charge of an activity in Risk Classification A or B under Schedule 1 must ensure that extra equipment is kept at a central Fire Equipment Cache where it can be delivered to any place on each worksite of the industrial activity within 1 hour.

(2) The quantity of extra equipment required by Guideline 11(1) is set out in Columns 2 to 5 of Schedule 2 opposite Column 1, which lists the number of persons who normally work at the worksite.

(3) For the purpose of Guideline 11(2), the number of persons in Column 1 of Schedule 1, is the sum of the persons normally working at all of the worksites referred to in Guideline 11(1). For this purpose, if more than one industrial activity is carried out at a worksite, the number of persons working at the worksite is considered to be the sum of the number of persons normally working at each activity.

PART 3 - FIRE PREVENTION

12. Large Engines

(1) A person must not operate a Large Engine unless it is equipped with a safe and effective device for arresting sparks that is

(a) an integral part of the exhaust system, and

(b) in good repair.

(2) A person must not operate a Large Engine that operates in a stationary capacity unless the site has been cleared of combustible material for a distance of at least three metres in each direction from the Large Engine.

(3) A Person in Charge of an industrial activity must ensure that a large engine meets the requirements under Guideline 12(1) and that combustible material is cleared as required under Guideline 12(2).

13. Small Engines

(1) A person must not operate a Small Engine unless

(a) the muffler on the Small Engine is maintained in good repair, and

(b) there is available at all times a Fire Extinguisher charged with at least 0.225kg (0.5lb.) of fire extinguishing chemical.

(2) A person must not operate a Small Engine if the ability of the muffler to reduce hot carbon emissions has been lessened by modification of the muffler, a spark arrestor or by redirection of the emissions.

(3) A Person in Charge of an industrial activity must ensure that a Small Engine is equipped with a muffler that meets the requirements under Guidelines 13(1)(a) and 13(2) and that a Fire Extinguisher is available as required under Guideline 13(1)(b).

14. Hot Work

(1) A person must not perform Hot Work unless a Fire Watcher is present.

(2) The Fire Watcher required under Guideline 14(1) must, in addition to the requirements of Guideline 14(1), remain at the site of the Hot Work for 30 minutes after the Hot Work has ceased, unless a longer period is required under Schedule 3.

(3) Subject to Guideline 14(1), a Fire Watcher is not required if all combustible material is removed for at least ten metres from the place where the Hot Work is performed.

15. Sawmills

(1) At least once in every calendar year, a Person in Charge of a sawmill must dispose of all combustible waste produced by the operation of the sawmill.

16. Combustible material

(1) A Person in Charge of a place that is a camp, mine, sawmill, refuse disposal site or timber processing facility must ensure that an area that extends inward 15 metres from the perimeter of the place is kept clear of combustible material.

(2) A Person in Charge of an industrial activity must ensure that all combustible material cleared from the area referred to in Guideline 16(1) is disposed of at least once in every calendar year.

17. Explosives

(1) A person must not use explosives at the site of an industrial activity unless a Fire Watcher remains at the site where the explosives are used for at least 30 minutes after the explosives have been detonated, unless a longer period is required under Schedule 3.

18. Restrictions on industrial activities

(1) A Person in Charge of an industrial activity must ensure that the activity is conducted in accordance with the requirements set out in Columns 3 and 4 of Schedule 3**,** that are opposite the industrial activity's Risk Classification in Column 2 and Forest Fire Danger Rating in Column 1.

(2) The person carrying out the industrial activity must

(a) determine the industrial activity's Risk Classification from Schedule 1 and

(b) unless exempted by a Forest Officer, obtain the Forest Fire Danger Rating from a Resources, Wildlife and Economic Development (RWED) Regional Duty Officer.

(3) A Forest Officer or RWED Regional Duty Officer can determine the Forest Fire Danger Rating for the industrial activity from data provided by the most representative weather stations.

PART 4 - FOREST FIRE SUPPRESSION

19. Requirement for a Fire Preparedness Plan

(1) The person who is the holder of a license or permit authorizing an industrial activity on Northwest Territory lands must, before carrying out an industrial activity in Risk Classification A or B in Table 1 of Schedule 1,

(a) submit a Fire Preparedness Plan to a Forest Officer for the person's area of operation; if the activity is to be carried out on the area between May 1 and September 31.

(b) obtain a copy of the RWED Regional Duty Officer roster and applicable contact numbers for the purposes of obtaining information and reporting fires.

20. Content of Fire Preparedness Plan

(1) A person who is required under Guideline 19 to prepare a Fire Preparedness Plan, must ensure that the Fire Preparedness Plan specifies the following:

(a) the number of people, types of equipment and the anticipated location of the people and equipment during the carrying out of the industrial activity,

(b) the names of key personnel and how they may be contacted, including the owner and Person-in-Charge,

(c) the names of personnel, who meet the prescribed training qualification,

(d) the tools and equipment available in a Fire Equipment Cache if a cache is required under Guideline 11(1) for that type of industrial activity,

(e) the location of the weather stations that will be used to monitor the weather at the site of the industrial activity,

(f) a schedule of industrial activity including proposed location and timing,

(g) operating procedures in the event of a fire, and

(h) activities which will be undertaken to prevent wildfires.

21. Requirement for a Permit to Burn

(1) A person who lights, fuels or makes use of one or more open fires to burn accumulations of waste material for resource management purposes must do so in accordance with the following conditions:

(a) before any fires are ignited

(i) the person lighting, fueling or making use of the open fires must obtain a Permit to Burn, and

(ii) a fuel break must be established around the fire to prevent the fire from escaping;

(b) during ignition and until all risk of the fires escaping is eliminated there must be at least two adult persons at the burn area who actively patrol to prevent the fire from escaping, and who are equipped with the following:

(i) a round nose shovel,

(ii) either an axe or a Pulaski, and

(iii) a Water Delivery System or a piece of Heavy Equipment that is suitable for fighting fires on the burn area that

(A) is capable of being delivered to the burn area within 1 hour, if the Fire Danger Rating is Moderate or less, or

(B) is located on the burn area, if the Fire Danger Rating is greater than Moderate.

(2) If a fire escapes or threatens to escape from the burn area, in addition to any other requirements of the *FOREST PROTECTION ACT*, the person lighting, fueling or making use of the open fire must provide the requirements specified in one or more of the following paragraphs, in any combination necessary to limit or prevent the escape of the fire

(a) the number of adult persons with suitable fire fighting tools, that are necessary to limit or prevent the escape of the fire,

(b) one Water Delivery System, or

(c) two pieces of heavy equipment suitable for fire fighting on the burn area.

(3) All fires must be extinguished within the specified time under which the Permit to Burn is issued.

22. Initial fire suppression

(1) For the purposes of the *FOREST PROTECTION ACT*, a person carrying out an industrial activity must take appropriate action when a fire is first discovered to

(a) contain or limit the spread of the fire,

(b) extinguish the fire if possible, and

(c) report the fire to the nearest RWED Regional Duty Officer.

(2) The person must commit, if necessary to meet the requirements of Guideline 22(1),

(a) all employees of the person who are working in the area of operation, and

(b) all tools and equipment required by and under this Guideline, and

(c) any other tools and equipment that are available to the person, including helicopters normally used in the industrial activities to move personnel and equipment to and from the area of operation.

23. Site rehabilitation

(1) A person who carries out emergency fire control or fire suppression operations must stabilize all fire access trails, fire guards and other fire suppression works to ensure that natural drainage patterns are maintained and surface soil erosion is minimized.

(2) Without limiting Guideline 23(1), a person carrying out rehabilitation must include the following activities:

(a) stabilization and re-vegetation of soil disturbed or exposed by Heavy Equipment,

(b) disposal of slash and debris,

(c) stabilization and restoration of the stream channels and stream beds to its original alignment and cross-section, and

(d) stabilization of sump and dam locations.

SCHEDULE 1 FOREST FIRE RISK CLASSIFICATION

I. The activities of industrial operations have the risk classifications assigned to them in Table 1.

II. If an industrial operation includes more than one component activity, each activity is subject to this regulation.

III. An activity not specifically listed in Table 1 is deemed to be risk classification A.

Table 1 - Risk Classification by Activity

Risk Classification A (High)	Risk Classification B (Moderate)	Risk Classification C (Low)
Blasting Bucking – power saw Bucking – tree processor Log barking Log skidding – ground system Log yarding – cable logging Metal cutting, grinding or welding Pipeline construction Rail grinding Sawmilling Silviculture – using small engines Silviculture – using large engines Trail building – using small engines Tree felling	Bucking - at landing Firewood cutting Land clearing Log forwarding Log yarding – helicopter Mining exploration Right of way clearing or maintenance Trenching Wood chipping Wood processing Road right of way grass mowing	Bitumen processing - portable plant Bridge building Drilling Equipment transportation Excavating Fencing Gas or oil well operation Gas Flaring Gravel processing, loading and hauling Guiding, packing or trapping Log sorting or reloading Log hauling Log loading Log scaling Log dumping Mining operations Plant harvesting Power line construction Prospecting Quarrying Railway construction or maintenance Ranch operation Road construction or maintenance Silviculture - using hand tools Surveying or engineering Timber cruising Tourist resort operation Trail building - using hand tools

SCHEDULE 2 QUANTITIES OF EQUIPMENT REQUIRED FOR A FIRE EQUIPMENT CACHE

Column 1 Number of persons	Column 2 Portable Pump Units	Column 3 Shovels	Column 4 Pulaski tools / Mattocks	Column 5 Hand-tank Pumps
1 – 10	0	0	0	0
11 – 20	1	4	4	2
21 – 40	2	6	6	4
41 – 60	3	10	8	6
61 – 80	4	14	10	8
81 – 100	5	20	12	12
101+	6	22	14	14

SCHEDULE 3 RESTRICTIONS ON INDUSTRIAL OPERATIONS

Column 1 Fire Danger Rating (FWI)	Column 2 Risk Classification	Column 3 Restriction	Column 4 Duration
Moderate (6 – 12)	**A or B**	After 3 consecutive days of Moderate maintain a fire watch after work for 1 hour	Until the fire danger class falls below Moderate.
High – Very High (13 – 24)	**A**	Maintain a fire watch after work for 1 hour	Until the fire danger class falls below Moderate.
		After 3 consecutive days of High or greater, cease activity between 1300 and 1900 hours each day	Until the fire danger class falls to Moderate for 2 consecutive days, or until the fire danger class falls to Low.
	B	Maintain a fire watch after work for 1 hour	Until the fire danger falls below Moderate
Extreme (25+)	**A**	Maintain a fire watch after work for 1 hour.	Until the fire danger class falls below Moderate
		After 2 consecutive days of Extreme, cease all activity all day.	Until the fire danger class falls below Extreme, then resume the activity except between the hours of 1 p.m. and 9 p.m. local time, or until the fire danger class falls to Moderate.
	B	Maintain a fire watch after work for 1 hour	Until the fire danger class falls below Moderate
		After 3 consecutive days of Extreme, cease activity between 1300 and 2100 hours each day	Until the fire danger class falls to High for 3 consecutive days, or until the fire danger class falls to Moderate.

SCHEDULE 4 FIRE EQUIPMENT STANDARDS

(Some pump units that are presently available.)

Pump	PSI (3/8" nozzle)	Max Output Vol. Litres/Hour	Max Output Vol. Litres/Min @ 3/8" Nozzle
Ariens 945	N/A	7600*	N/A
Tanaka QCP 121	N/A	6960*	N/A
Tanaka TCP 210	N/A	7600*	N/A
Shindaiwa GP25	35	8800*	N/A
Yamaha YP20G	N/A	32,400***	N/A
Wajax Mini Mark TD48D	55	14,400**	270
Wajax Mark 26	110	20,000**	200
Wajax Mark 3	170	21,600**	240
Hale XL 2000	N/A	135,000****	N/A

Pressure outputs are Manufacture free-flow discharge estimates based on *1" Discharge hose, **1 1/2" Discharge hose, ***2" Discharge hose, ****3" Discharge hose.

BMP 2
GNWT Guideline for Dust Suppression, June 2013

Guideline for Dust Suppression

June 2013

Guideline for Dust Suppression

1 Introduction

The purpose of this guideline is to make you aware of the procedures you must follow before applying a dust suppressant in the Northwest Territories. The Environment Division (ED) of the Department of Environment and Natural Resources (ENR) has currently approved three dust suppressants for use on Commissioner's Land in the NWT. This publication provides guidance for applying these products and a process for approving other dust suppression products.

Section 2.2 of the *Environmental Protection Act* gives the Minister of Environment and Natural Resources the authority to develop, coordinate and administer these guidelines (see Appendix A).

1.1 Definitions

Approved Product	A product approved by ED for dust suppression.
Commissioner's lands	Lands in the NWT that have been transferred by Order-in-Council to the Government of the Northwest Territories. This includes highways, block land transfers and most lands within municipalities.
Leachate Test	Leachate Extraction Procedure - Canadian General Standards Board (CGSB) #164-GP-1-MP (or as amended) or equivalent.
PCB	Polychlorinated biphenyl.
Roadway	The traveled surface of a road, from shoulder to shoulder; it does not include the side slopes or ditches.
Set	The point at which the product becomes stable, according to the manufacturer's specifications.
Used Oil	Any oil from an industrial or non-industrial source that has become unsuitable for its intended purpose due to the presence of impurities or the loss of original properties.

1.2 Why are Dust Suppressants Used?

Reasons for using dust suppressants include:

Safety	Untreated roads may lead to more accidents. Accident potential is increased due to loss of visibility.
Health	Dust particles may become a health hazard when they become trapped in the lungs.
Vegetation	Large amounts of dust may induce changes in vegetation due to increased heat absorption and decreased transpiration.
Aquatic Resources	High levels of dustfall into aquatic systems may adversely affect aquatic plants and fish that are not adapted to high levels of sedimentation.
Road Maintenance Costs	Treated roads can lower road maintenance costs by reducing gravel loss and blading time.
Aesthetics	Dust produces an immediate visual impact that may affect residents who live near dust prone roads.

An Ambient Air Quality Guideline established under the *Environmental Protection Act* sets standards respecting the maximum desirable levels of dust in ambient air in the NWT. Measured as total suspended particulate (TSP), the standards for dust over 24 hours are 120 micrograms per cubic metre ($\mu g/m^3$) and averaged over a year are 60 $\mu g/m^3$. These standards apply to the whole of the NWT. They define the long term goal for air quality to protect unpolluted parts of the Territory and for the continuing development of control options in polluted areas.

