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DRAFT WILDLIFE MITIGATION AND MONITORING PLAN

Canadian Zinc Corporation Prairie Creek Mine, Northwest Territories

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REPORT



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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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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 dalli*), 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:

- First Nation concern with respect to traditional use;
- 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]);
- Known to be important to residents, managers, and regulators (e.g., harvested species);
- When taken together, reflect overall environmental and social conditions; and
- Can be easily measured or described with one or more practical indicators (i.e., measurement endpoints).

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 (<i>Rangifer tarandus</i>)	<i>Northern Mountain Ecotype</i> <ul style="list-style-type: none">■ 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
	<i>Boreal Ecotype</i> <ul style="list-style-type: none">■ 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



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VC	Rationale for Inclusion	SARA Listing	COSEWIC Listing	GNWT Listing
Grizzly Bear (<i>Ursus arctos</i>)	<ul style="list-style-type: none"> 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 (<i>Gulo gulo</i>)	<ul style="list-style-type: none"> 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 (<i>Bos bison athabasca</i>)	<ul style="list-style-type: none"> 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 (<i>Ovis dalli</i>)	<ul style="list-style-type: none"> 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 (<i>Alces americanus</i>)	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Peregrine falcon (<i>Falco peregrinus anatum</i>) designated as Threatened under SARA. Short-eared owl (<i>Asio flammeus</i>) designated as Special Concern under SARA and COSEWIC. 			
Waterfowl	<ul style="list-style-type: none"> Horned grebe (<i>Podiceps auritus</i>) designated as Special Concern under COSEWIC. 			
Passerines	<ul style="list-style-type: none"> Rusty blackbird (<i>Euphagus carolinus</i>) designated as Special Concern under SARA and COSEWIC, designated as May Be at Risk under GNWT Status Ranks. Olive-sided flycatcher (<i>Contopus cooperi</i>) designated as Threatened under SARA and COSEWIC. 			
Non-passerines	<ul style="list-style-type: none"> Common nighthawk (<i>Chordeiles minor</i>) 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 keeping 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; and where not possible, to deter 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;
- 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 7.5). 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);



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- 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, and in a dedicated truck only;
- 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;
- Flight paths to and from the mine will be considered according to the recommended guidelines for flying in caribou country (MPERG 2008), where feasible and within topographic and safety constraints;
- Flights paths to and from the mine will be considered according to recommended guidelines for flying in sheep country (MERG 2002), where feasible and within topographic and safety constraints; and
- A Dall's sheep monitoring program will be implemented to ensure that Project-related effects on sheep are minimized (see Section 6.2). Based on results of the sheep monitoring program, the existing Flight Impact Management Plan will 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 would take on the Wildlife Monitor role, in addition to other duties. More than one person would 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 the *Vegetation and Wildlife Assessment Report*);
- Knowledge of regional wildlife behaviour (particularly listed wildlife species and other VC species described in the *Vegetation and Wildlife Assessment Report*), 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 km² 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 conflict 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; 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 assess caribou presence and identify caribou aggregations in the Project area.
- 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.
- 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 biologist. The biologist must have prior experience conducting extensive behavioural monitoring studies of wildlife. In addition, the biologist 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 qualified personnel 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 Wildlife Monitor during the parturition period (typically mid-April to mid-June) to document sheep distribution and habitat use in the defined study area.

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.
- If a significant impact to overflights is observed, the Flight Impact Management Plan 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 Flight Impact Management Plan 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.



DRAFT WILDLIFE MITIGATION AND MONITORING PLAN

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) and 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; and, 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 Manager 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 reoccurrence 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;
- If the bear approaches to within 30 m, shows clear signs of aggression and the worker(s) is/are unable to retreat to a safer location, lethal force may be used to protect the safety of workers;



- Record details of the incident and take photographs, as appropriate, and report the incident to NWT ENR and Parks Canada; and
- Incidents involving human injury and/or destruction of bears are to be reported 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; and 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);
- When 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);
- When 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;



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- 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
<i>15 mm pistol launcher</i>		
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.
<i>12 gauge shotgun</i>		
Bean Bags	25 m	Designed for close range encounters and should be fired from a distance of approximately 5 m.
Shell Crackers	75 m	Shell Crackers are consistent in range and accuracy. They explode with a loud bang at the end of travel.
Rubber Slugs	75 m	They are 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 injuries 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, 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.



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

Monitoring Strategies	Adaptive Management Trigger	Potential Adaptive Management Response
Incident Monitoring	<ul style="list-style-type: none"> ■ 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. 	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ 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. 	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ Apparent shifts in a VC species habitat use/distribution across the landscape. ■ Identification of declines in a VC species numbers. 	<ul style="list-style-type: none"> ■ 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.

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