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**Wildlife and Wildlife Habitat Management Plan  
Eureka High Arctic Weather Station**

**Environment and Climate Change Canada c/o  
Public Services & Procurement Canada (Western Region)**

**August 2018  
SLR Project No.: 209.40604.00000**



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Eureka High Arctic Weather Station**



**PSPC No.: Project # R.015446.003**

**SLR Project No.: 209.40604.00000**

Prepared by  
SLR Consulting (Canada) Ltd.

for

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20 August 2018

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## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>6</b>
1.1	Background.....	6
1.2	Project Description.....	7
1.3	Purpose and Scope of the Wildlife and Wildlife Habitat Management Plan.....	8
1.4	Regulatory Context.....	8
1.5	NIRB Terms and Conditions .....	11
1.6	Roles and Responsibilities .....	12
1.7	Training .....	13
<b>2.0</b>	<b>POTENTIAL EFFECTS ON WILDLIFE AND WILDLIFE HABITAT .....</b>	<b>14</b>
2.1	List of Potential Effects on Wildlife and Wildlife Habitat.....	17
<b>3.0</b>	<b>WILDLIFE AND WILDLIFE HABITAT MITIGATION MEASURES.....</b>	<b>18</b>
<b>4.0</b>	<b>WILDLIFE DETERRENT PLAN .....</b>	<b>22</b>
4.1	Wildlife Identification .....	22
4.2	Wildlife Monitoring.....	22
	4.2.1 <i>Pre-Construction Monitoring</i> .....	22
	4.2.2 <i>Construction Monitoring</i> .....	26
4.3	Setback and Buffers .....	26
4.4	Wildlife Observation Reporting.....	28
4.5	Deterrent Procedures .....	29
	4.5.1 <i>General</i> .....	29
	4.5.2 <i>Camps and Food</i> .....	29
	4.5.3 <i>Construction</i> .....	30
	4.5.4 <i>Prevention of Wildlife Collisions</i> .....	30
	4.5.5 <i>Waste Management</i> .....	31
<b>5.0</b>	<b>WILDLIFE ENCOUNTER PROTOCOL.....</b>	<b>31</b>
5.1	Peary Caribou .....	31
5.2	Muskox .....	32
5.3	Polar Bear.....	33
	5.3.1 <i>General</i> .....	33
	5.3.2 <i>Polar Bear Encounter</i> .....	33
	5.3.3 <i>Deterrents</i> .....	34
	5.3.4 <i>Polar Bear Attack</i> .....	35
5.4	Arctic wolf .....	37
5.5	Arctic Fox and Wolverine.....	37
5.6	Other Mammals.....	38
5.7	Nesting Birds, including Raptors .....	38
5.8	Wildlife Mortality .....	38
5.9	Reporting.....	38
<b>6.0</b>	<b>VEGETATION.....</b>	<b>38</b>
6.1	Pre-construction Reconnaissance Survey.....	39
6.2	Reporting.....	40
6.3	Adaptive Strategies .....	40
<b>7.0</b>	<b>REFERENCES.....</b>	<b>41</b>

## **FIGURES**

### **Figure 1: Proposed Project Location**

## **TABLES**

<b>Table 1: Valued Ecosystem Components Used in the EIA to Predict Possible Effects from the Project and their Assessment and Listing Status .....</b>	<b>15</b>
<b>Table 2: Mitigation Measures .....</b>	<b>19</b>
<b>Table 3: Recommended Setback or Buffers Based on Species and Time of Year .....</b>	<b>27</b>
<b>Table 4: ECCC Recommended Setbacks for Identified Bird Groups.....</b>	<b>28</b>

## **APPENDICES**

<b>Appendix A</b>	Bear Safety Pamphlets
<b>Appendix B</b>	HAWS Wildlife Photolog
<b>Appendix C</b>	Wildlife Observation Log
<b>Appendix D</b>	Porsild's Bryum and its Preferred Habitat

## 1.0 INTRODUCTION

### 1.1 Background

Environment and Climate Change Canada (ECCC) is undertaking several improvement projects at the Eureka High Arctic Weather Station (HAWS) in Eureka, Nunavut (NU). The proposed projects are located within the Qikiqtani region of Nunavut, approximately 407 km northwest from the community of Grise Fiord.

The HAWS was originally established in 1947 with additional buildings added in subsequent years. The primary purpose of the facilities is to collect meteorological information. The secondary purpose is to provide logistical support and a staging location for science-based research, exploration and military operations as well as serve the small tourist trade that visits the area.

An Environmental Impact Assessment (EIA) report for four specific improvements was prepared in 2015, submitted and approved by the Nunavut Impact Review Board (NIRB) under NIRB file number 150922-12XN020 in September of 2015. Due to logistical constraints, some of the proposed work at the HAWS has yet to occur. To date, a multi-purpose building was constructed and completed in September 2017. Construction of the remainder of the approved improvement projects has not taken place. Subsequently, the scope of works and activities was revised to include three additional proposed project components, namely:

- Development of a new quarry site
- Construction of a new access road
- Construction of a water crossing over Black Top Creek

As a result, ECCC prepared and submitted a new project proposal with a supporting EIA Addendum report to the Nunavut Planning Commission (NPC or Commission), for a conformity determination with the North Baffin Regional Land Use Plan. On March 7, 2018 the NIRB received a referral to screen ECCC's project proposal from the NPC along with an accompanying positive conformity determination. Pursuant to Article 12, Sections 12.4.1 and 12.4.4 of the *Nunavut Agreement* and section 87 of the *Nunavut Planning and Project Assessment Act, S.C. 2013 (NuPPAA)*, the NIRB commenced screening this project proposal. Due to the proposal containing activities that were sufficiently related to previously assessed activities under NIRB file number 12XN020, the NIRB viewed this project proposal as an amendment to the previously screened project and assigned this proposal with this previous file number.

Notice regarding the NIRB's screening of this project proposal was distributed on April 3, 2018 requesting that interested parties review the proposal and provide the Board with any comments or concerns by April 24, 2018.

Following NIRB's assessment of all materials provided by ECCC and comments received from interested parties, the NIRB issued its Screening Decision Report on June 1, 2018, concluding that further review of this project is not required pursuant to paragraph 92(1)(a) of the *NuPPAA*. Further, the NIRB concluded that subject to ECCC's compliance with the terms and conditions as set out in its Screening Decision Report, the project proposal is not likely to cause significant public concerns, and it is unlikely to result in significant adverse environmental and social impacts. The NIRB therefore, recommended that the responsible Minister of Indigenous and Northern Affairs (INAC) accept the Screening Decision Report.

During NIRB's review of the EIA Addendum Report, and in response to comments and recommendations from the Government of Nunavut (GN), ECCC committed to the preparation

of a Wildlife and Wildlife Habitat Management Plan (WWHMP) to be developed by a professional biologist that would be implemented by ECCC's on-site contractor.

SLR Consulting (Canada) Ltd. (SLR) was retained by Public Services and Procurement Canada (PSPC) to develop the WWHMP in support of these improvement projects at the Eureka HAWS.