1.3 Roles and Responsibilities

Although the *Environmental Protection Act* does not require permits for the application of dust suppressants in the NWT, all suppressants must first be approved by ED. While general conditions are provided for approved dust suppressants, additional conditions may be required on a case by case basis.

The responsible party, being the landowner, road authority or municipal authority, must make provisions to notify the public and contact ENR before applying suppressants. The responsible party must also verify that the products are approved for use and properly applied by the applicator. If the product migrates from the roadway and is deemed to violate the *Environmental Protection Act*, the person(s) responsible must be prepared to take appropriate remedial measures.

Applicators are also accountable for their actions. Applicators are responsible for ensuring that the product is approved for use in the NWT, is correctly applied to the designated area and does not migrate off the site. Applicators, manufacturers and retailers must provide information about new products to ED for approval before their use in the NWT (section 3).

> ***It is important to remember that the responsible party (the landowner, road authority or municipal authority) is liable for any activity they authorize. Contamination of the environment and subsequent remediation of the site is ultimately their responsibility (see Appendix A).***

2 General Dust Suppression Guidelines

There are many aspects to consider before you apply a dust suppressant in the NWT. The following are general guidelines to be followed:

2.1 Notification for Use of Approved Products

The following parties must be notified:

Property Owner	Any application of a dust suppressant should be conducted according to an agreement between the applicator and the responsible road authority or property owner. A written agreement is recommended.
ENR	Before any application, provide the local Renewable Resource Officer with the following information: the location of the site, the product(s) used and a timetable for the work.
Public	Notify the affected public before any application. This can be through signs, public notices or media announcements.

2.2 Approved Products

Calcium chloride and DL10 are currently the only approved dust suppressants in the NWT. Appendix B contains a list of approved products and information regarding the application of these products.

Other products cannot be used in the NWT until they have been approved by ED.

Used oil cannot be used as a dust suppression/road stabilizing product or added to other dust suppression products.

2.3 Application Procedures

Directions	Follow the manufacturer's specifications or other tested and approved procedures.
Roadway	The application shall be limited to the roadway, driveway or parking lot.
Rate	Carefully monitor the application rate to ensure adequate coverage without pooling or runoff of products. The amount of dust suppressant applied should not exceed the minimum amount required to effectively suppress dust.

Incorporation	Products must be bladed or incorporated into the road immediately upon application, to ensure the product does not migrate off the roadway.
Surplus	There should be no evidence of excess product on the roadway.
Migration	The material must not migrate or run off the traveled portion of the roadway.

2.4 Environmental Concerns

2.4.1 General

Contaminants	Dust suppressants must conform with the manufacturer's specifications and must not contain concentrations of contaminants that would not normally be found in the suppressant.
PCB Concentration	Materials that contain more than 2 parts per million (ppm) of PCB are considered unacceptable and shall not be applied as a dust suppressant.

2.4.2 Water

Proximity to Water	Ensure that dust suppressants do not enter and contaminate waterbodies, including surface and groundwater. Do not allow the product to leave the roadway.
Sensitive Environments	Application rates near sensitive environments, (e.g. marshes), must be closely monitored. Remember, environmental restoration is the responsibility of the landowner, road authority or municipal authority.
Flooding	Do not apply products to areas of roads that are subject to flooding.
Imminent Precipitation	Do not apply products if precipitation is occurring, or forecast to occur before the product sets or cures.

2.5 Spill Contingency Plan

Provide EPS with a contingency plan, if required by the *Spill Contingency Planning and Reporting Regulations*, under the *Environmental Protection Act*.

Be prepared to respond to spills, including any product that migrates off the roadway.

3 New Products

Products that have not been approved by ED must undergo an assessment before being approved for use as a dust suppressant. The following information is required before such an assessment can be done:

Manufacturer's Information	Manufacturer's specifications and application procedures.
Laboratory Analysis	All new products must be characterized by an accredited laboratory.
Material Safety Data Sheets (MSDS)	Complete Workplace Hazardous Material Information System (WHMIS) data sheets.
Toxicity Tests	Toxicity tests should be provided for LC-50 and LD-50.
Leachate Tests	(see section 3.1)
Other Requirements	Provide a proposed schedule of field tests to confirm product efficiency and appropriate application rates. Provide any other materials, tests or analysis carried out on the substance. Provide copies of approvals from other jurisdictions. Laboratory or testing costs are the responsibility of the person(s) applying for approval.

3.1 Leachate Toxicity Testing

New, non-approved dust suppressant products may be required to undergo the leachate extraction procedure to determine toxicity of the product. Testing should be carried out on a sample consisting of the material, at the standard application

rate, and on a representative sample of road material. Such a leachate toxicity test can be undertaken by a variety of reputable commercial laboratories. Leachate extraction procedure CGSB #164-GP-1-MP, or an acceptable equivalent, must be used (see Appendix C).

4 Conclusion

This is a brief introduction to dust suppressant application in the NWT.

For more information, please contact:

Environment Division
Environment and Natural Resources
600, 5102-50 Avenue
Yellowknife, NT, X1A 3S8
phone (867) 873-7654 fax (867) 873-0221

Remember that this document is to inform you of the procedures you must follow before applying dust suppressants in the NWT. If you have any questions or comments, contact the Environment Division before beginning a dust control program.

5 Bibliography

Community Dust Control Program - Technical Services Division. Calcium Chloride as a Dust Suppressant. Department of Government Services and Public Works, Yellowknife, N.W.T., (1992).

Environmental Protection Act - Spill Contingency Planning and Reporting Regulations.

Gazette officielle du Quebec. Environmental Quality Act - Hazardous Waste Regulation- Schedules III and IV. Quebec: Editeur officiel du Quebec, (1988).

Government of British Columbia. British Columbia Waste Management Act - Special Waste Regulation, Schedule 4, Queen's Printer of British Columbia, (1988).

Government of Ontario. Regulation 347 (formerly Reg. 309) -Schedule 4, Toronto, Ontario: Queen's Printer of Ontario, (1980).

Green, L. Public Awareness Information for Dust Control on N.W.T. Highways, Yellowknife, N.W.T.: Department of Transportation, (1992).

RTAC●ARTC Guidelines for Cost Effective Use and Application of Dust Palliatives, (1987).

Ontario Ministry of the Environment. Draft Guidelines for the Application of Product Dust Suppressant Materials, Toronto, Ontario: Ontario Ministry of the Environment, (1992).

Secretary of Canadian General Standards Board(CGSB). Leachate Extraction Procedure 164-GP-IMP, Ottawa, Ontario: CGSB, (1987).

Techman Engineering Ltd. Road Dust Suppression in Northern and Western Canada- Manual or Recommended Procedures, Calgary, Alberta: Environment Canada, (1982).

Thompson, N. Use of Entac Dust Suppressant, Yellowknife, N.W.T.: Environmental Protection Division, Renewable Resources Department, (1990).

Appendix A

Environmental Protection Act

The following is a subset of the *Environmental Protection Act*. The complete act can be obtained from the Environmental Protection Service, Department of Resources, Wildlife and Economic Development.

1. In this Act,

"contaminant" means any noise, heat, vibration or substance and includes such other substance as the Minister may prescribe that, where discharged into the environment,

(a) endangers the health, safety or welfare of persons,
(b) interferes or is likely to interfere with normal enjoyment of life or property,
(c) endangers the health of animal life, or
(d) causes or is likely to cause damage to plant life or to property;

"discharge" includes, but not so as to limit the meaning, any pumping, pouring, throwing, dumping, emitting, burning, spraying, spreading, leaking, spilling, or escaping;

"environment" means the components of the Earth and includes

(a) air, land and water,
(b) all layers of the atmosphere,
(c) all organic and inorganic matter and living organisms, and
(d) the interacting natural systems that include components referred to in paragraphs (a) to (c).

2.2. The Minister may

(a) establish, operate and maintain stations to monitor the quality of the environment in the Territories;
(b) conduct research studies, conferences and training programs relating to contaminants and to the preservation, protection or enhancement of the environment;
(c) develop, co-ordinate and administer policies, standards, guidelines and codes of practice relating to the preservation, protection or enhancement of the environment.

5. (1) Subject to subsection (3), no person shall discharge or permit the discharge of a contaminant into the environment.

(2) **REPEALED.** R.S.N.W.T. 1988,c.117(Supp.),s.8.

(3) Subsections (1) does not apply where the person who discharged the contaminant or permitted the discharge of the contaminant establishes that

(a) the discharge is authorized by this Act or the regulations or by an order issued under this Act or the regulations;
(b) the contaminant has been used solely for domestic purposes and was discharged from within a dwelling-house;
(c) the contaminant was discharged from the exhaust system of a vehicle;
(d) the discharge of the contaminant resulted from the burning of leaves, foliage, wood, crops or stubble for domestic or agricultural purposes;
(e) the discharge of the contaminant resulted from burning for land clearing or land grading;
(f) the discharge of the contaminant resulted from a fire set by a public official for habitat management of silviculture purposes;

(g) the contaminant was discharged for the purposes of combating a forest fire;
(h) the contaminant is a soil particle or grit discharged in the course of agriculture or horticulture; or
(I) the contaminant is a pesticide classified and labeled as “domestic” under the *Pest Control Products Regulations* (Canada).

(4) The exceptions set out in subsection (3) do not apply where a person discharges a contaminant that the inspector has reasonable grounds to believe is not usually associated with a discharge from the excepted activity. R.S.N.W.T. 1988,c.75(Supp.),s.5;c.117(Supp.),s.8.

5.1 Where a discharge of a contaminant into the environment in contravention of this Act or the regulations or the provisions of a permit or licence issued under this Act or the regulations occurs or a reasonable likelihood of such a discharge exists, every person causing or contributing to the discharge or increasing the likelihood of such a discharge, and the owner or the person in charge, management or control of the contaminant before its discharge or likely discharge, shall immediately

(a) subject to any regulations, report the discharge or likely discharge to the person or office designated by the regulations;
(b) take all reasonable measures consistent with public safety to stop the discharge, repair any damage caused by the discharge and prevent or eliminate any danger to life, health, property or the environment that results or may be reasonably expected to result from the discharge or likely discharge; and
(c) make a reasonable effort to notify every member of the public who may be adversely affected by the discharge or likely discharge. R.S.N.W.T. 1988,c.75(Supp.),s.5; c.117(Supp.),s.9.

6. (1) Where an inspector believes on reasonable grounds that a discharge of a contaminant in contravention of this Act or the regulations or a provision of a permit or licence issued under this Act or the regulations has occurred or is occurring, the inspector may issue an order requiring any person causing or contributing to the discharge or the owner or the person in charge, management or control of the contaminant to stop the discharge by the date named in the order.

7. (1) Notwithstanding section 6, where a person discharges or permits the discharge of a contaminant into the environment, an inspector may order that person to repair or remedy any injury or damage to the environment that results from the discharge.

(2) Where a person fails or neglects to repair or remedy any injury or damage to the environment in accordance with an order made under subsection (1) or where immediate remedial measures are required to protect the environment, the Chief Environmental Protection Officer may cause to be carried out the measures that he or she considers necessary to repair or remedy an injury or damage to the environment that results from any discharge.

Appendix B

Approved Dust Suppression Products and Application Information

Calcium Chloride

This is a commonly used product in the NWT. It is available in granular and liquid form. Because it is hygroscopic and deliquescent, it draws moisture from the air and will control dust if applied frequently enough.

Road surface conditions and traffic volume dictate the amount, timing and frequency of calcium chloride application. With normal application procedures and concentrations, it is generally non-toxic with rapid dissolution in the environment. However, calcium chloride can wash away in heavy rain. For more information read: *Calcium Chloride as a Dust Suppressant,* (see section 5).

Toxicity to Plants	Calcium chloride is toxic to some plants. Keep the product on the roadway.
Application Rate	Apply minimum amounts as it can cause roads to become slippery.
Applicator Competence	Ensure application personnel are informed of corrosive nature of the product (can be harmful to eyes and skin with direct contact).
General Guidelines	Follow all other general dust suppressant guidelines listed in section 2.

Appendix B (cont'd.)

DL10

DL10 is an asphalt product that is mixed with water and a soap solution. DL10 should be applied to one side of the road at a time, and then allowed to set for approximately three hours. Braking may be difficult on freshly treated road, so a pilot car may be necessary to direct traffic during the application. Vehicles should travel no faster than 20 km/hr through areas where the application has not set.

Fresh DL10 can be washed off using soap and water. If it is allowed to dry, a solvent may be required.

General Guidelines Follow all general dust suppressant guidelines listed in section 2.

Appendix C

Leachate Extraction Procedure Test and Equivalents (see bibliography section for complete documentation).

The Environment Division may require new products to undergo the following test:

> CGSB #164-GP-1-MP Leachate Extraction Procedure Canadian General Standards Board (or as amended).

Or one of these equivalent tests:

> Schedules III and IV - Environmental Quality Act - Hazardous Waste Regulation- Gazette officielle du Quebec.
>
> Schedule 4 - British Columbia Waste Management Act - Special Waste Regulation, Government of British Columbia.
>
> Schedule 4 - Regulation 347 (formerly Reg. 309), Government of Ontario.

If you would like to be placed on a mailing list to receive guideline amendments or for public consultation on Environment Division legislation please fill this out and mail or fax to:

Environment Division
Department of Environment and Natural Resources
Government of the Northwest Territories
600, 5102 - 50th Avenue
Yellowknife, NT, X1A 3S8
Fax: (867) 873-0221

Mailing List for Environmental Protection Service Information

Name: _____

Title: _____

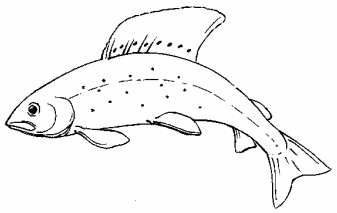
Address:_____

_____

_____

Phone/Fax Number_____

BMP 3
DFO Water Withdrawal Protocol, June 2010



DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut

Rationale

In the Northwest Territories and Nunavut, winter activities such as access road construction, exploratory drilling and camp operations often require large amounts of water. Excessive amounts of water withdrawn from ice-covered waterbodies can impact fish through oxygen depletion, loss of over-wintering habitat and/or reductions in littoral habitat. The potential for such negative impacts to over-wintering fish and fish habitat has made winter water withdrawal a critical issue for Fisheries and Oceans Canada (DFO) in the Northwest Territories and Nunavut. To mitigate impacts to fish from water withdrawal from ice-covered waterbodies, and to provide standardized guidance to water users, including volume limits for certain water source types, DFO has developed this protocol in conjunction with industry and other regulators.

For the purposes of this protocol, a **waterbody** is defined as any water-filled basin that is potential fish habitat. A waterbody is defined by the ordinary high water mark of the basin, and excludes connecting watercourses.

This protocol will **not** apply to the following:

- Any waterbody that is exempted by DFO (e.g. Great Bear Lake, Great Slave Lake, Gordon Lake, and others as and when determined by DFO), and;
- Any waterbody from which less than 100m^3 is to be withdrawn over the course of one ice-covered period.

In order to establish a winter water withdrawal limit for a given waterbody, the following criteria must be adhered to:

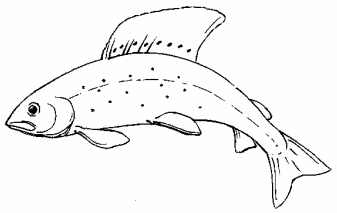
1. In one ice-covered season, total water withdrawal from a single waterbody is not to exceed 10% of the available water volume calculated using the appropriate maximum expected ice thickness provided in Table 1.
2. In cases where there are multiple users withdrawing water from a single waterbody, the total combined withdrawal volume is not to exceed 10% of the available water volume calculated using the appropriate maximum expected ice thickness provided in Table 1. Therefore, consistent and coordinated water source identification is essential.
3. Only waterbodies with maximum depths that are ≥1.5m than their corresponding maximum expected ice thickness should be considered for water withdrawal (Table 1). Waterbodies with less than 1.5m of free water beneath the maximum ice are considered to be particularly vulnerable to the effects of water withdrawal.
4. Any waterbody with a maximum expected ice thickness that is greater than, or equal to, its maximum depth (as determined from a bathymetric survey) is exempt from the 10% maximum withdrawal limit (Table 1).

To further mitigate the impacts of water withdrawal, water is to be removed from deep areas of waterbodies (>2m below the ice surface) wherever feasible, to avoid the removal of oxygenated surface waters that are critical to over-wintering fish. The littoral zone should be avoided as a water withdrawal location. Water intakes should also be properly screened with fine mesh of 2.54 mm (1/10") and have moderate intake velocities to prevent the entrainment of fish. Please refer to the *Freshwater Intake End-of-Pipe Fish Screen Guideline* (DFO, 1995) which is available upon request, or at the following internet address: www.dfo-mpo.gc.ca/Library/223669.pdf.

In order to determine the maximum water withdrawal volume from an ice-covered waterbody, and thereby conform to this protocol, the following information must be provided to DFO for review and concurrence prior to program commencement.

Water Source Identification

1. Proposed water sources, access routes, and crossing locations clearly identified on a map, with geographical coordinates (latitude/longitude and/or UTMs) included.
2. Any watercourse connectivity (permanently flowing and/or seasonal) between the proposed water source and any other waterbody or watercourse.



DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut

3. Aerial photos or satellite imagery of the water sources.
4. Estimated total water withdrawal requirement for work or activity and estimated total water withdrawal per water source (in m^3).

Bathymetric Survey Results

1. For all waterbodies: One longitudinal transect, connecting the two farthest shorelines, is to be conducted regardless of waterbody size. Note: a longitudinal transect may be straight or curved in order to accommodate the shape of a lake (see Figure 1).
2. For waterbodies equal to or less than 1 km in length: a minimum of one longitudinal transect and two perpendicular transects are to be conducted. Perpendicular transects should be evenly spaced on the longest longitudinal transect, dividing the lake into thirds (Figure 1).
3. For lakes greater than 1 km in length: a minimum of one longitudinal transect is to be conducted. Perpendicular transects (minimum of 2) should be evenly spaced on the longest longitudinal transect at maximum intervals of 500 m.
4. Additional transects should be run as required to include irregularities in waterbody shape such as fingers or bays (Figure 1).
5. All longitudinal and perpendicular transects are to be conducted using an accurate, continuous depth sounding methodology, such as open water echo sounding or ground penetrating radar (GPR), that provides a continuous depth recording from one shore to the farthest opposing shore (Figure 1). Any alternative technology should be reviewed by DFO prior to implementing for bathymetric surveys.

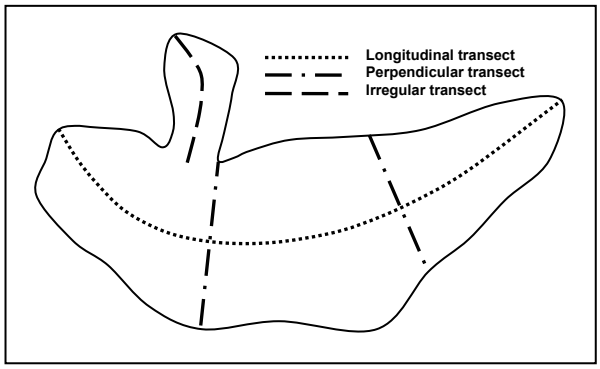
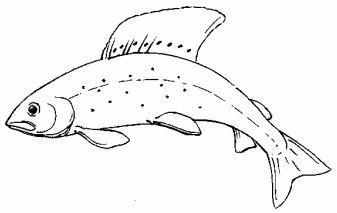


Figure 1. Minimum transect layout for a lake that is less than 1 km in length, with an irregularity.

Volume Calculations

1. Document the methods used to calculate surface area. If aerial photos or satellite imagery were used, provide the date (day/month/year) taken, as surface area may change depending on the time of year. If maps were used, provide the year that they were surveyed.
2. Detail the methods used to determine the total volume of free water, incorporating the relevant bathymetric information.
3. Calculate the available water volume under the ice using the appropriate maximum expected ice thickness, i.e. *Total Volume* $_{lake}$ *– Ice Volume* $_{max\ thickness}$ *= Available Water Volume* (see Table 1 for maximum ice thickness).
4. For programs where ice-chipping is used, the total ice volume to be removed from the waterbody should be converted to total liquid volume and incorporated into the estimate of total water withdrawal requirement per water source.



DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the Northwest Territories and Nunavut

Table 1. Maximum expected ice thickness, and corresponding water depth requirements, for different regions in the Northwest Territories.

Area	Maximum Expected Ice Thickness (m)	Minimum Waterbody depth Required for 10% Water Withdrawal (m)
Above the Tree Line	2.0	≥3.5
Below the Tree Line - North of Fort Simpson	1.5	≥3.0
Deh Cho –South of Fort Simpson	1.0	≥2.5

A brief project summary report documenting and confirming total water volume used per water source and corresponding dates should be submitted to DFO within 60 days of project completion. Information should be provided in the following format (this information would also be useful as part of the project description):

Lake ID	number and/or name
Coordinates	latitude and longitude and/or UTM coordinates
Surface area	in ha
Total Lake Volume	in m^3
Under Ice Volume	in m^3 (based on max ice thickness for region)
Max expected ice thickness value used	in m
Calculated 10% Withdrawal volume	in m^3
Total required water volume extracted	in m^3
Aerial photographs of waterbody	PDF format
Bathymetric Map(s) of waterbody	PDF format

Any requests deviating from the above must be submitted to DFO and will be addressed on a site-specific basis.

Beaver and Muskrat

Many species of animals are highly sensitive to water fluctuations. In areas where beaver and muskrat may occur, the appropriate agencies or organizations should be consulted to determine if harmful effects will result from your activities, and whether these effects can be successfully mitigated through modifications to your plans including best management practices.

Please note that adherence to this protocol does not release the proponent of the responsibility for obtaining any permits, licenses or authorizations that may be required.

For more information contact DFO at (867) 669-4915.

BMP 4
Bear Incident Response Guidelines, 2013

2013

Bear Incident Response Guideline

Photo by Dean Cluff/ENR

North Slave Region

Environment & Natural Resources

Northwest Territories Environment and Natural Resources

ENR North Slave Region
Bear Incident Response Guideline

Implementation of these guidelines will allow ENR North Slave Regional office a greater ability to provide advice and assistance in preventing harm to humans, bear(s) or property. In addition, it will provide guidance on safely deterring bears that find themselves in areas of development, tourism camps or cabins with the aim of preventing habituation and unnecessary destruction.

Report any incidents such as sightings, encounters, injuries and/or mortalities to the ENR Regional Contacts listed below:

Wildlife Emergency (On Call Officer)	(867) 873-7181 (24 Hours)
North Slave Regional Office	(867) 873-7184 (8:30 am to 5:00 pm)
Tlicho Area Office	(867) 392-6511 (8:30 am to 5:00 pm)

The Department's *Safety in Grizzly and Black Bear Country* brochure contains basic precautions and safety tips to keep in mind while you are in bear country. ENR understands that there may be some variation due to geographic conditions which may limit the actions you are able to take.
http://www.enr.gov.nt.ca/_live/documents/content/Bear_Safety.pdf

BEAR AWARENESS TRAINING

ENR North Slave Regional office supports the NWT Mine Health and Safety Regulations (s.15.05), which requires that all field personnel involved in mineral exploration undertake bear-safety training. However, human/wildlife incident prevention is a key component to the training.

Training of personnel in preventing and responding to wildlife incidents can reduce the likelihood of injury to personnel and wildlife. Therefore, all field personnel working on the project must receive bear awareness training from a professional trainer.

The training should include:

1. Recognizing the causes of human/wildlife conflicts;
2. How to prevent and respond to bear incidents;
3. Proper storage, transfer and disposal of camp waste; and
4. Proper use and safe application of deterrents.

INCIDENT PREVENTION

Refer to the ENR North Slave Regional ***Camp Waste and Wildlife Attraction Guideline.*** This resource will provide guidance on how to reduce or prevent attraction from bears to your camp, cabin or work site.

INCIDENT RESPONSE

Small scale exploration and tourism camps should prepare a Bear Response Standard Operating Procedure (SOP) that can be used in the field. The SOP will allow all members on site to have knowledge of how to reduce or prevent any loss of life or property if there is a bear within the vicinity of your camp area or work site. A SOP may include such things as:

a) Response team
b) Equipment
c) Action level
d) Emergencies
e) Reporting Requirement

1. SIGHTING - Bear in the general vicinity (>1km)

1. If it is within sight of your camp/cabin and it is safe to do so, use the *Bear Incident Checklist* to record information regarding your observations.
2. Report the bear to the ENR North Slave Regional contacts listed above.
3. Continue to monitor, if necessary.

2. ENCOUNTER - Bear In Camp (<1km)

1. If safe to do so; take a quick note of the location, direction of travel and general behaviour of the bear(s).
2. Sound the bear alarm.
3. Phone the ENR North Slave Regional contacts listed above for guidance on necessary next steps to ensure human/wildlife safety and protection of property.
4. Stay indoors or in your vehicle. DO NOT APPROACH THE BEAR.
5. Keep all doors and windows closed.
6. If necessary and safe to do so; continue to monitor the behaviour and movement until either the bear leaves on its own, deterrence is successful or response personnel arrive.
7. Report status of bear encounter to the ENR North Slave Regional contacts listed above when safe to do so.

3. Bear Injury

1. Any injuries a bear may have obtained from direct or indirect contact with the camp or persons must be reported to the appropriate ENR North Slave Regional contact listed above.
2. Use the *Bear Incident Checklist* to record observations and any events that may have lead up to the injury and any other actions taken.

4. Bear Mortality

1. A bear may be destroyed if human life is in danger or destruction of property is imminent.

2. Mortalities must be reported to the appropriate ENR North Slave Regional contact listed above immediately. Under the NWT Wildlife Act, the responsible party is required to:

    a) Skin the bear leaving the claws and head attached.
    b) Preserve the hide by freezing and/or salting it and store it in a cool place. Turn in the hide, the skull, evidence of sex and any other biological samples requested when filing the report to the nearest ENR North Slave office or to an ENR Renewable Resource Officer.

If possible, the attached *Bear Incident Checklist* should be completed prior to calling ENR. It is critical that as much information as possible be provided at this point in order for ENR to provide appropriate advice and guidance.

DENNING BEARS

A. For exploration camps, if a bear is located in, at or near a den site, work in the area must halt. All employees should safely retreat from the area and report the incident to the Site Supervisor and/or Wildlife Monitor and the appropriate ENR North Slave Regional contact listed above for further advice and assistance.

B. For cabin owners, if a bear is located in, at or near a den site, safely retreat from the area and report the incident to the appropriate ENR North Slave Regional contact listed above for further advice and assistance.

C. Staff from ENR will be required to assess the den site and may implement measures to ensure both human safety and that the bear(s) remain undisturbed. This may include the establishment of a buffer zone of at least 300 meters around the den.

D. Work inside the buffer zone may not be permitted until after den emergence.

ENR North Slave Region
Bear Incident Checklist

Office Use Only
File#:
Date reported:
Name:

- Fill out or check all that apply

1. **Complainant Details:**				
Name, job title and affiliation:				
Contact information:				
Location of complainant: *(coordinates, lake or property name)*				
Other on-site contact information: *(wildlife monitors/site supervisors)*				
2. **Bear Incident Details**				
Date/Time:		**Location:** *(coordinates, lake or property name)*		
Type of bear incident:	□ sighting	□ encounter	□ injury	□ mortality *Ear tag/tattoo #*
	□ Other, explain:			
Number of bears:		**# of cubs**		
Type:	□ black	□ grizzly	□ unknown	
Sex :	□ male	□ female	□ unknown	
Age Class:	□ cub (<1)	□ juvenile	□ adult	□ unknown
Behaviour:	□ fearful	□ not fearful	□ aggressive	□ other
General Observations	□ moving toward site	□ moving away from site	□ at site	
Other observations: *(i.e. walking, resting, eating, mortality, injury, den site, number of cubs, etc.)*				
Has bear(s) been involved in a previous incident:	□ No □ Yes	**If yes, explain:**		
Did the bear obtain a reward	□ No □ Yes	**If yes, explain:**		
Any property damage or loss of life:	□ No □ Yes	**If yes, explain:**		

3. **Detection/Deterrent:**				
Detection system on site:	□ Alarm	□ Dog	□ Motion detector	□ Other:
Deterrence on site:	□ Bear boards	□ Auditory *(Yelling/Flares/Alarm/Horn/Bell/ Whistle/Cracker shells)*	□ Projectile *(Rubber Bullets/Firearms)*	
	□ Electric Fence	□ Chased *(Dog, vehicle)*	□ Other:	
Was deterrence used:	□ No □ Yes	**Explain:**		
Was the deterrence successful:	□ No □ Yes	**Explain:**		
Present status of bear with dates:	□ at large	□ captured	□ deterred	□ other

4. Additional Comments	

BMP 5

Safety in Grizzly and Black Bear Country, May 2009

If You Encounter a Bear...