## 1.2 Project Description

The proposed project is located within the Qikiqtani region, approximately 407 km northwest from Grise Fiord (Figure 1). ECCC proposes to develop a new quarry site located at West Remus Creek and an associated access road from the Eureka Weather Station to the new quarry site with the construction program of the road proposed to take place from July 2018 to October 2018. The scope of the project proposal includes the following components:

- Upgrade an existing all-terrain vehicle (ATV) path/trail to a 6 m wide permanent road from West Remus Creek to the current Eureka runway for a total length of approximately 12 km;
- Development of a new borrow area located at West Remus Creek to provide up to 75,000 m<sup>3</sup> of aggregate to construct the road.
- Placement of culverts along the road to drain melt runoff including two arch culverts in Blacktop Creek to create a culvert bridge;
- Movement of crusher from Blacktop Creek to West Remus Creek; and,
- Storage and use of fuel for improvement activities with a facility to be located at Remus Creek.

This project component will generally include the following activities:

- relocating the crusher from Black Top Creek to West Remus Creek;
- extraction and crushing of aggregate;
- earthworks (excavating, grading);
- material handling (loading and dumping);
- vehicle travel; and,
- refueling of vehicles.

The identification of the West Remus Creek quarry site for extraction and crushing of granular material took place after it was confirmed that Black Top Creek was not a viable source of granular material. The quarry site is located near the mouth of West Remus Creek, approximately 15 km east of Eureka. The total surface area of the proposed borrow area at West Remus Creek is estimated to be 360,000 m<sup>2</sup> and it is expected to yield more than 325,000 m<sup>3</sup> of raw granular material. The current Improvement Project program is expected to require extraction of approximately 75,000 m<sup>3</sup> of material over an area of approximately 100,000 m<sup>2</sup> (100 ha). This area represents the total area that will be developed to meet the project's needs. The quarry will be developed using a D8 dozer, 980 loader and a 320 excavator. The dozer will cut and push material into stockpiles and windrows, as appropriate, such that the loader or excavator can more readily load the material into haul trucks. There are no drill and blast requirements. To the extent possible, the excavations will be of uniform depth over a wide area to maintain positive surface drainage. Reclamation procedures/methods will be in place to ensure cleanup, trimming and tidiness of the quarry (Arcadis Canada Inc. 2018).

### 1.3 Purpose and Scope of the Wildlife and Wildlife Habitat Management Plan

The purpose of the WWHMP is to help ECCC and its contractors comply with legislative and regulatory requirements under the *Migratory Birds Convention Act* (MBCA), *Migratory Birds Regulations*, *Species at Risk Act* (SARA), and the *Wildlife Act* (Nunavut), and NIRB's terms and conditions as set out its Screening Decision Report as they relate to mitigating the potential adverse impacts to wildlife, birds (including migratory birds in the context of the MBCA) and associated wildlife habitat and habitat for a rare moss species at risk from construction of the road, quarry activities, and aggregate hauling. Specifically, the terms and conditions of the Screening Decision Report are numbered 8, 13, 19 through 24, and 35.

The WWHMP is also intended to guide on-site Project personnel with:

- the implementation of mitigation measures for specific wildlife and vegetation;
- the completion of a reconnaissance survey of these species prior to commencing the construction work; and,
- Avoidance, response and safety procedures in the event that on-site Project personnel encounter wildlife within the Project area.

The WWHMP is not intended to specifically address mitigation of potential adverse impacts to surface water quality and quantity, fish and fish habitat, aquatic vegetation, land and soil quality related to the quarrying and road construction activities, specifically the construction of a water crossing over Black Top Creek and new culverts; storage and use of fuel and chemicals, waste storage and disposal, and aggregate hauling.

### 1.4 Regulatory Context

The proposed project is subject to the requirements under *Nunavut Planning and Project Assessment Act*, as well as a wide range of federal and territorial legislation and regulation as described in the EIA Addendum Report (Arcadis Canada Inc. 2018) and the Regulatory Requirements section of the NIRB's Screening Decision Report, dated June 1, 2018 as follows:

1. *Fisheries Act* (<http://laws-lois.justice.gc.ca/eng/acts/F-14/index.html>).
2. *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (<http://www.canlii.org/ca/sta/n-28.8/whole.html>).
3. *Migratory Birds Convention Act* and *Migratory Birds Regulations* (<http://laws-lois.justice.gc.ca/eng/acts/M-7.01/>).
4. *Species at Risk Act* (<http://laws-lois.justice.gc.ca/eng/acts/S-15.3/index.html>).
5. *Wildlife Act* (<http://www.canlii.org/en/nu/laws/stat/snu-2003-c-26/latest/snu-2003-c-26.html>).
6. *Nunavut Act* (<http://laws-lois.justice.gc.ca/eng/acts/N-28.6/>).
7. *Transportation of Dangerous Goods Regulations* (<http://www.tc.gc.ca/eng/tdg/clear-tofc-211.htm>), *Transportation of Dangerous Goods Act* (<http://laws-lois.justice.gc.ca/eng/acts/t-19.01/>), and the *Canadian Environmental Protection Act* (<http://laws-lois.justice.gc.ca/eng/acts/C-15.31/>).
8. *Aeronautics Act* (<http://laws-lois.justice.gc.ca/eng/acts/A-2/>).
9. *Federal Guidelines for Landfarming Petroleum Hydrocarbon Contaminated Soils*, Science Applications International Corporation (SAIC Canada), March 2006.



10. *Northern Land Use Guidelines Pits and Quarries* (<http://www.aadnc-aandc.gc.ca/eng/1100100023585>)
11. *Nunavut Mining Safety Ordinance and the Territorial Quarrying Regulations* (<http://www.canlii.org/en/ca/laws/regu/crc-c-1527/latest/crc-c-1527.html>) or equivalent.

The legislation that specifically applies to this WWHMP are:

**Federal**

- *Migratory Birds Convention Act*
- *Species at Risk Act*

**Territorial**

- *Wildlife Act*

These are briefly described below.

***Migratory Birds Convention Act***

The MBCA is a federal act, which applies to all of Canada, including federal, provincial, Aboriginal, and private lands. Under the MBCA, the Migratory Birds Regulations prohibit deliberate harm to migratory birds, and incidental destruction, disturbance or taking of their nests, shelters or eggs, as well as possession of live birds, nests or eggs. Approximate timing windows where vegetation removal can occur with the lowest probability of creating harm are provided by Environment Canada (2017).

Under the Migratory Birds Regulations, no person shall hunt a migratory bird except under authority of a permit nor hunt a species of migratory bird except during an open season specified in a Schedule for that area and that species.

Currently, federal regulations do not provide for authorizations or permits for the incidental take of migratory birds and recommend avoidance of activity during the nesting period. To comply with the MBCA and regulations, developers should take all reasonable efforts to avoid and minimize incidental take of migratory birds during activities that may inadvertently disturb or destroy birds, nests and eggs. Not all birds are protected by the MBCA (e.g., owls, hawks, raven, ptarmigan); however, the same level of protection is provided by the Nunavut *Wildlife Act*.

Federal guidelines indicate ways to minimize disturbance or destruction of birds and their nests but are not part of the MBCA and cannot be used exclusively to comply with the MBCA. Activities affecting migratory birds and/or their nests and eggs, regardless of their scale, the level of potential detrimental effects on bird populations, or the nature of mitigation measures taken, can result in violations of the MBCA.

This WWHMP is intended to avoid violations of the MBCA. This WWHMP includes provisions for on-site Project personnel to undertake the activities typically undertaken by a qualified person. As such, the successful implementation of this WWHMP will require careful review of this Plan, training on the WWHMP by ECCC and oversight by the Contractor Supervisor and ECCC.