- Remember the 3 S's... Stop, Stand still, Stay calm.
- Ensure others know that a bear is in the vicinity.
- Do not run.
- Leave the bear an open avenue of escape.

...at a DISTANCE

- Alert the bear to your presence – speak in low tones, slowly wave your arms.
- Quietly walk back the way you came or make a wide detour.
- Keep an eye on the bear.
- Stay downwind.
- Consider using warning shots, noisemakers.

...that is NEARBY

- Do not shout or make sudden movements.
- Avoid direct eye contact.
- Back away slowly.
- Climb at least four metres up a tree to escape a grizzly. (Ineffective against black bears).

Deterrents...

- Include... 12 gauge cracker shells, air horns, flares, and chemical repellents such as pepper spray.
- Are not completely effective against every bear in every situation.
- Should not make you less careful to avoid bear conflicts.
- Are potentially dangerous – use with extreme caution.

If a Bear Charges...

- Many charge are bluffs – the bear will often veer to the side at the last minute.
- Use a chemical repellent only at close range.
- If you have a firearm and contact appears unavoidable, shoot to kill.
- Play dead only during a grizzly bear attack (lie on your side, curl into a ball with your legs tight to your chest, hands clasped behind your neck).

If you must shoot a bear in self-defense, report the kill to a Renewable Resource Officer as soon as possible. If an Officer is not immediately available, skin the bear and preserve the hide. The hide must be turned in to an Officer. You may not keep any part of a bear killed in self-defense.

For Further Information...

For further information, contact any Environment and Natural Resources Office:

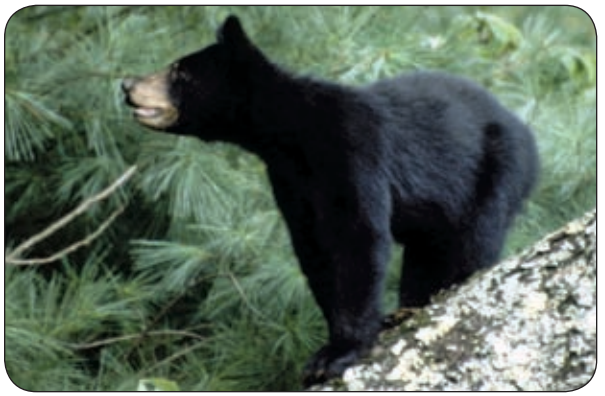
Area Code (867)

Aklavik	978-2248
Deline	589-3421
Fort Good Hope	598-2271
Fort Liard	770-4311
Fort McPherson	952-2200
Fort Providence	669-3002
Fort Resolution	394-4596
Fort Simpson	695-7433
Fort Smith	872-6400
Hay River	875-5554
Inuvik	678-6670
Lutsel K'e	370-3141
Norman Wells	587-3500
Behchokǫ̀	392-6511
Tsiigehtchic	953-3605
Tulita	588-3441
Tuktoyaktuk	977-2350
Ulukhaktok	396-4505
Yellowknife	873-7181

Northwest Territories Environment and Natural Resources

May 2009

Safety in Grizzly and Black Bear Country



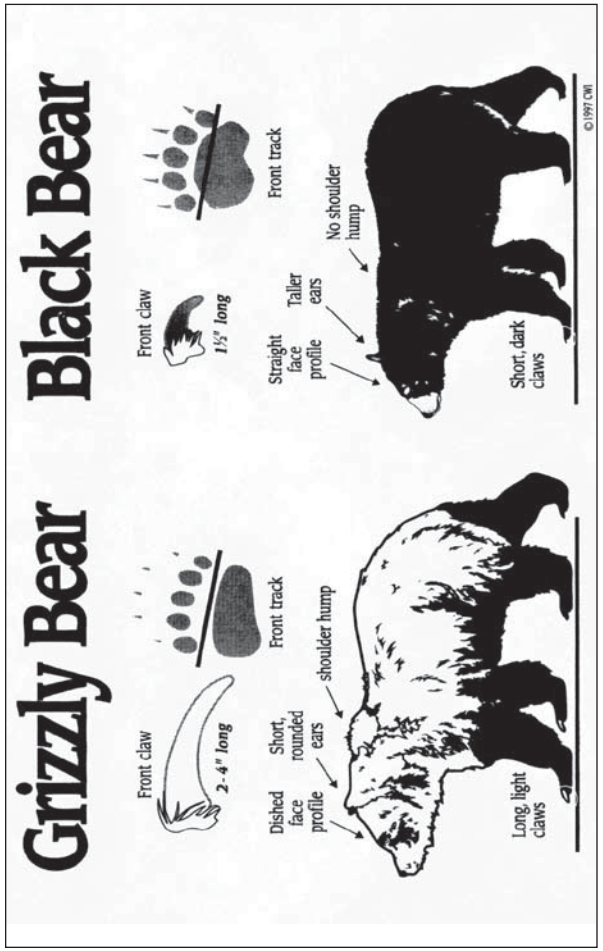
Black Bear

Welcome to Bear Country

Grizzly and black bears can be found throughout the Northwest Territories. They are an important part of the northern ecosystem.

Northerners are committed to maintaining healthy populations of all wildlife, including grizzly and black bears. Treat them with respect. Remember that you are in a bear's territory.

What's the Difference Between...?



While You are Travelling...

- Always be alert.
- Travel in groups.
- Travel only during daylight.
- Avoid carrying strong smelling foods.
- Make noise where visibility is limited.
- Avoid bear feeding areas such as flood plains, berry patches and areas rich in horsetails and other grasses.
- Avoid bear travel areas like shorelines, trails along the water or near berry patches.
- Watch for fresh bear droppings and tracks.
- Carry bear deterrents.

If You are Camping...

- Avoid camping in areas frequented by bears.
- Always sleep inside a shelter (tent, cabin, etc.).
- Don't keep food in tents or areas of camp other than the cook tent.
- Keep a clean camp - wash all dishes and utensils after every meal.
- Avoid cooking greasy foods.
- Burn all garbage every day or take it to a bearproof disposal site. Burying garbage does not eliminate odors.
- If you're going to leave the campsite:
  - bearproof your camp – store food and other attractants (dish detergent, toothpaste, etc.) in an inaccessible place.
  - let someone know where you are going.
  - take a partner and bear deterrents with you.

Grizzly Bears

If You are Fishing...

- Be cautious near streams or lakes - bears frequent these areas.
- Clean fish away from camp and store them underwater.
- Burn fish guts away from camp.
- Store fish-cleaning knifes away from camp.
- Don't wear clothes that smell like fish to bed.

If You are Hunting...

- Avoid hunting late in the day and returning to camp in the dark.
- Stay alert when dressing game or handling meat and only do so away from camp.
- Avoid shooting more than your party can pack out in a single load.
- If you must leave meat in the field, leave it near a visible landmark with a clear approach route and cover it with a tarp to discourage scavengers.
- Don't keep bloodied clothes in your tent.

BMP 6
Guidelines for Industrial Activity in Bear Country, 2008

Guidelines for Industrial Activity in Bear Country

For the mineral exploration, placer mining and oil & gas industries

Mining and Petroleum Environmental Research Group
MPERG

Yukon
Environment

MPERG Report 2008-2

MPERG is a co-operative working group formed to promote research into mining, oil and gas and environmental issues in Yukon. Members represent the federal and Yukon governments, Yukon First Nations, mining companies and non-governmental organizations.

Thank you to EDI Environmental Dynamics Inc., plus all the individuals from the mineral exploration, tourism, and mining industries, regulatory agencies, and Environment Yukon for collaborating in the development of these guidelines.

For additional copies, contact MPERG at:

Box 2703
Whitehorse, Yukon Y1A 2C6
Located at 2099 – 2nd Avenue

Phone: (867) 456-3808
Fax: (867) 393-6232

mperg@gov.yk.ca

Photo credits:
Cover(Bear) – Gerry Perrier; all others Yukon government unless otherwise noted.
SIBCS = Safety in Bear Country Society

A Clear Need for Guidelines

Mineral and oil & gas exploration and development, as well as placer mining, have increased in Yukon in the past few years. Wilderness tourism and outfitted hunts are popular too. Increased activity in the backcountry can affect bear behaviour as well as increase the likelihood of negative bear-human encounters.

The Mining and Petroleum Environmental Research Group (MPERG) saw the need to develop guidelines to minimize the impacts of increased human activity on bears and bear habitat.

These guidelines provide best practices for minimizing the disturbance to bears and bear habitat and for preventing and handling bear encounters.

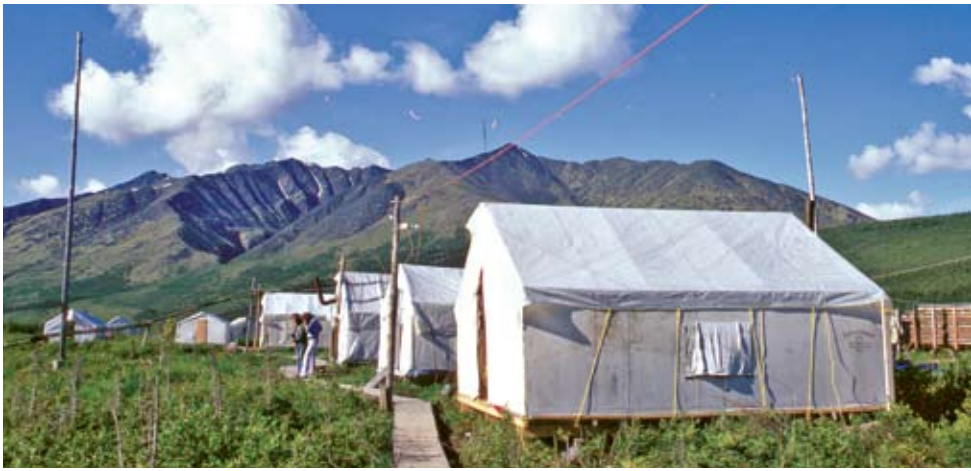
Information on bear biology, foods and behaviour is also provided to aid understanding and guide decisions about camp set-up and field activities. Additional resources are listed at the back of this booklet.

These guidelines are intended for:

- Hard rock and placer miners
- Mineral exploration companies
- Oil & gas exploration and development companies
- Hunting outfitters
- Wilderness tourism companies and others using backcountry camps

In the workplace, employers and supervisors are required to take all reasonable precautions to prevent injuries to workers.

Remember that bears are not the only factor in planning for a safe and successful season. Land use, water, public health and other permits may be required depending on the size and location of the camp.



Industrial Activity and Bears

Bears have an intrinsic value and are important to the proper functioning of ecosystems. Mineral exploration, oil and gas development and placer mining are important to the Yukon economy. It is possible to have a successful camp operation that can safely share the landscape with bears.

Bears are important

Visitors and Yukoners alike consider bear viewing a special experience. In fact, viewing wildlife is the most common answer when visitors are asked what they want from their Yukon trip. Guided bear viewing and hunting trips generate economic benefits for nearby communities.

Bears, particularly grizzlies, are extremely vulnerable to extinction as the population cannot recover quickly if too many animals are killed. Female bears reproduce at a late age, produce few young over their lifetimes and cubs have low survival rates. Removing bears – or driving them out of prime breeding, feeding and denning habitat – affects bear populations and the health of ecosystems in the long-term.

Conflict is preventable

Industrial activity can affect bear populations in several ways:

- alienation from important habitats,
- increased energy expenditure,
- injury or death.

By ensuring that your camp is properly located, designed, and maintained, and your activities take bear habitat and bear behaviour into account, you can reduce the likelihood of your camp or crew harming – or being harmed by – the bears in the vicinity.

Preventing Human-Bear Encounters

Overall 30–40 black bears and 10–15 grizzly bears are reported killed each year due to conflicts with humans in Yukon.

The simplest and best way to prevent human-bear encounters is not to attract bears in the first place.

The responsible handling of food and garbage is key to eliminating bear problems. Approximately 70% of all reported human-bear conflicts are due to garbage odour attraction.

Bears in pursuit of improperly stored food and garbage can seriously damage property and may affect camp operations.

Habituating bears to human food or garbage ("spoiling") can lead to human-bear conflicts, and injury or death of bears, crew members or future users of the area.

Avoid bear habitat when possible.

Do not locate camps or work in areas that may be frequented by bears. While home ranges for black and especially grizzly bears are large, riparian habitat (streams, riverbanks and lakeshores) and subalpine areas are especially important as feeding and travel corridors.

Figures on the number of operational days lost and expenses incurred in dealing with habituated bears and property destruction are not officially collected, but anecdotally are significant. Take the necessary precautions to limit your impact on bears – and theirs on you – anywhere within your operating area.

Provide information, training and equipment to protect employees.

In bear country, this means providing bear awareness training and bear spray, in addition to developing safe work procedures such as those described in this booklet. Other procedures may be implemented where hazard assessments warrant and as far as reasonably practicable.

All camp and field personnel should be familiar with preventative measures and dealing with close range bear-human encounters. These are outlined in the videos *Staying Safe in Bear Country* and *Working in Bear Country*, and in the booklet *How you can stay safe in bear country.*

Encountering Each Other

Bears can respond in a number of ways to the presence of humans:

- Intolerant bears avoid humans and can be easily displaced from important habitat they need for survival and reproduction.
- Tolerant bears accept varying degrees of human presence and are less easily displaced. They may be attracted to the presence of food and/or garbage, and are more likely to become in conflict with humans.

When to call for help

If a bear repeatedly visits your camp, or exhibits curious or aggressive behaviour towards your crew members, contact the district Conservation Officer (CO) immediately. (See page 20 for contact numbers.)

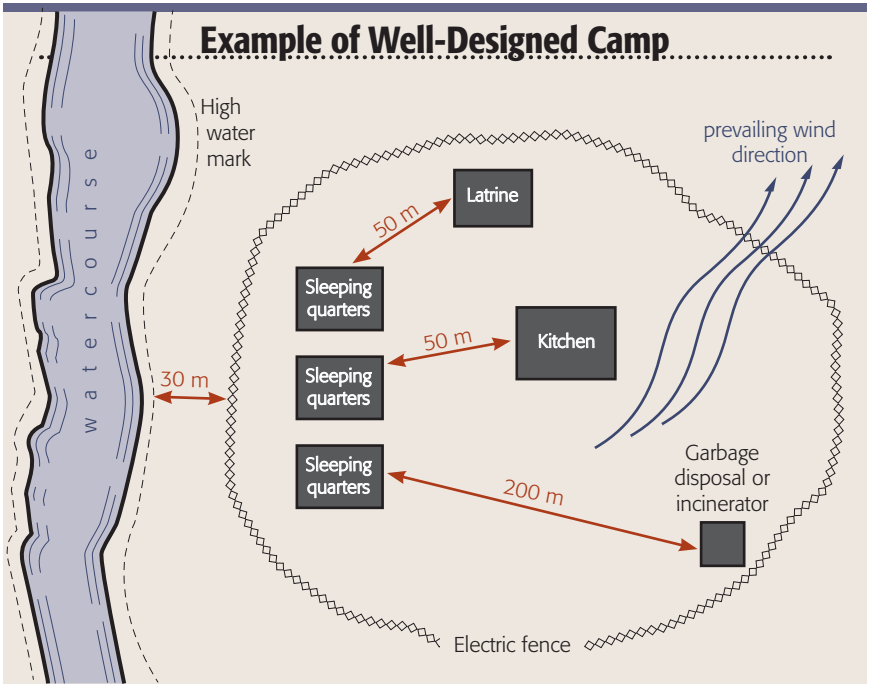
Decisions regarding the appropriate action should be left up to the CO. Options include deterrence, removal of attractants, and/or relocation or destruction of the bear, depending on the circumstances.

Best Practices

Camp Location

Consult with the district Conservation Officer about possible camp locations before establishing camp.

- Establish camps at least 30 m from the high water mark (avoid riparian areas).
- Do not set up camps near dumps or near camps/sites with previous bear problems because bears are known to return to sites on an annual basis.
- Avoid habitats rich in bear foods (horsetails, berry patches), and salmon spawning areas. See pages 16–17.
- Avoid areas with recent bear sign (scat, tracks, rub trees, diggings, game trails, feeding activity).
- Avoid noisy areas near rushing water. Bears can't hear you coming.
- Restrict all activities, including camp location, to at least 1 km from a suspected or confirmed bear den site. Bears tend to cluster denning activity in certain areas year after year and reuse denning sites approximately 25% of the time.



Camp Design

Proper camp design is important because location and fencing aren't always fail-proof:

- Give adequate space for the camp within the electric fence.
- Arrange tents or trailers in a line rather than a circle. They should be well spaced, but not scattered.
- Install windows at entrances and exits of tents and trailers to increase visibility to the exterior.
- Clear brush from trails leading to and from buildings and tents to improve visibility and ensure line of sight.
- Locate the cook tent, food storage area and latrine in open spots, well away (~50 m or more) from sleeping quarters.
- Locate the cook tent down-wind (use the prevailing wind) from sleeping quarters if possible.
- Keep the garbage disposal area and burning vessel visible from a distance, downwind from camp and ~200 m from sleeping areas.
- Ensure all activity areas are well lit if possible.

Fencing

Electric fencing around all camp facilities is an effective method for keeping bears out of camps and is strongly recommended. A solar panel/battery storage system or generator is needed to power the fence. Recent improvements include:

- Low cost – $500 - $5000 depending on number of openings, corners, gates and overall length.
- Easy to install – light-weight, durable materials, relatively short set up time depending on size of camp (few hours to a few days).

The type of camp influences the type of fence:

- Portable electric fence – Ideal for short term camps. Uses medium gauge wire with 7/8" fiberglass posts, 6 wires.
- High tensile electric fence – Ideal for longer-term or permanent camps. Uses 12-gauge wire, 2½" hollow fiberglass posts, 8 wires.

Food storage and cooking

It is unlawful under the Yukon *Wildlife Act* to encourage any wildlife to become a nuisance by leaving food or garbage in an area where wildlife can access it or be attracted by it.

Food storage methods vary depending on the amount of food involved:

- Large amount of food – use metal food storage lockers with latches, locking fridges or freezers, bear-proof garbage containers, bear-proof shed, steel shipping containers, and/or steel drums with locking lids.
- Small amount of food – use bear resistant canisters, hang food 3 m above ground and 1.5 m from vertical support.
- Lunches for field crews – pack food and drinks in airtight containers and ensure all garbage is packed back.

In all camps:

- Cook with adequate ventilation, and ensure kitchen areas are kept clean.

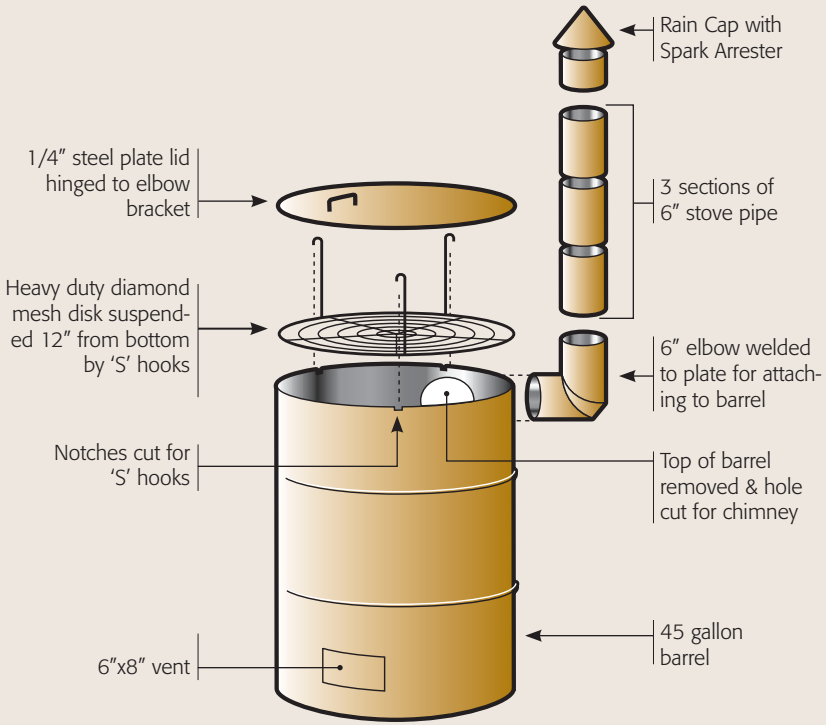
- Re-use or completely burn all grease and oils in a burning vessel or incinerator.
- Strain food particles from dishwater and dispose of with the garbage.
- Do not allow food or cooking in sleeping tents.
- Ensure crew members never feed bears or other wildlife. Often the presence of a bear or other scavengers (ravens, foxes, coyotes, marten, etc.) will attract other bears.

Waste disposal

Your permits will set out burning, incineration and garbage disposal requirements for your size of camp:

- Use of a Yukon Burn Barrel (a 45-gallon barrel with a suspended basket, lid, venting hole, and spark-arresting chimney) is sufficient for smaller camps.
- Use of a commercially-designed forced air, fuel-fired incinerator is required for larger operations.

Yukon Burn Barrel



- Do not bury food waste. This is ineffective as bears have a keen sense of smell and are known to dig pits up to 2 m deep to gain access to garbage.
- Do not burn food waste in open pits or drums as it produces hazardous emissions that may be harmful to people and the environment, and does not eliminate bear attractants.
- Use a burning vessel or incinerator to generate the high temperatures needed to reduce smoke emissions, contaminants and bear attractants.
- Incinerate all combustible and odorous kitchen waste after every meal. Do not temporarily store garbage outside.
- Remove incinerated residue from site using supply backhauls if possible.

Fuel Storage

- Store motor oil, diesel, gas and anti-freeze in airtight containers in a location that is inaccessible to bears such as a well-made shed, or steel locking container. Bears are often attracted to these types of synthetic materials.

Camp Maintenance

- Assign a full-time staff member to garbage management if your camp has more than three people in it. Their tasks should include incinerating, maintaining the incinerator, scheduling garbage pick-up, and maintaining a clean camp.
- Ensure that an inventory of spare parts for your burning vessel or incinerator is on hand so that equipment failure does not result in an accumulation of food waste.
- Practice regular maintenance and testing of your electric fence including removal of vegetation or other materials that might touch the wires and ground the fence's electrical charge.
- Treat latrine facilities with lime and cover with earth on a regular basis.
- Report all dead animals within close proximity to operating areas and remove or incinerate all carcasses within 1 km of camp.

Camp Shutdown

Seasonal shutdown – the focus is on minimizing animal interest in the camp site:

- Remove all wildlife attractants.
- If practical, back haul any solid waste to nearest maintained dump.
- Remove or safely store on-site any materials that may result in injury to wildlife (wire, steel, glass, plastic).
- Back haul or bury non-combustible garbage on-site with 1 metre of overburden.

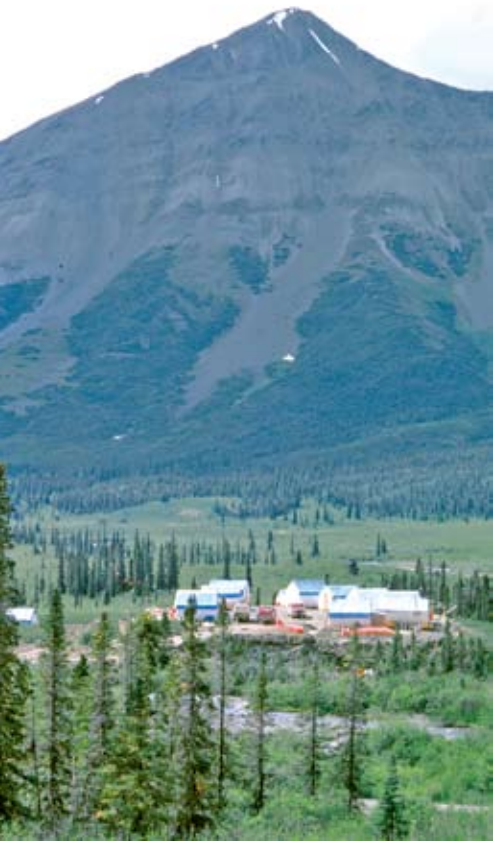
Final camp abandonment – the focus is on returning the site to its natural state, without any special attraction for bears:

- Remove all buildings, machines, materials, fuel drums, used hydro-carbons, unburied solid waste, and metal from site.
- Rip/loosen compacted soils to allow for natural revegetation.

Deterrence at Camp

Several options are available to deter a bear from entering or investigating a camp:

Noise deterrents include air horns, bear bangers, cracker shells, or firearm warning shots. Bear bangers should be aimed to discharge between you and the bear for the greatest chance that the bear runs away. There is a fire risk when using bear bangers.



Non-lethal firearm projectiles such as bean bags and rubber bullets may also be used with a 12-gauge shotgun. Crews should be trained and practiced in the proper use of noise and non-lethal deterrents and they should be accessible at all times.

Well-trained bear dogs are useful for detecting and deterring bears.

A **helicopter** may be used in limited circumstances to protect life and property. Improper use of helicopters to haze wildlife may be perceived as harassment under the *Wildlife Act*. Contact a Conservation Officer before using a helicopter to haze a bear away from camp.

If the bear is an immediate threat to life and all practical means of averting the threat have failed, killing the animal may be necessary. **Shooting** a bear is the **last resort** and should only be for the **immediate protection of life** and property. Ensure that at least one crew member has current firearms safety training including proficient use of firearms.

If a bear is killed in defense of life or property, you are legally required to report the incident to a Conservation Officer as soon as possible. The entire carcass must be left intact. (Do not remove any parts of the bear – claws, gall bladder etc.). The CO will provide further instructions.

Deterrence Up Close

Crews must receive **bear-awareness training**, including information on bear behaviour, how to avoid bear encounters in the field and how to respond to bears in the case of an encounter.

Ensure field staff have adequate and regular **communications procedures** in place to stay in touch with each other when in the field. They must be able to call for assistance in the event of an emergency.

Carry **bear spray.** It is an effective method for fending off aggressive, charging and attacking bears if used properly and under the right conditions. (Weather conditions such as wind, rain and cold may influence the effectiveness of the bear spray.) It should be easy to get at, not tucked away in a pack. Provide training to staff on the proper use, transport and storage of bear spray. Use full cannisters only, before their expiry date.

As a last resort, a **firearm** can be used to protect yourself in the event of a bear attack. Be aware, however, that few people have the skills required to deliver lethal shots to an attacking bear with

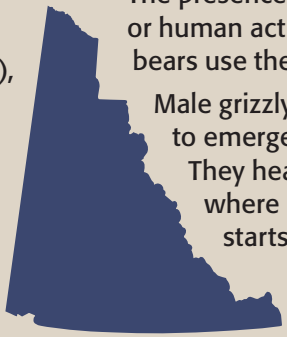
a firearm in the extremely short time available. Remember, if a bear is killed in self-defense, you are legally required to report the incident to a Conservation Officer as soon as possible.

Understanding Bears

Grizzly Bears

Grizzly bears are found throughout Yukon, from the B.C. border to the Arctic coast. There are approximately 6,000 – 7,000 grizzly bears, representing 30% of Canada's grizzly bear population.

Grizzly bears have a very low rate of reproduction. Compared to other species, females breed later in life (7-9 years), less often and cub survival is lower. As a result, the grizzly bear population is extremely vulnerable to extirpation (regional extinction) because they are not able to recover from overharvesting or excessive removal of adults from the breeding population.



Grizzly bears are especially sensitive to the availability of food. Females have to accumulate enough fat over the summer so that the eggs fertilized in the spring will implant and she will reproduce the next spring.

Grizzly bears require large undisturbed areas for feeding, denning, thermal cover, security cover, breeding and traveling. The presence of humans and/or human activity can affect how bears use these areas.

Male grizzly bears are the first to emerge from their dens. They head to valley bottoms where spring snow melt starts the growth of new vegetation. Females emerge from their den later and remain at higher elevations where the over-wintered cranberries, crowberries, alpine sweet-vetch and winter-killed ungulates are important spring food sources for them.