### ***Species at Risk Act***

The SARA came into effect in June 2003 to protect wildlife and plant species at risk in Canada. SARA is a federal commitment to prevent “at risk” wildlife species from becoming extirpated or extinct and to implement the necessary actions to secure their viable long-term recovery and conservation. SARA provides a legal framework for the protection of wildlife including plants and conservation of biological diversity in Canada. SARA makes it an offence to kill, harm, harass, capture or take any individual of a species listed under Schedule 1 as threatened, endangered or extirpated, and prohibits the destruction of critical habitat which has been designated in a recovery strategy or action plan, and which has been subject to a protection order. SARA applies to all species at risk across Canada, but the application of the prohibitions is dependent upon the species type and location.

This WWHMP is intended to avoid violations of the SARA. This WWHMP includes provisions for on-site Project personnel to undertake the activities typically undertaken by a qualified person. As such, the successful implementation of this WWHMP will require careful review of this Plan, training on the WWHMP by ECCC and oversight by the Contractor Supervisor and ECCC.

### ***Nunavut Wildlife Act***

The Nunavut *Wildlife Act* (Government of Nunavut 2005) and applicable regulations that came into effect in July 2015, is territorial legislation established for the management of wildlife and habitat in Nunavut, including the conservation, protection and recovery of species at risk. The Act applies to all terrestrial, aquatic, avian and amphibian flora and fauna that are wild by nature or wild by disposition; and all parts and products from wildlife; and all habitat of wildlife. The GN's Department of Environment (DOE) has a legislated mandate for the management of terrestrial species in Nunavut and is responsible for fulfilling GN's responsibilities under federal legislation, and national and international agreements and conventions. Sections of the Act that related specifically to this WWHMP are:

- **Section 10** identifies the Inuit right to harvest subject to where harvesting does not exceed his or her basic needs level or where a total allowable harvest for a population is established.
- **Section 11** states that “...all Inuit have the free and unrestricted right of access for the purpose of harvesting wildlife to all lands within Nunavut.” The right of access is excluded within a radius of 1.6 km of any building, structure or other facility on lands under a surface lease (11(2)(f)). The right of access may also be limited by the Nunavut Wildlife Management Board (NWMB) for the purposes of conservation (11(3)(b)).
- **Section 72** indicates that unless lawfully harvesting eggs or down, no person shall injure, molest or destroy an egg of a bird, the nest of a bird when the nest is occupied by a bird or its egg; or the nest of any bird of prey or prescribed bird.
- **Section 73** indicates that no person shall, unless authorized by a license or by exception, engage in any activity, other than harvesting, that is likely to result in a significant disturbance to a substantial number of wildlife; or break into, destroy or damage any abode of a bear, fox, beaver, muskrat, weasel, wolf or wolverine outside any municipality or prescribed area.
- **Section 74** indicates that no person shall chase, weary, harass or molest a wild animal and that notwithstanding anything else in this *Act*, a person may use a vehicle to chase a dangerous animal away from a dwelling, municipality, camp or settlement or its

immediate vicinity if it is necessary to defend life or property and may avoid killing the animal.

- **Section 97** indicates that notwithstanding anything in this *Act*, a person may kill wildlife if it is necessary to preserve a human life or to protect a person's property, but that this section shall not be construed as providing a lawful excuse to a person who kills wildlife as a result of his or her mismanagement or contravention of this *Act*.

This WWHMP is intended to avoid violations of the *Wildlife Act*. This WWHMP includes provisions for on-site Project personnel to undertake the activities typically undertaken by a qualified person. As such, the successful implementation of this WWHMP will require careful review of this Plan, training on the WWHMP by ECCC and oversight by the Contractor Supervisor and ECCC.

### 1.5 NIRB Terms and Conditions

As noted above, the NIRB have set out a number of terms and conditions in its Screening Decision Report dated June 1, 2018 as they relate to mitigating the potential adverse impacts to wildlife including birds and plants and associated wildlife habitat from construction of the road, quarry activities, and aggregate hauling as well as the increase in noise from the construction activities. Specifically, these are terms and conditions are:

8	The Proponent shall keep all garbage and debris in bags placed in a covered metal container or equivalent until disposed of at an approved facility. All such wastes shall be kept inaccessible to wildlife at all times.
13	The Proponent shall store all fuel and chemicals in such a manner that they are inaccessible to wildlife.
19	The Proponent shall ensure that there is no damage to wildlife habitat in conducting this operation.
20	The Proponent shall not harass wildlife. This includes persistently worrying or chasing animals, or disturbing large groups of animals. The Proponent shall not hunt or fish, unless proper Nunavut authorizations have been acquired.
21	The Proponent shall ensure that all on-site Project personnel are made aware of the measures to protect wildlife and are provided with training and/or advice on how to implement these measures.
22	The Proponent shall not disturb or destroy the nests or eggs of any birds. If nests are encountered and/or identified, the Proponent shall take precaution to avoid further interaction and or disturbance (e.g., a 100 metre buffer around the nests). If active nests of any birds are discovered (i.e., with eggs or young), the Proponent shall avoid these areas until nesting is complete and the young have left the nest.
23	The Proponent shall restrict aircraft/helicopter activity related to the project to a minimum altitude of 610 metres above ground level unless there is a specific requirement for low-level flying, which does not disturb wildlife and migratory birds.
24	The Proponent shall ensure that aircraft maintain a vertical distance of 1,000 metres and a horizontal distance of 1,500 metres from any observed groups (colonies) of migratory birds. Aircraft should avoid critical and sensitive wildlife areas at all times by choosing alternate flight corridors.

25	The Proponent shall ensure that aircraft/helicopter do not, unless for emergency, touch-down in areas where wildlife are present.
35	All road vehicles must be fitted with standard and well-maintained noise suppression devices and engine idling is to be minimized.
Monitoring and Reporting	The Proponent shall submit an annual report with copies provided to the Nunavut Impact Review Board by November 1 of each year between 2015 and 2022. The annual report must contain the following information: a) A summary of activities undertaken for the year, including a list of activities and when they were undertaken, as well as the approximate quantities of aggregate extracted each year.

## 1.6 Roles and Responsibilities

The roles and responsibilities of key organizations and individuals responsible for the successful management and implementation of the WWHMP are identified below.

ECCC is responsible for the overall management of the technical and engineering aspects of the project from its inception to completion and for ensuring that all legislative and regulatory requirements, including all NPC and NIRB Terms and Conditions. ECCC is responsible for all communications and consultation with the NIRB, NPC and GN throughout the duration of the Project, including;

- a) notifying the NPC and the NIRB of any changes in operating plans or conditions, including phase advancement, associated with this project prior to any such change;
- b) reporting any problem wildlife or any interaction with carnivores to the local Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235); and,
- c) the preparation and submission of an annual report to the NIRB and NWB (as required).

ECCC shall ensure all on-site employees and visitors working on the Project site receive awareness training regarding the content of this WWHMP and with respect to the following responsibilities under this Plan.