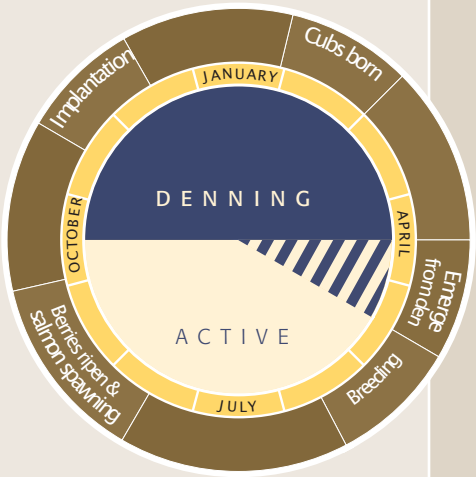
In the summer, riparian areas (streams, riverbanks and lakeshores) provide rich new growth in the form of horsetails and other vegetation. In the fall, alpine and subalpine regions provide a diet of grasses, horsetails, berries and ground squirrels required for the accumulation of weight before denning.

Spawning salmon along some Yukon rivers are also an important food source for grizzly bears in the fall. Meat protein sources also include insects (e.g. ants, moths, and wasps), rodents, caribou and moose calves, and carrion. Riparian areas are especially important to grizzly bears as travel corridors and bedding areas to escape the summer heat.


Stefan Cottermann

Periods of Activity

A bear's activity level and the likelihood of a bear-human encounter vary depending on many factors.



During the early and mid-summer before berries ripen, and during berry-poor years, bears are more likely to pursue human sources of food and odors.

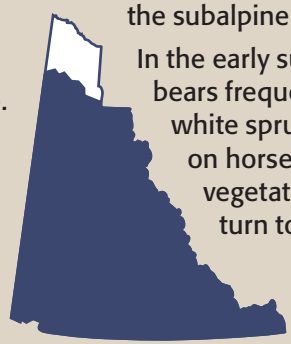
Even while denning in winter, bears may periodically leave their dens as a result of disturbance, variations in temperature, deterioration of den conditions, and in search of food.

Black Bears

Black bears are distributed from the B.C. border to the northern tree line near Old Crow, concentrated along forested river valleys. There are approximately 10,000 black bears in Yukon.

Black bears in the north have a low rate of reproduction because females start breeding later in life (5–8 years) and few cubs survive. For example, a 20 year-old sow may only have 2–4 litters over her lifetime, with many failing to survive to adulthood.

Black bears may den for up to seven months, limiting the amount of time available to acquire sufficient food for growth and reproduction. Human activity may alter black bears' use of important habitats required for food, water, denning and cover.



After emerging from the den, black bears favour grassy south facing slopes and hillsides where they eat overwintered berries and grasses. Along rivers they feed on horsetails and fresh willow catkins. Newborn moose and caribou calves are an important food source in the spring in both the subalpine and valley bottoms.

In the early summer, black bears frequent openings in white spruce forests to feed on horsetails and other vegetation. Later they turn to ripe soapberries in aspen and cottonwood stands. As the nutritional value of horsetails and grasses declines, black bears may eat fish, cottonwood catkins or become tempted by improperly stored garbage while waiting for berries to ripen.

Catkins

In the fall, black bears feed on blueberries in black spruce forests and may move to higher elevations to take advantage of other berry crops. Forest litter is consumed incidentally when they are searching for other foods.

Meat protein sources for black bears may include ants, wasps, rodents, ungulate calves, salmon, and carrion. Black bears are also known to use riparian areas of salmon spawning streams, although their use of riparian and subalpine areas may be influenced by the presence of grizzly bears.

Polar Bears

Polar bears inhabit the northern coastal regions of Yukon, mainly associated with multi-year pack ice and the availability of seals. Polar bears have been seen as far inland as 150 km, however.

Yukon's polar bears are part of the Southern Beaufort Sea population (approximately 1,500 individuals) that range along the coast from Alaska to the Baillie Islands, NWT.

Due to major differences in size, diet, habitat associations, behaviour, denning requirements and travelling patterns, workers and camp operators need to take additional precautions in areas frequented by polar bears. See the resources listed on page 18.

Avoid Areas of Common Bear Foods

Roots

Alpine sweet-vetch
(Hedysarum alpinum)

Plants/Flowers*

Horsetail
(Equisetum arvense)

Locoweed
(Oxytropis spp.)

Bearflower
(Boykinia richardsonii)

Berries

Crowberry or mossberry
(Empetrum nigrum)

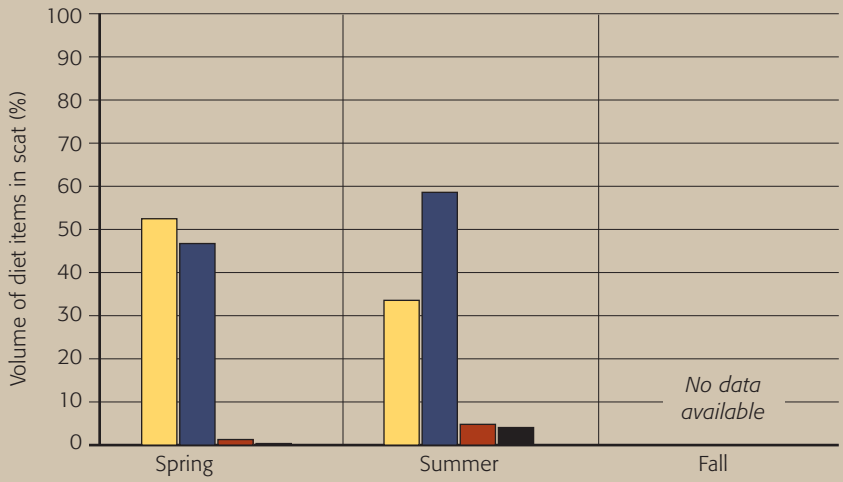
Bog Blueberries
(Vaccinium uliginosum)

Soapberry
(Shepherdia canadensis)

Bearberry
(Arctostaphylos uvi-ursi)

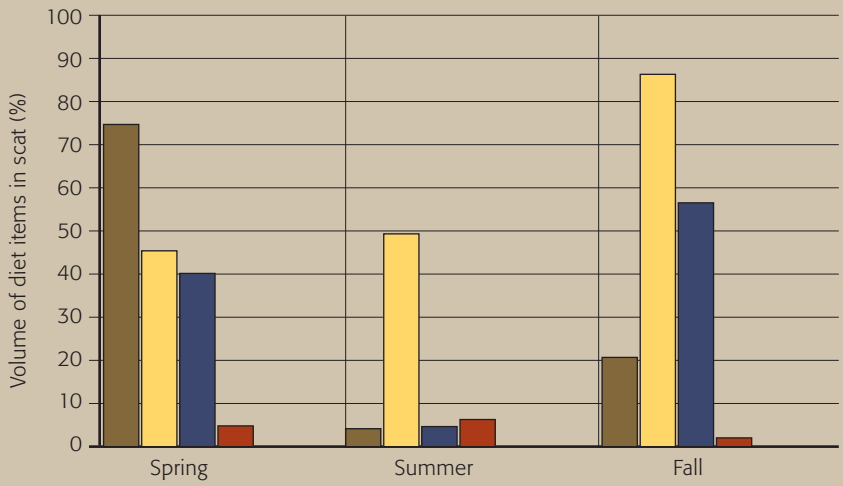
Black Bear Diet

(MacHutchon, 1989)



Grizzly Bear Diet

(MacHutchon and Wellwood, 2003)



Roots | Plants/Flowers* | Berries | Meat | Forest Litter

** Black bears eat mostly horsetail. Grizzlies eat horsetail, grasses, and bearflower and locoweed flowers.*

Resources

Mention in this document of commercial goods or services does not constitute an endorsement by the Government of Yukon.

Websites

Bear Biology

www.**environmentyukon.gov.yk.ca**/wildlifebiodiversity/mammals/blackbear.php
www.**environmentyukon.gov.yk.ca**/wildlifebiodiversity/mammals/grizzly.php
www.**bearsmart.com**/bearFacts
fwp.mt.gov/bearid/default.html
www.**hww.ca**/hww2.asp?id=90
www.**hww.ca**/hww2.asp?id=83

Bear Safety

www.**environmentyukon.gov.yk.ca**/camping/bearsafety.php
www.**centerforwildlifeinformation.org**/BeBearAware/BearSpray/bearspray.html
www.**bearsmart.com**
www.**bearaware.bc.ca**
www.**igbconline.org**/html/safety.html
www.**canadianrockies.net**/Grizzly/gbsafety.html
www.**dec.state.ak.us**/eh/fss/public/bearbroch.pdf

Bear Safe Containers

www.**wildlife.alaska.gov**/index.cfm?adfg=bears.containers

Electric Fencing

www.**bearsmart.com**/bearSmartCommunities/ProtectingLivestock&Crops/ElectricFencing.html
www.**margosupplies.com**/canadian1/fencing.htm
www.**electrobearguard.com**/Product.html
www.**waterstrider.com**/bear-repellent-portable-electric-fence.htm

Incinerators and Burning Vessels

www.**wildlife.alaska.gov**/index.cfm?adfg=bears.incinerators
www.**westlandincinerator.com**/html/Home-page.html
www.**wellcoenergy.com**/products/drilling2.asp
www.**ketek.ca**
www.**inproheat.com**/solid_waste.htm

Firearms

www.**cfc-cafc.gc.ca**/factsheets/safety_training_e.asp
www.**environmentyukon.gov.yk.ca**/huntingtrapping/huntingregulations.php

Polar Bears

www.**hww.ca**/hww2p.asp?id=99&cid=0
www.**nunavutparks.com**/visitor-information/polar-bear-saftey.html
www.**macecanada.com**/downloads/polar_bear.pdf

Brochures

Environment Yukon

- How you can stay safe in bear country
- Bear Viewing Along Yukon Highways
- How to Keep Bears Out of Your Yard
- Be Bear Aware
- Into the Yukon Wilderness

Parks Canada

- You are in Bear Country
- Keep the Wild in Wildlife

Videos

- Staying Safe in Bear Country
- Working in Bear Country
- Polar Bears: A Guide to Safety

To order call: 1-888-440-4640 or on-line at www.distributionaccess.com/new/index.cfm.

Contact Information

Environment Yukon

Box 2703, Whitehorse, Yukon Y1A 2C6
Located at 10 Burns Road

Phone: **(867) 667-5652**
Toll free (in Yukon): **1-800-661-0408, ext. 5652**
Fax: **(867) 393-6213**

Email: **environmentyukon@gov.yk.ca**

Conservation Officer Services Branch

Phone: **(867) 667-8005**
Toll free (in Yukon): **1-800-661-0408 ext. 8005**
Fax: **(867) 393-6206**

Email: **environmentyukon@gov.yk.ca**

District Conservation Officers

Whitehorse: **667-5221**

Watson Lake: **536-7363**

Mayo: **996-2202**

Ross River: **969-2202**

Teslin: **390-2685**

Dawson: **993-5492**

Haines Junction: **634-2247**

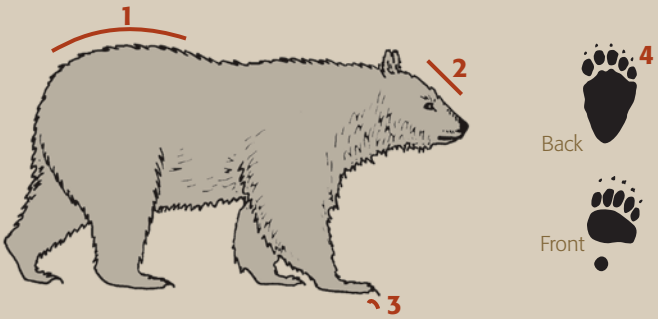
Old Crow: **966-3040**

Faro: **994-2862**

Turn in Poachers / Polluters

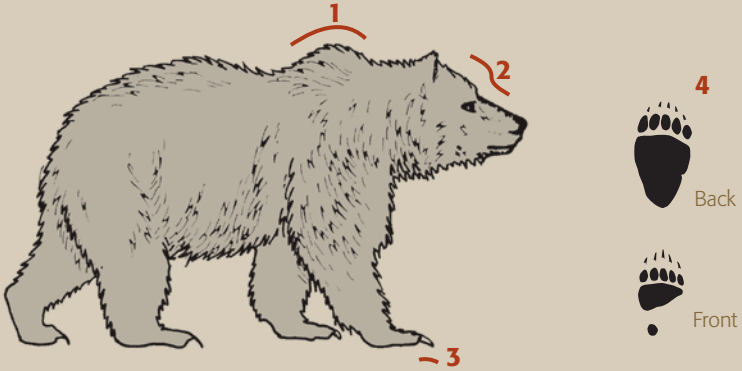
1-800-661-0525

Black Bear



1. Highest point of back is over hind legs.
2. In profile, muzzle is straight and long.
3. Front claws are dark coloured, relatively short and well curved.
4. Tracks often do not include claw imprints. Toes imprint with space between.

Grizzly Bear



1. Highest point of back is over the shoulders.
2. In profile, brow gives face a dished or concave look.
3. Front claws are light coloured, 10 cm long or longer and slightly curved.
4. Tracks usually include claw imprints. Toes imprint very close to touching.

BMP 7

Camp Waste & Wildlife Attraction Guideline, 2013

Camp Waste & Wildlife Attraction Guideline

To prevent or reduce attracting wildlife and to discourage wildlife habituation ENR North Slave Regional Office (NSR) strongly encourages that the recommendations listed below be implemented to ensure human safety and to protect our natural environment, including wildlife at a camp or cabin.This guideline is intended for small scale campsites an recreational cabins including:

- Exploration camps
- Tourism outfitters & commercial companies
- Residential & recreational cabin owners

Camp Design

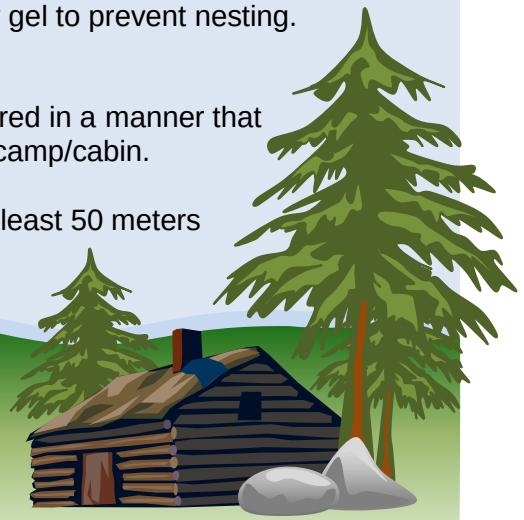
To prevent wildlife from accessing a camp/cabin and discourage habituation, a camp/cabin should be situated away from known or possible bear activity (previous camp/cabin, berry patches, dens, etc.) and designed in a manner that eliminates or reduces the potential for human and wildlife interaction.

- Clear brush to increase visibility and eliminate blind spots.
- Kitchen, latrine, food/waste storage, incinerator, composting site and garden should be at least 50 meters from sleeping area.
- Temporary cooking areas (kitchen, fire pits, BBQs) should be located down-wind from the sleeping area.
- All structures should be well spaced and the sleep tents or trailers arranged in a line rather than circular with doors facing the kitchen.
- There should be no food or cooking in the sleeping area.
- Properly install and maintain an electric fence around the camp or at minimum around incinerator, composting site and garden.
- Skirting around infrastructure that extends approx. 1m+ underground to prevent wildlife tunnelling.
- Whenever possible, keep doors and windows closed, cover openings/crawl spaces, seal cracks, screen chimney caps and place spikes or tacky gel to prevent nesting.

Food Storage

Amount of food at each camp/cabin will vary but food should be stored in a manner that will eliminate any food rewards if wildlife was to gain access to the camp/cabin.

- Store all food in the kitchen or in a central location that is at least 50 meters away from the sleeping area.
- Cooking and eating area(s) should be thoroughly cleaned after every meal.
- If the camp is to become vacant for more than a week, food should be stored in sealed animal proof container.



Domestic Waste

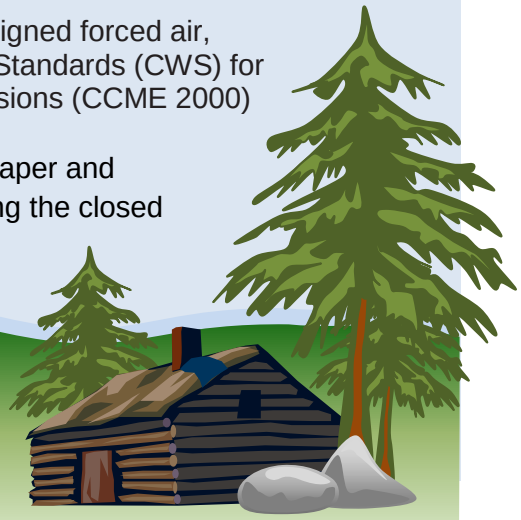
Inadequate storage, lack of onsite treatment and/or improper disposal of domestic waste (food & food contaminated waste) are the most common activities that contribute to the release of odours which may result in human/wildlife conflicts.

- Purchase bulk products to reduce amount of domestic waste produced.
- Implement a camp waste segregation system (recyclables, combustible, non-combustible and hazardous wastes) appropriate to the volume of waste produced.
- Domestic waste should not be stored in plywood boxes or in sheds as odours tend to permeate the wood and linger. Waste should be stored in a central area in a sealed animal proof container until final disposal.
- The sealed animal proof containers should be cleaned daily with bleach.
- Non-combustibles such as metal, glass and plastic should be cleaned with bleach and stored in a manner not to attract wildlife until transported back to an approved facility.
- Burying domestic waste is ineffective; the preferred method of disposal is backhauling domestic waste to an approved facility such as an approved landfill or bottle depot in a timely manner.

Burning/Incineration

An alternative method of camp waste disposal but it should be considered when no other options are available. There are additional hazards associated with this method that may still result in wildlife attraction, forest fires and air contamination.

- Designate a person or trained staff member to be responsible for the daily duties involved with burning/incineration.
- Burning in a "modified burn barrel" is recommended as an alternative only to open burning for timely disposal for cabin/camp waste.
    - To ensure a high temperature and complete burn, NSR suggests that there be approx.1/3 wet with 2/3 dry waste per bag;
    - Burn a maximum of two bags per day; and
    - Install a fine screen on the chimney for reducing sparks.
- Larger scale exploration camps require a commercially-designed forced air, fuel-fired incinerator capable of meeting the Canada-Wide Standards (CWS) for Dioxins and Furans. (CCME 2001), CWS for Mercury Emissions (CCME 2000) and the NWT Ambient Air Quality Guidelines.
- Camp waste suitable for open burning is untreated wood, paper and cardboard. A permit to burn will be required if burning during the closed season (May 1 - Sept 30).
- Residual waste such as ash needs to be collected, stored in a sealed animal proof container and transported back to an approved facility site for disposal.



Grey Water (dishes, showers, laundry, etc.)

- Bleach should be added to dish water and/or a grease trap installed.
- Disposed of in a natural depression/sump/pit a minimum of 30 meters from the high water mark.
- Disposal site should be covered and treated with lime or crystal lye daily.

Black Water (Sewage)

- Honey bags are stored in a manner that is inaccessible to wildlife and transferred to an approved facility for disposal in a timely fashion.
- Ensure that pits have sufficient depth and treated with lime or crystal lye daily.

Animal/Fish Parts

- Clean away from camp and dispose of entrails a minimum of 3km away from camp area and on an island, if possible.
- In the NWT, fish entrails can be disposed of in water as an alternative to moving them away from the camp area.
- Any surface used for cutting or cleaning should be cleaned immediately with bleach.
- Do not leave smoking/drying fish or meat unattended.

Other Attractants

- Both the cooking (kitchen, fire pits, BBQs) and eating area(s) should be thoroughly cleaned after every meal.
- Do not leave bloody hunting clothes or items that smell like fish near the sleeping area.
- Pet food should be stored indoors in a sealed animal proof container and pets fed indoors, if possible.
- Any oils, gas or grease should be stored in a manner that is inaccessible to wildlife.

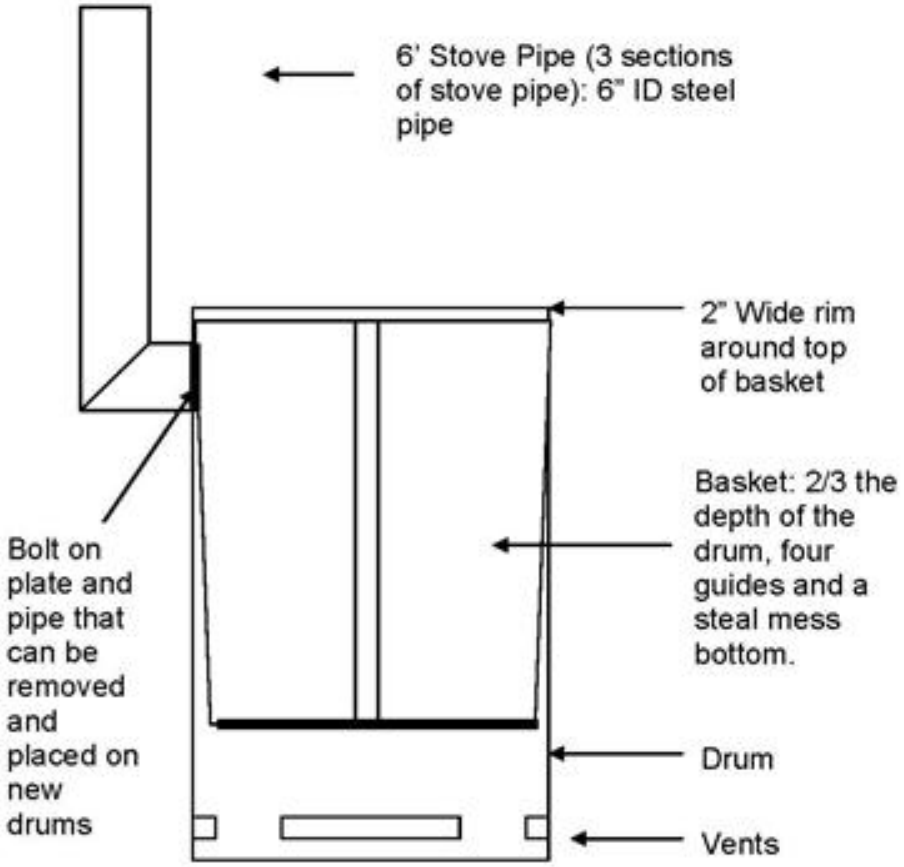
Reporting Wildlife Incidences (sightings, encounters, injuries, mortalities)

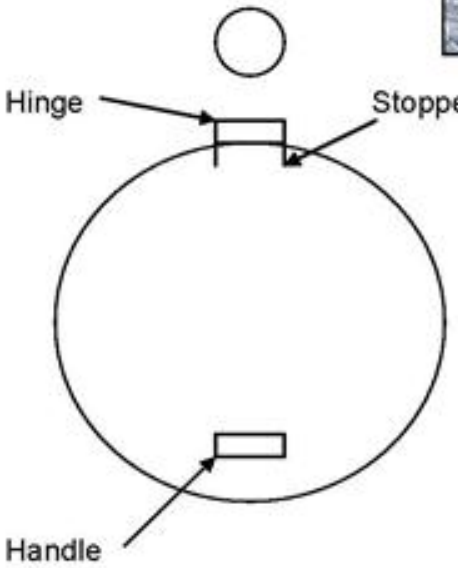
- Incidences should be reported at your earliest opportunity.
- Timely reporting allows ENR to provide advice and assistance in deterring nuisance wildlife before they become habituated and must be destroyed.
- Any defence of life and property kills must be reported immediately.

If you have additional questions, a report to file, or an emergency, please contact:

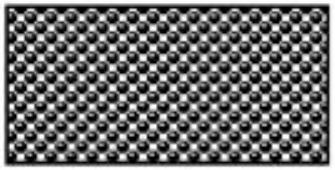
- 24hr Wildlife Emergency number at **(867) 873-7181**
- North Slave Regional ENR Office at **(867) 873-7184** (8:30am – 5:00pm)
- ENR Tlicho Area Office in Behchoko at **(867) 392-6511** (8:30am – 5:00pm)

MODIFIED BURN BARREL

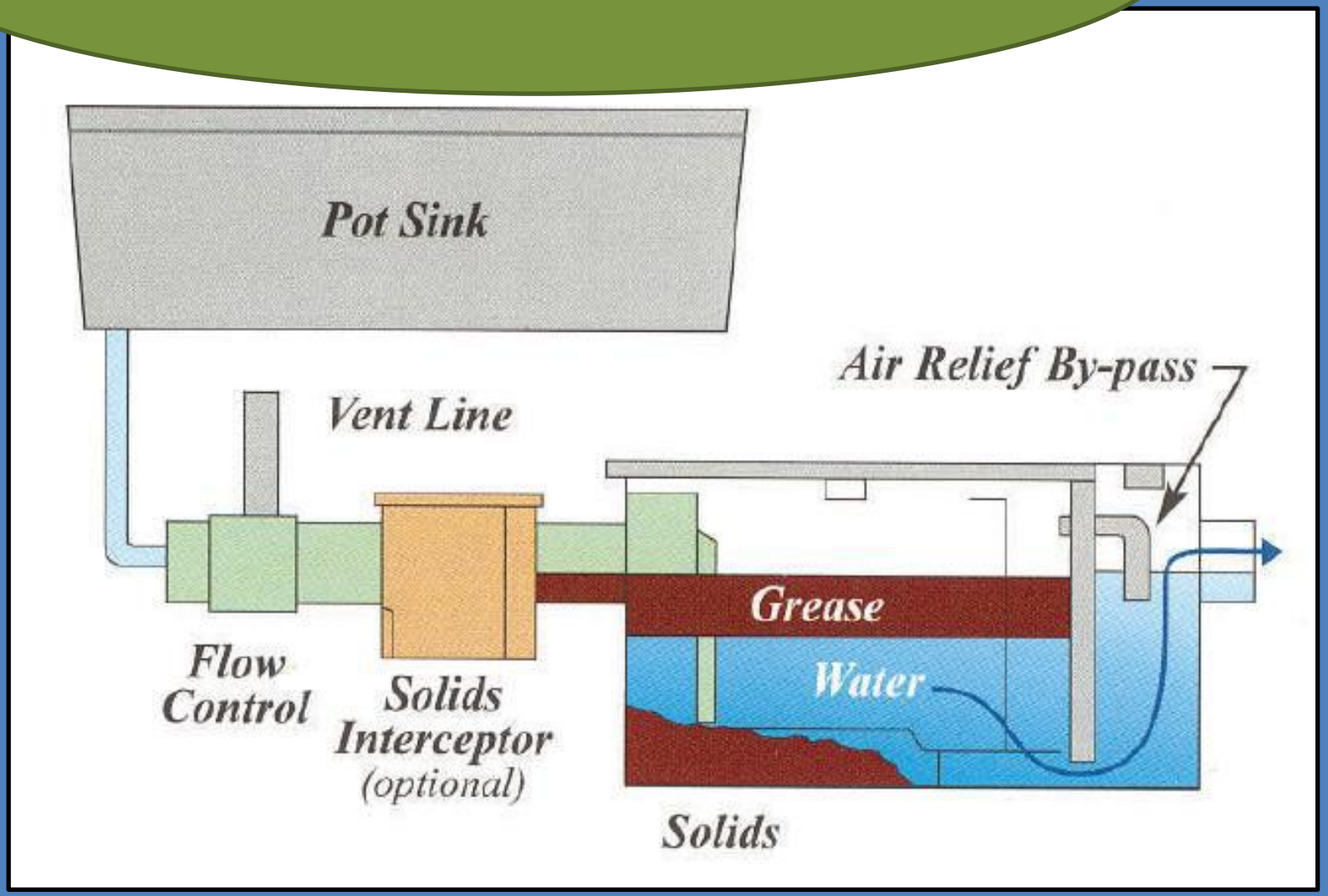




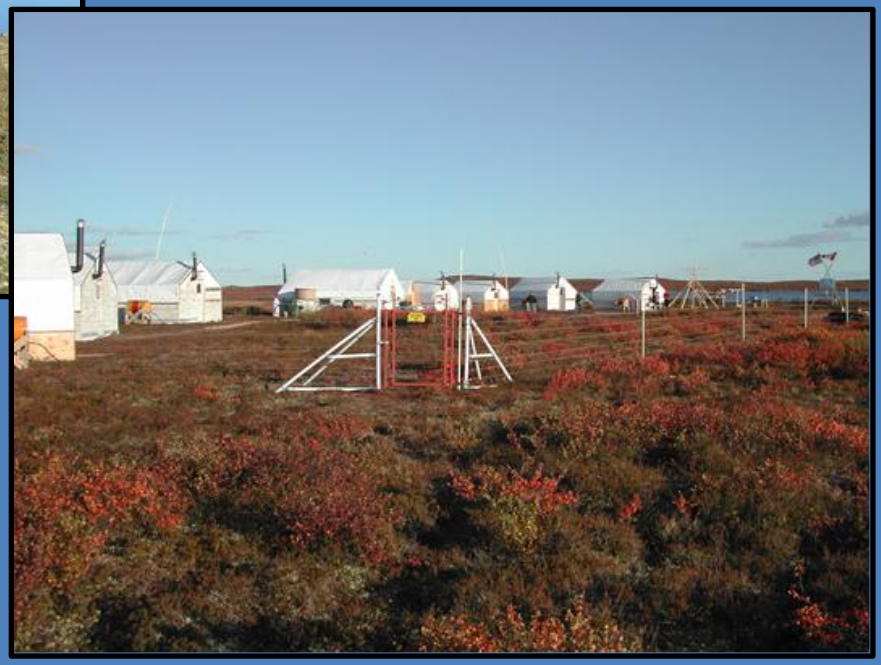
Example of basket bottom plate pattern



GREASE TRAP

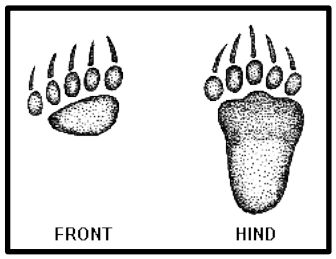

Pot Sink
Air Relief By-pass
Vent Line
Grease
Water
Flow Control
Solids Interceptor (optional)
Solids