Specific roles and responsibilities include:

- **ECCC:** provide any staff, contractors, and visitors with a safety and wildlife orientation upon arrival to the Project site, which includes appropriate training in the WWHMP.
- **Contractor Supervisor:** the day-to-day responsibility to ensure that all NIRB Terms and Conditions related to wildlife and plants and habitat management measures described in this WWHMP are followed.
- **All On-site Staff and Visitors:** respecting and following, where applicable to them, the measures outlined in this WWHMP.
- **Designated On-site Personnel:** the on-site Contractor Supervisor shall designate at a minimum two on-site Project personnel who will be responsible for understanding the contents of the WWHMP. They will report to the on-site Contractor Supervisor and are responsible for carrying out surveillance and monitoring activities for the Project as outlined within this Plan, and reporting results to the ECCC Station Manager. They will also identify whether activities are being conducted in accordance with the mitigation measures, commitments, and applicable regulations as outlined in this Plan.

The GN's Department of Environment Conservation office in Iqaluit shall advise on measures regarding any wildlife interactions reported by ECCC.

The NIRB shall receive and review ECCC's annual report in the context of the Terms and Conditions identified in its Screening Decision Report.

Indigenous and Northern Affairs Canada (INAC) may impose mitigation measures, conditions and monitoring requirements pursuant to the Federal Land Use Permit and may conduct Land Use Inspections, pursuant to the authority of the Federal Land Use Permit, while the project is in operation.

## 1.7 Training

All on-site staff and visitors arriving at the site will be required to undergo a site orientation program to be informed on the contents of this WWHMP, and specifically, on how to respond to encounters with wildlife on and around the site in a manner that is safe for both humans and wildlife. This orientation program will include information related to:

1. The Government of Nunavut's booklet on "*Bear Safety Reducing Bear People Conflicts in Nunavut*" available at [http://gov.nu.ca/sites/default/files/bear\\_safety\\_-\\_reducing\\_bear-people\\_conflicts\\_in\\_nunavut.pdf](http://gov.nu.ca/sites/default/files/bear_safety_-_reducing_bear-people_conflicts_in_nunavut.pdf) and Parks Canada's "*Safety in Polar Bear Country*" pamphlet, available at: <https://www.pc.gc.ca/en/pn-np/mb/wapusk/securite-safety/ours-bear> and both are located in Appendix A.
2. Environment and Climate Change Canada's "*Environment Assessment Best Practice. Guide for Wildlife at Risk in Canada*", available at the following link: [http://www.sararegistry.gc.ca/virtual\\_sara/files/policies/EA%20Best%20Practices%202004.pdf](http://www.sararegistry.gc.ca/virtual_sara/files/policies/EA%20Best%20Practices%202004.pdf).
3. Canadian Wildlife Services' "*Key migratory bird terrestrial habitat sites in the Northwest Territories and Nunavut*", available at the following link: <http://publications.gc.ca/site/eng/317630/publication.html> and "*Key marine habitat sites for migratory birds in Nunavut and the Northwest Territories*", available at the following link: <http://publications.gc.ca/site/eng/392824/publication.html>.
4. Environment and Climate Change Canada's Incidental Take web page and the fact sheet "*Planning Ahead to Reduce the Risk of Detrimental Effects to Migratory Birds, and their Nests and Eggs*" available at <http://www.ec.gc.ca/paom-itmb/>.

All on-site Project personnel shall be provided with training related to:

1. Wildlife identification and surveillance procedures;
2. Wildlife deterrent procedures;
3. General wildlife encounter protocols;
4. Polar bear awareness training, which should include:
  - a. Understanding the causes of human/wildlife conflicts;
  - b. Recognizing and understanding polar bear behaviour;
  - c. Proper storage, transfer and disposal of camp waste;
  - d. Proper use and safe application of deterrents; and,
  - e. How to prevent and respond to polar bear incidents.

A copy of this WWHMP and the above guidance documents will be kept at centres of all operations for the Project at the Project site.

## **2.0 POTENTIAL EFFECTS ON WILDLIFE AND WILDLIFE HABITAT**

The identification of potential effects to wildlife and wildlife habitat was conducted in the EIA (Arcadis Canada Inc. 2018), which focussed on Valued Ecosystem Components (VECs). Indicator species were selected to be representative species from different ecological niches. They may also represent specific niches or position in the food web that suggests they will be good indicators of biological effects due to disturbance (e.g., physical disturbance of habitat, noise).

Table 1 provides an overview of the wildlife and vegetation indicator species used in the EIA to identify potential effects from the Project, and to provide focus to planning mitigation and monitoring. These species have been used to frame this WWHMP that applies to all wildlife in the Project area.

**Table 1: Valued Ecosystem Components Used in the EIA to Predict Possible Effects from the Project and their Assessment and Listing Status**

SPECIES	OCURRENCE IN THE VICINITY OF EUREKA HAWS	GENERAL DESCRIPTION AND BREEDING BEHAVIOUR	COSEWIC/SARA STATUS
<b>Mammals</b>			
Muskox	Occurrence known	<ul style="list-style-type: none"> <li>Restricted to far north in Canada, including north Ellesmere Island.</li> <li>Ruminants that feed on sedges, grasses and willows.</li> <li>Population is stable and increasing in some areas.</li> <li>Females usually bear a calf every two years.</li> </ul>	Not assessed
Peary caribou	May occur	<ul style="list-style-type: none"> <li>Barren-ground caribou subspecies widely distributed across the Canadian Arctic Archipelago.</li> <li>Population in decline since the 1990s.</li> <li>Calving occurs in early July.</li> <li>In summer, feeds on upper slopes of river valleys and uplands.</li> <li>Present on North Ellesmere Island, but numbers are low.</li> </ul>	COSEWIC: Threatened SARA: High Arctic population: Schedule 1, Endangered
Polar bear	Occurrence known	<ul style="list-style-type: none"> <li>Distributed throughout the Canadian Arctic.</li> <li>Top marine predator.</li> <li>Female bears den in snow drifts on land near the coast, or on multi-year ice floes.</li> <li>Female bears emerge from denning in March or April and mate on sea ice from April to late June.</li> <li>Male bears do not den or hibernate.</li> </ul>	COSEWIC: Special Concern SARA: Schedule 1, Special Concern
Wolverine	May occur	<ul style="list-style-type: none"> <li>Small carnivore of the mustelid family (resembles a small bear)</li> <li>Widely distributed throughout northern Canada.</li> <li>Primarily a scavenger, but also preys on small to medium sized mammals.</li> <li>Mating season is in the summer; litters are born in the spring.</li> </ul>	COSEWIC: Special Concern SARA: Schedule 1, Special Concern
Arctic fox	Occurrence known	<ul style="list-style-type: none"> <li>Widely distributed across northern Canada, primarily north of 60, and population is stable.</li> <li>Feed on small mammals and scavenges kills from bears or wolves.</li> <li>May scavenge around human dwellings.</li> <li>Female matures at 9 months and bears young once a year.</li> </ul>	Not assessed
Nearctic collared lemming	May occur	<ul style="list-style-type: none"> <li>Small mammal of roughly 75 g</li> <li>Feeds on sedges, grasses and berries in summer.</li> <li>Occupy shallow burrows under sod where soil is available.</li> <li>Breeding season is from March to September.</li> </ul>	Not assessed