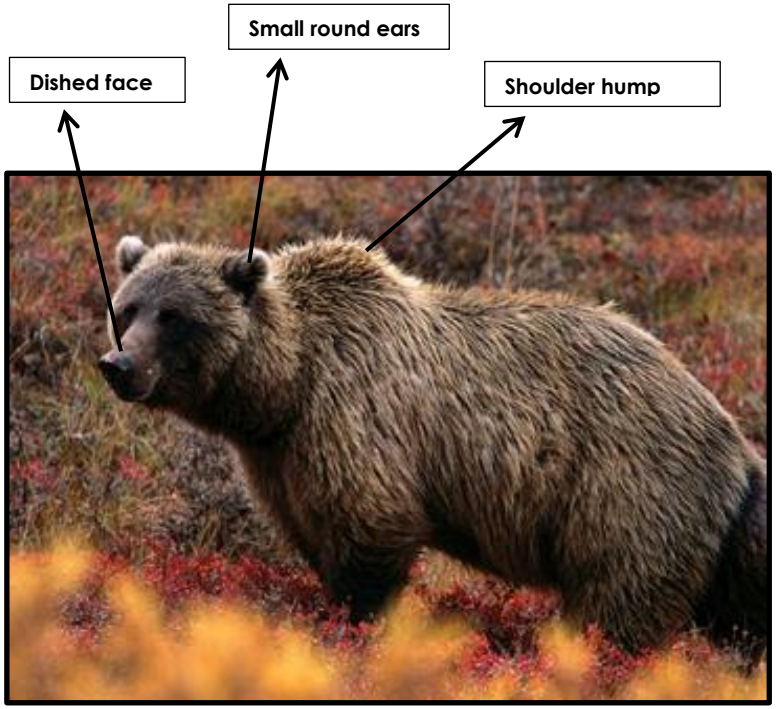
ELECTRIC FENCE



GRIZZLY BEAR

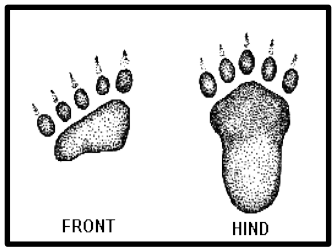
2 – 4" long, light claws

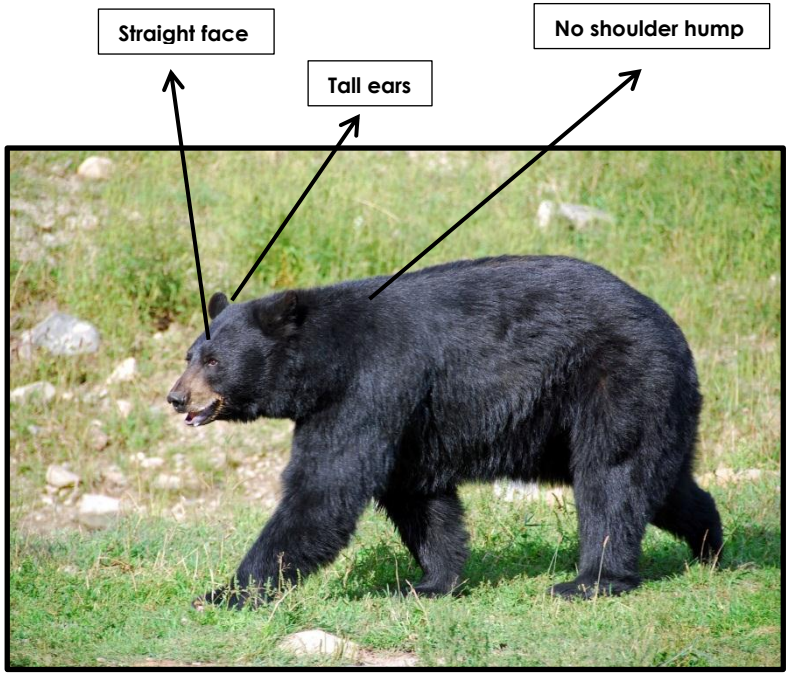




BLACK BEAR

1 ½" short, dark claws





BMP 8
Flying Low? June 2007

Please:

- obey Transport Canada regulations and do not fly below 1,000 feet;
- find out where outfitter camps are located and avoid them during hunting season;
- avoid barren-ground caribou calving grounds during calving season;
- do not take-off or land in a calving area during calving season;
- do not chase or harass wildlife by flying too close; and
- respect our wildlife – keep to a safe altitude.

**Remember,
flying close enough
to an animal
so that it runs away
is too close!**

If geological survey or mineral exploration work is planned at any time, but especially during outfitting or calving seasons, please contact the regional office of Environment and Natural Resources for information before flying.

Mackenzie Mountains and Mackenzie Valley:

Sahtu Region .....(867) 587-3500
Dehcho Region .....(867) 695-7450
South Slave Region .....(867) 872-6400

Tundra:

Inuvik Region.....(867) 777-7308
North Slave Region.....(867) 873-7184
South Slave Region .....(867) 872-7450

Visit the Wildlife Division web site
of Environment and Natural Resources
at http://wildlife.enr.gov.nt.ca.

Northwest Territories Environment and Natural Resources

June 2007

Flying Low?

A variety of wildlife, quality guides and outfitters, spectacular scenery and solitude that only a location away from human habitation can offer…

The Northwest Territories is a popular destination for big game hunters and eco-tourists alike. But their experience can be ruined by low-flying aircraft that disturb wildlife.

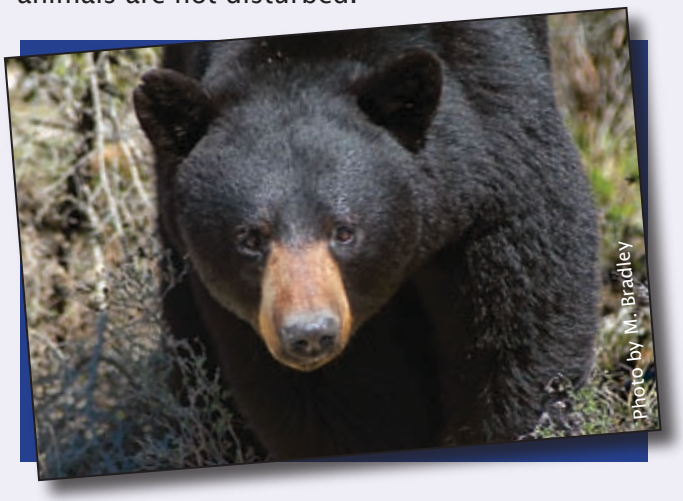
Increased exploration and development throughout the NWT also means increased air traffic. Pilot encounters with wildlife are becoming more frequent. If you are a fixed wing or rotary pilot, please respect our wildlife and keep to an elevation that does not disturb them.

Wildlife are Protected Under NWT Law

Section 38 of the NWT *Wildlife Act* protects wildlife by making it illegal to disturb or harass wildlife. Flying close enough to an animal that it runs away is flying too close!

In addition, Transport Canada regulations stipulate that aircraft may not fly lower than 1,000 feet above ground.

Please keep your aircraft at a safe elevation so animals are not disturbed.



In the Mackenzie Mountains

Big game hunters pay sizable fees for the chance to take home a trophy animal from the Mackenzie Mountains. Much of the hunting in this area is done on foot or on horseback and it is a time consuming process. Sound is amplified by the mountains and low flyovers can frighten an animal into flight, causing hours, or even days, of stalking to be wasted.

Wildlife that are affected by low level flyovers in the Mackenzie Mountains include Dall's sheep, mountain goat, mountain caribou and moose.

During the mid-July to end of September hunting season, please be cautious and avoid outfitter areas.

In the Mackenzie Valley

Boreal caribou are a threatened species found throughout the Mackenzie Mountains. Unlike barren-ground caribou, during the May calving period, boreal caribou go into hiding to have their calves. Low flying is especially harmful, stressing the female, which can cause separation from calves and lead to calf death. If electromagnetic surveys are going to be conducted in April or May, please contact the regional ENR office for information.

On the Tundra

During Hunting Season

Hunters also pay large fees for a hunting experience on the tundra. In late summer and

early fall, outfitters have active barren-ground caribou sport hunting camps. Aircraft must remain at least 1,000 feet above ground.

During the mid-August to end of October hunting season, please be cautious and avoid outfitter areas.

During Calving Season

Caribou are a valuable resource to the people of the Northwest Territories. From the end of May to the end of June, female barren-ground caribou come together at herd-specific locations on the tundra to give birth to their calves. Low flyovers, take-offs and landings in these areas are especially harmful as they can stress the cows, which can cause separation from calves and increased calf mortality.

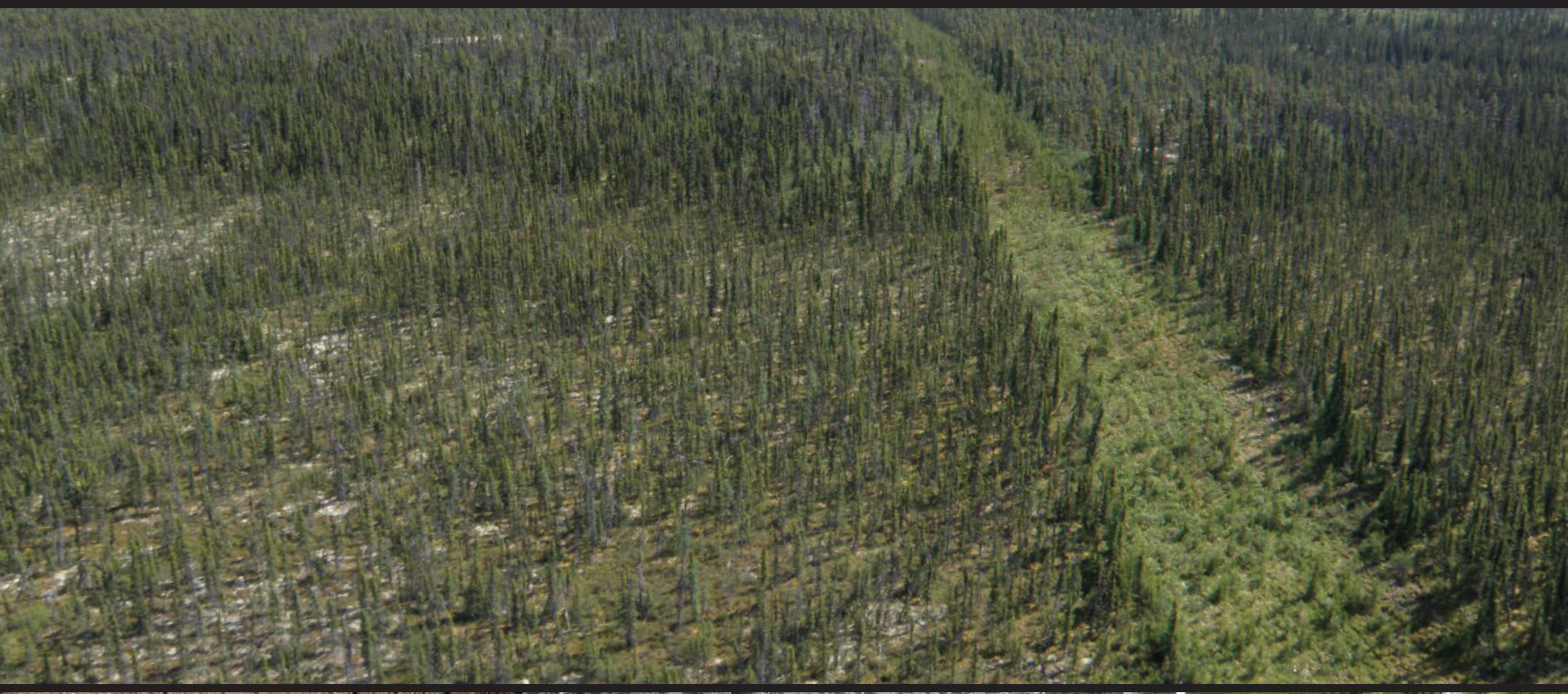
Avoid barren-ground calving grounds from mid-May to early July. This is especially important during times of low barren-ground caribou numbers. Please contact the regional office of Environment and Natural Resources in your area.

Other Wildlife

Grizzly bears, pelicans, whooping cranes, polar bears, muskoxen, black bears, eagles and other wildlife are also disturbed by low flying aircraft. Please respect our wildlife and keep to a safe altitude.

CANADIAN ZINC CORPORATION

UPDATED DRAFT
WILDLIFE MITIGATION AND MONITORING PLAN
Prairie Creek Mine and All-Season Road, Northwest Territories



TETRA TECH EBA