Raptors			
Snowy owl	May occur	<ul style="list-style-type: none"> <li>Predator that nests in high arctic and overwinters in southern/central Canada.</li> <li>Needs high density of small prey (e.g., lemmings) to breed.</li> <li>Nests are located on dry areas on tundra, usually on high mounds or hummocks.</li> </ul>	COSEWIC: Not at Risk SARA: no schedule, no status
Ground Nesting and Marine Birds			
Rock ptarmigan	Occurrence known	<ul style="list-style-type: none"> <li>Small grouse-like bird widely distributed across the arctic.</li> <li>Small scale migration during winter to avoid most severe climate.</li> <li>Feeds on plant material (99% - e.g., birch buds, willow, <i>Dryas</i>) with some invertebrates in summer.</li> <li>Nests on dry rocky ground, nest is little more than open scrape on the ground.</li> </ul>	Not assessed
Snow bunting	Occurrence known	<ul style="list-style-type: none"> <li>Medium sized songbird that nests in high arctic.</li> <li>Overwinter in southern Canada and northern US.</li> <li>Feeds on seeds, buds and invertebrates in summer.</li> <li>Nests in rocky areas and rock cavities; isolation in rocks reduces predation.</li> <li>May use barrels, metals cans for nests.</li> </ul>	Not assessed
Ivory gull	May occur	<ul style="list-style-type: none"> <li>Medium-sized marine gull nesting on remote cliffs in the Canadian Arctic.</li> <li>Feeds in the near shore marine environment.</li> <li>Nesting and fledging occurs from June to August</li> </ul>	COSEWIC: Endangered SARA: Schedule 1, Endangered
Red knot	May occur	<ul style="list-style-type: none"> <li>Medium-sized shorebird breeding in the arctic.</li> <li>Nests in cup-like nests on flat land.</li> <li>Hatching occurs in first half of July.</li> </ul>	COSEWIC: Special Concern SARA: <i>islandica</i> population: Schedule 1, Special Concern
Vegetation			
Porsild's Bryum	May occur	<ul style="list-style-type: none"> <li>Small (0.3 – 1 cm tall) plant.</li> <li>Stems grow tightly together to form compact cushions which are brilliant green</li> <li>Small leaves (0.6 – 1.0 mm long) are wide spreading, ovate, with a short leaf tip.</li> <li>May occupy cliff faces near waterfalls in shade of overhang.</li> </ul>	COSEWIC: Threatened SARA: Threatened

Sources: Environment and Natural Resources. NWT Species at Risk Database.  
Species at Risk Public Registry.



## **2.1 List of Potential Effects on Wildlife and Wildlife Habitat**

The potential effects of the Project were identified and assessed in the EIA (Arcadis Canada Inc. 2016 and Addendum 2018) and are summarized below:

### **A. Direct loss of habitat**

- Direct loss of habitat will result from road widening and quarrying activities. The use of the facility in the operational phase will not result in further direct loss of habitat.
- Potential loss of nesting, roosting or denning sites during construction and operational activities, which is especially significant for species at risk.
- Short-term loss of habitat for temporary quarry construction camp site and quarrying activities.

### **B. Indirect loss of habitat**

- Possible loss of effective habitat when wildlife avoid parts of the facility under construction and operation. Avoidance can be related to sensory disturbances, including noise, dust, vehicle emissions, and lights at night. During construction, activities will be concentrated in the HAWS main site, runway site and quarry site, and wildlife disturbance will be of short duration, intermittent and localized. The potential for avoidance of the facility would be greater during the operational phase, when traffic is heavier and of longer duration. This effect may be temporary or sporadic (as some animals may initially avoid areas and then become habituated), and it may only apply to some species.

### **C. Alteration of habitat**

- Vegetation damage will be equal to the footprint of the construction sites and the dust footprint.
- Potential for loss of quality of forage vegetation from dust deposition during construction.
- Potential for contamination of soils and vegetation by toxic substances, through fugitive dust, leakage or spills. Localized effects could occur from spills during construction.
- Due to the extreme conditions at Eureka, construction will be conducted during the brief summer months when most damage to tundra will occur. However, most of the Improvement Project activities are located in areas that have already been disturbed by past or existing land uses resulting in a limited presence of vegetation.
- Damage to plant communities caused by construction will endure for a long time. It is unlikely that revegetation will be successful given the environmental conditions. However, the residual adverse environmental effect is expected to be not significant.

### **D. Increased mortality**

- Risk of wildlife mortality from vehicle collisions on the road. This applies to both construction and operational phases, but is a greater risk during the construction phase, as the volume of traffic will be greater.
- Potential for wildlife attractants at construction camps leading to wildlife encounters and habituation to camp scavenging (specifically for bears, foxes and wolves). Might also

include predatory behavior by some species which could result in the animals being shot.

- Predatory species (e.g., ravens) are known to be attracted to infrastructure and prey on small mammals and birds.

***E. Changes in wildlife populations, health and behaviour patterns***

- Aircraft flights could cause avoidance of the area by breeding wildlife or disruption of normal feeding and reproductive activity if nests and dens were established before flights began.
- Potential to alter wildlife movement patterns, through avoidance of the Improvements Project area. This is mainly relevant to the construction phase.
- Potential for disturbance-related stress to wildlife resulting in changes to behaviour, health or reproductive success.
- Potential changes in predator-prey dynamics if use of the road corridor by predators leads to increased predation.
- Wildlife exposed to elevated levels of contaminants of concern in surface waters or through the contamination of soil and vegetation. This can occur off-site, as chemicals migrate through air or water, or on-site as wildlife move to contaminated areas.

**3.0 WILDLIFE AND WILDLIFE HABITAT MITIGATION MEASURES**

Mitigation measures are summarized in Table 2 in relation to potential effects identified in Section 2. These have been modified from those in the EIA (Arcadis Canada Inc. 2016 and Addendum 2018) to reflect the context within which this WWHMP will be implemented and recommended buffers for various species.

**Table 2: Mitigation Measures**

**A. Minimize direct habitat loss**

Objective	Mitigation Measures	Regulatory Cross Reference
Prevent loss of nesting, roosting or denning sites during construction and operations.	<p>Ensure minimal disturbance to birds and mammals, by requiring designated on-site Personnel to be present before and during important phases of construction to facilitate protection of wildlife. This person should conduct a survey prior to commencement of construction to identify important areas and sensitive species that might be affected. Survey efforts will focus on locating bear dens, indications of and actual nesting sites, and threatened vegetation (i.e., Porsild's Bryum).</p> <p>If SARA listed birds or mammals are located in or adjacent to the area, construction crews should be prepared to avoid, modify or delay activity that might harm the protected species.</p> <p>Designated on-site Personnel will report to the Contractor Supervisor and will carry out surveillance and monitoring activities prior to and during construction to ensure a coordinated, appropriate response to wildlife sightings and to ensure protection of local species during construction. They will also identify whether activities associated with potential effects are being conducted in accordance with the mitigation measures, commitments, and applicable regulations.</p> <p>Movements of workers in off-hours will be restricted to ensure nesting sites and denning areas are not disturbed.</p>	<p>Nunavut Wildlife Act (NWA), Sections 72, 73</p> <p>NIRB Condition 19 and 22</p> <p>WWHMP Sections 1.6, 1.7, 4.0 and 5.0</p>
Prohibition on hunting or harassing wildlife	<p>Personnel should not hunt or harass wildlife and will be made aware of measures required to protect wildlife and wildlife habitat.</p> <p>Contractor Supervisor will ensure that all NIRB Terms and Conditions related to wildlife and wildlife habitat management measures described in this WWHMP are followed and that applicable staff, contractors, and visitors are appropriately trained to implement the WWHMP.</p>	<p>NWA sections 74 and 97</p> <p>NIRB condition 21</p> <p>WWHMP Sections 1.6, 1.7, 4.0 and 5.0</p>

## B. Minimize indirect habitat loss from sensory disturbance

Objective	Mitigation Measures	Regulatory Cross Reference
Reduce vehicle and equipment noise where possible.	Noise reduction measures such as use of industry standard muffling equipment; regular maintenance of equipment and vehicles, and adherence to best practices and standard operating procedures will be employed.	NIRB condition 19 and 35 WWHMP Section 1.7
Keep dust levels low.	Water, or other non-toxic bio-degradable additives will be applied as a dust suppressant. Good road maintenance will be practiced to minimize the potential for road dust emissions.  Vehicle speeds will be reduced on unpaved road surfaces.  Workers, visitors and personnel will be required to remain on established roads and trails where possible.	NIRB condition 19 WWHMP Section 1.7
Minimize vehicle emissions.	The number of equipment/vehicle movements and travel distances will be optimized to reduce fuel consumption and minimize dust and greenhouse gas emissions.  Appropriate exhaust emissions controls such as catalytic converters and diesel particulate filters will be used to mitigate fuel combustion emissions from heavy equipment and vehicles.	NIRB condition 19 WWHMP Section 1.7
Restrictions on aircraft flight	Aircraft/helicopter activity related to the project will be restricted to a minimum altitude of 610 m above ground level unless there is a specific requirement for low-level flying, which does not disturb wildlife and migratory birds.  Aircraft will maintain a vertical distance of 1000 m and a horizontal distance of 1500 m from any observed groups (colonies) of migratory birds and moulting and/or staging waterfowl. Aircraft should avoid critical and sensitive wildlife areas, at all times, by choosing alternate flight corridors.  Aircraft/helicopter will not, unless for emergency, touch-down in areas where wildlife are present.  Pilots will be advised of relevant flight restrictions.	NIRB condition 24 and 25  WWHMP Section 1.6 and 1.7

### C. Minimize alteration of habitat

Objective	Mitigation Measure	Regulatory Cross Reference
Prevent damage to vegetation from dust deposition.	Dust reduction and dust suppression measures.	See Table B
Prevent contamination of soils, vegetation and water from petroleum hydrocarbons.	<p>Vehicles and equipment will be fueled in designated areas (at a minimum of 31 m away from the high water mark). Drip pans will be used when fuelling.</p> <p>Basic petroleum spill clean-up equipment will be kept on-site.</p> <p>Machinery will be inspected for leakage of lubricants or fuel, and to ensure that they are in good working order.</p> <p>Permanent fuel storage on-site will have appropriate secondary containment and will be inaccessible to wildlife.</p> <p>The condition of all large fuel tanks will be inspected and documented weekly.</p> <p>Follow Fuel Spill Contingency Plan should a spill occur.</p> <p>All personnel will be trained in fuel and hazardous waste handling procedures.</p>	NIRB conditions 12 through 18
Prevent damage to vegetation from physical disturbance.	A pre-construction reconnaissance vegetation survey will be conducted prior to initiation of ground disturbance. Focus will be on suitable habitat for Porsild's Bryum (areas of wet, calcareous cliffs with constant seepage during spring and summer months). Should suitable habitat be identified within the Project footprint, a qualified person will conduct further surveys.	NIRB condition 19 WWHMP Section 6.0
Remediate contaminated soil and snow	Remove and treat hydrocarbon contaminated snow/soil on site or transport them to an approved disposal site for treatment.	NIRB condition 11

### D. Prevent significant increased wildlife mortality

Objective	Mitigation Measures	Regulatory Cross Reference
Prevent mortality from vehicle collisions.	Measures to minimize wildlife collisions (construction and operational phases) will include orientation and training, signage, speed limits, maintenance measures to reduce attraction of wildlife to the station area and reporting and notification of wildlife presence.	WWHMP Sections 1.6, 1.7, 4.0 and 5.0
Prevent mortality from habituation	See Table E	

## E. Prevent changes in wildlife populations, health and behaviour patterns

Objective	Mitigation Measures	Regulatory Cross Reference
Prevent attraction of wildlife to construction camps for human safety and to minimize associated wildlife mortality.	<p>All garbage and debris will be kept in bags placed in a covered metal container or equivalent until disposed of at an approved facility. All such wastes shall be kept inaccessible to wildlife at all times.</p> <p>All combustible wastes will be incinerated daily, and ash from incineration activities and non-combustible wastes will be removed from the project site to an approved facility for disposal.</p> <p>Temporary workers will be trained in station protocols for the control and disposal of food and refuse to ensure that local wildlife is not attracted to the site;</p> <p>Temporary workers involved with construction will be trained in how to avoid contact with all wildlife and to report sightings to a central authority.</p> <p>An electric perimeter bear fence will be installed around the quarrying temporary tent camp at West Remus Creek.</p>	NIRB conditions 7 and 8 WWHMP Section 1.6, 1.7, 4.0 and 5.9
Restrictions on aircraft flight	See Table B	WWHMP Section 4.4.3
Prevent wildlife exposure to elevated levels of contaminants of concern	See Table C	

## 4.0 WILDLIFE DETERRENT PLAN

Avoidance is a significant strategy to prevent conflict with wildlife. This includes being aware of the potential wildlife species in the area and educating on-site Project personnel on how to identify them and provide an understanding on how they typically behave.

### 4.1 Wildlife Identification

Provided in Appendix B is a list of wildlife which may be encountered on-site. For each wildlife species, a picture and description of their behaviours that can be anticipated are provided.

### 4.2 Wildlife Monitoring

The following sections provide the surveillance and reporting procedures to be implemented by on-site Project personnel.

#### 4.2.1 Pre-Construction Monitoring

Pre-construction monitoring will be conducted by selected on-site Project personnel with the objective of identifying wildlife den sites and nests or indications of nesting, and habitat for Porsild's Bryum (see Section 6) that may be affected by the Project. Pre-construction monitoring will determine whether sensitive wildlife or wildlife habitat are in the area that could potentially

be negatively affected by the Project. If sensitive wildlife or wildlife habitat are identified, appropriate mitigation including the use of setbacks will be implemented. Setback distances for sensitive wildlife and wildlife habitat are provided in Section 4.3, Table 3. All on-site staff and construction activities are to maintain appropriate distances during the specific time periods as identified in Table 3.

Appendix B provides a photograph, description of the animal and the warning signs for some wildlife that may be encountered in the area.

## Dens

The wildlife species potentially occurring in the area that construct or use dens include the polar bear, Arctic wolf, wolverine and Arctic fox.

Male **polar bears** do not den and remain active year-round. In the high arctic, female polar bears construct dens, for the purpose of bearing young, during the fall in snowdrifts along coastal areas (Messier *et al.* 1994). Dens are occasionally dug into frozen earth but this behaviour is typically observed much further south (Clark *et al.* 1997). Non-pregnant females and males may occasionally use snow shelters during winter (Messier *et al.* 1994). Cubs are typically born November to January and the female and cubs emerge in March or early April (COSEWIC 2008). In one study in the Canadian arctic, polar bears did not stay in dens past the end of April (Harington 1968). Given the summer timing of construction, it is very unlikely that polar bears will be denning and unlikely that dens will be encountered. However, as a precautionary measure, the designated on-site Personnel shall:

- scan any remaining snow areas for den entrances, within 1,000 m of the Project; and
- if a den is found, a 1,000 m setback for construction activity will be implemented until the family group has vacated the den.

The following should be considered when conducting a den search:

- Den searches will focus on areas with snow accumulation.
- Dens are typically dug into protected sides of valley slopes, hills, cliffs, and large rock outcrops where snow tends to build up (Harington 1968).
- Den entrances are large and should be visible during late spring and summer. They are typically about 60 cm high and 60 cm wide with the entrance extending approximately 2 m to the main den area.
- Occupied dens can be detected by fresh tracks in the vicinity of the den, wisps of vapour rising from vents or exits (Harington 1968) and, after March/April when bears emerge, by the presence of an opening in the den.

The designated on-site Personnel will conduct the den search by:

- travelling along the proposed construction area and periodically stopping to scan the landscape within 1,000 m of the Project with binoculars for areas with snow.
- In hilly terrain, the designated on-site Personnel should position themselves at a vantage point that permits a clear view of the landscape.
- If a patch of snow is found, scan the patch for the presence of a den entrance or tracks or other signs as noted above.

- If a den is found, the location should be recorded, and a Wildlife Observation Log completed (Appendix C). It should be periodically monitored, from a distance, for 2 days to determine if the den is occupied. Monitoring should be conducted at a safe distance from the safety of a vehicle.
- If the den is occupied, implement the 1,000 m setback as identified in Table 3 until the bears leave the area. If the den is within 1,000 m of construction, implement project shutdown within the buffer until the bears have left the area. Contact the ECCC Station Manager immediate. The ECCC Station Manager is responsible for contacting the ECCC/PSPC Project Team. If required, the ECCC/PSPC Project Team will contact the Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235) for guidance.

**Wolverines** also build dens. In the eastern Arctic, female wolverines build dens primarily in snow caves in areas where snow accumulates such as leeward slopes, ravines, and avalanche debris. Wolverines will also use caves in rocky slopes where access below ground is available. In British Columbia, kits emerge from dens during late May (Lofroth 2001, The Wolverine Foundation 2018). Construction of the Project is expected to occur during summer and therefore, potential for active wolverine dens is low. However, the designated on-site Personnel shall:

- survey for wolverine dens in areas within 800 m of the Project where deep snow persists or where rocky slopes are present; and,
- if a den is found, an 800 m setback will be implemented until the family group has left the den.

The following should be considered when conducting a den search:

- Wolverine den searches will be conducted during the search for polar bear dens using the same methods, although only dens within 800 m will be identified.
- Wolverine dens are typically in areas with deep snow and since wolverines don't hibernate, tracks should be evident around the den entrance.
- Den tunnels are about 30 to 40 cm in diameter (The Wolverine Foundation 2018).

If a den is found and is occupied, implement the 800 m setback as identified in Table 3 until the wolverines leave the area.

Both **Arctic fox** and **Arctic wolf** will construct dens. Denning areas for Arctic wolves are limited due to the frozen ground conditions. Wolves tend to den on eskers (long, winding ridge of sand and gravel) because they are easier to dig into (Klaczek 2007). Denning starts late spring when the ground thaws to a suitable depth. Due to limited sites where wolves can excavate dens, they will often re-use older den sites. Designated on-site Personnel shall:

- survey esker sites within 800 m of the Project for both Arctic wolf and 200 m for fox dens.

The following should be considered when conducting a den search:

- Fox and wolf den searches will be conducted during the search for polar bear dens within the specified setback distance for each species.



- The potential for eskers to occur should be identified and be given particular focus together with areas with rock outcrops and boulders as opposed to areas with snow accumulation.

If a wolf or fox den is located, an 800 m (wolf) and 200 m (fox) buffer from the den site will be implemented until the family has left the den.

### **Bird Nests**

Although it is recognized that nest surveys are typically not effective at locating all active nests, behavioural observations of birds can identify the general location where nesting is likely occurring and appropriate protective measures (e.g., setbacks) can be implemented.

As stated in Section 1.4, this WWHMP is intended to avoid violations of the MBCA. This WWHMP includes provisions for on-site Project personnel to undertake the activities typically undertaken by a qualified person. Each bird nest survey team will usually consist of 1 or 2 crew members. Pictures of VEC bird nests are located in Appendix B.

The purpose of a nest survey is to locate all active bird nests within a specific work area so that appropriate mitigation measures to protect the nest and the birds can be implemented. Nest surveys will use the following methods:

- Nest surveys will be conducted within three to four days of construction.
- Surveys can be conducted throughout the day but are more effective during the early morning hours.
- Cancel nest surveys during rain or very windy conditions (exceeding 20 km/hr). Rain and wind may deter birds from calling and it is also difficult in these conditions to hear birds calling.
- Generally, nest surveys begin within the Project area (e.g., the access road or borrow pit) and a 100 m buffer so that appropriate setbacks are established.
- Project personnel will walk parallel to each other at a spacing of about 10 m, and at about 2 to 3 km/h, stopping periodically to listen and watch for birds.
- Notes taken will include all observed behaviour, including but not limited to: times when birds are flushed, as well as bird behaviour (e.g., presence of singing birds, territorial males, alarm calls, distraction displays, carrying of food or nesting material).
- Care will be taken to minimize stress on nesting birds during surveys.
- Note that visual scans of the surrounding area up to 2 km will be conducted to identify potential ivory gull nesting areas. Ivory gull nest on sheer granite cliffs or large gravel limestone plateaus. These can be searched by use of binoculars from good viewing vantage points.
- Nest searching will not last longer than 5 minutes to avoid affecting nesting birds.
- When a nest is found, the location will be documented with a GPS location, date and time, habitat type, number of eggs and species of bird. Nest sites will not be marked in any way to reduce risk of nest predation. Natural vegetation or subtle terrain features will be used to indicate the location of the nest by noting the features and making a detailed diagram on a field nest card for later reference by biologists searching for the nest. In isolated situations, where nests are extremely hard to find, nest sites are marked by a pin flag 10 m to the north of the nest.

- If active bird nests are found, take photographs of the species for identification purposes<sup>1</sup>. Monitoring may be required to ensure that setbacks are appropriate and to check on the nesting status. Nest checks will be limited to every 7 days, to avoid disturbance. Nest monitoring will be conducted by the designated on-site Personnel using binoculars to monitor a nest from a distance as opposed to direct inspection. Direct inspection, however, may be the only way to confirm a nest is no longer active. Attendance at the nest site will be kept to an absolute minimum (less than 30 seconds) to prevent abandonment of nest or drawing attention to the site by predators.

#### **4.2.2 Construction Monitoring**

The designated on-site Personnel will be responsible for ensuring that the mitigation, setbacks (Table 3) and communication procedures outlined in the WWHMP are being respected. During the construction phase of this Project, monitoring of wildlife presence relative to work activities, will be important.

Throughout the work day the designated on-site Personnel should conduct a sweep of the active Project footprint to look for:

- Wildlife occupying the Project site
- Signs of recent activity (e.g., scat, tracks)

If wildlife are present, the designated on-site Personnel will notify the Contractor Supervisor. They will work with the ECCC Station Manager to agree upon appropriate mitigation which could include halting all work activities until the wildlife has left the Project footprint and application of the recommended setback (Table 3).

If signs of recent wildlife activity are observed, the designated on-site Personnel will ensure there is a heightened awareness and consideration of setback and buffers that may apply due to particular work activities scheduled for that day among all on-site Project staff and visitors.

All wildlife observations will be recorded as per the wildlife observation protocol (Section 4.4)

- Open pits and holes will be examined for trapped animals at the start of each day and before doing any activity. Contact Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235) should an animal be present and unable to move away independently for advice and/or to receive an appropriate permit to relocate it.
- Check all transportation routes for wildlife mortalities and record observations in the Wildlife Observation Log.

#### **4.3 Setback and Buffers**

Provided in Table 3 are the minimum personal and/or construction distances that should be applied when: a) on-site Project personnel observe wildlife, b) if a den or nest is located, c) aircraft/helicopter is operating in the presence of wildlife and, d) Porsild's Bryum presence is confirmed on the Project site.

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<sup>1</sup> Send photographs to ECCC/PSPC Project Team to help with identification of the species and determination of appropriate mitigation.

**Table 3: Recommended Setback or Buffers Based on Species and Time of Year**

Species	Location	Time of Year	Setback or Buffer
Polar bear	Den sites	September 15 to April 15, or until the den has been vacated by the family group	1,000 m from den
Polar bear	Project site	Duration of Construction and Operation phases	1 km from individuals
Birds, including Raptors	Active nest	Most probable time to see nests in Eureka is May 17 to Aug. 19) (Jean-Francois Dufour, pers comm, 2018)	As great as 750 m from nest depending on the species. Refer to Table 4 below
Muskox	Project site	Duration of Construction and Operation phases	200 m from individuals
Peary caribou	Project site	Duration of Construction and Operation phases	100 m from individuals
Arctic fox	Project site	Duration of Construction and Operation phases	100 m from individuals
Arctic fox	Den sites	Mid-February – April is breeding season with pups in the den until July	200 m from den
Arctic wolf	Project site	Duration of Construction and Operation phases	500 m from individuals
Arctic wolf	Den sites	January to March is breeding season with pups in the den until July	800 m from den
Wolverine	Den sites	Late April emerging in late May	800 m from den
Small mammals	Project site	Duration of Construction and Operation phases	25 m from individuals
Colonies of migratory birds	Project site	Duration of Construction and Operation phases	On land, 1,000 m during high disturbance activities (e.g. drilling and blasting) otherwise 300 m from colonies; Aircraft to maintain a vertical distance of 1,000 m and a horizontal distance of 1,500 m from any observed groups (colonies) of migratory birds.
All Birds and other Wildlife	Project site	Duration of Construction and Operation phases	Aircraft/helicopter activity related to the project will be restricted to a minimum altitude of 610 m above ground level unless there is a specific requirement for low-level flying
Ivory gull	Nesting site	Duration of Construction and Operation phases	2 km from nest

Species	Location	Time of Year	Setback or Buffer
Porsild's Bryum	Habitat	Duration of Construction and Operation phases	May be as large as 1 - 3 km dependent on activity and subject to assessment of impacts of vibration and air pollution and to be determined by the local GU – Dept. of Environment Conservation Office in Iqaluit.

The following setback distances are recommended to minimize disturbance to nests for different bird groups nesting in tundra habitat (see footnotes for adjustments to setbacks for sensitive species and species at risk):

**Table 4: ECCC Recommended Setbacks for Identified Bird Groups**

Species Group	Setbacks for Specific Species	Pedestrians /ATVs (m)	Roads / Construction / Industrial Activities (m)
Songbirds		30	100
Shorebirds generally	Default to setbacks for Red Knot if species cannot be identified	50 <sup>a</sup>	100 <sup>a</sup>
	Ruddy Turnstone	150	300
	Red Knot	300	500
Terns/Gulls	Default to setbacks for Ivory Gull if species cannot be identified	200 <sup>a</sup>	300 <sup>a</sup>
	Ivory Gull	2 km	2 km
Ducks		100	150
Geese		300	500
Swans/Loons/Cranes		500	750

<sup>a</sup> If field crew are trained in the identification of these species then these higher setbacks need only apply to these more sensitive species listed, and lower setbacks can be used for the remaining shorebird species. In areas where several species are nesting in proximity, setbacks for the most sensitive species should be used.

#### 4.4 Wildlife Observation Reporting

In the event that wildlife or wildlife activity (e.g., scat, tracks) are observed during the pre-construction or construction phase of this Project, information related to the occurrence should

be documented in the Wildlife Observation Log (Appendix C). This log includes information such as:

- Date, time and weather;
- Name and number of animal(s) observed;
- Life stage and/or sex of animal(s) observed;
- Behaviour of animal(s);
- Activity of the animal(s);
- Location of observation (GPS coordinates if possible); and,
- Other information (such as what actions were taken to avoid an encounter).

All polar bear observations should be immediately reported to the nearest Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235).

#### **4.5 Deterrent Procedures**

The following measures shall be implemented by on-site Project personnel to reduce direct encounters with wildlife and eliminate attractants of wildlife.

##### **4.5.1 General**

- Work in groups of two or more.
- Carry a portable method of communication
- Provide wildlife plenty of space and give right of way. Always give wildlife an avenue for retreat, and never pursue an animal.
- Avoid noises or actions that might stress wildlife or cause animals to unnecessarily waste energy.
- Do not approach young or juvenile animals.
- Avoid approaching animals that are breeding, nesting, brooding, denning or raising young.
- On-site Project personnel, unless authorized, will not be permitted to have pets in the construction camp or on work sites.
- On-site Project personnel, unless authorized by the ECCC Station Manager, must not possess or store firearms, bows and crossbows, or fishing equipment in construction camps or in work vehicles.
- Feeding wildlife is prohibited at all times.

##### **4.5.2 Camps and Food**

- Camps or facilities should be located away from wildlife habitats and movement corridors.
- All garbage containment areas, waste water containment, cooking facilities, and accommodation facilities should be encompassed by a high tensile fence or 2.4 m high fencing topped with 3-4 strand barbed wire.
- Buffer areas (2 m clear of vegetation and infrastructure) should be provided on each side of the fence.

- If a perimeter fence is not installed, buildings should be skirted with skirting buried into the substrate to prevent openings.
- There should be central cooking and eating areas.
- Field lunches will be packed and stored in air tight containers and lunch waste will be replaced in the container and deposited back in camp when the shift is over.
- Food and attractants are not permitted in sleeping areas.
- There should be no meat pits or cooking over open fires.
- Other non-food attractants should be stored in a bear proof receptacle.
- All food should be stored in a bear proof receptacle.
- Open gray water systems should be pumped out and odour controlled (liming).

#### **4.5.3 Construction**

- Work activities should be conducted in a manner that limits the physical disturbance of animals. Conducting activities during times, in locations, or utilizing methods that have potential to damage key habitat (e.g., denning sites, calving and post-calving grounds, or forage areas) should be avoided. These areas will be identified by the designated on-site Personnel.
- If work activities to be carried out in identified polar bear denning areas and during the denning season, a trained polar bear monitor must be present.
- Pits and other hazardous areas should be delineated with visible markers or physical barriers to deter animals from approaching the area.
- If previously unknown polar bear dens are discovered within 1,000 m of activities, all work activities shall stop and the Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235) will be contacted immediately for guidance. DOE will evaluate these instances on a case-by-case basis (either Project activities have to cease or can be continued with modifications).
- All fuel and chemicals shall be stored in such a manner that they are inaccessible to wildlife.
- Aircraft/helicopter shall not, unless for emergency, touch-down in areas where wildlife are present.
- Minimize lighting for health and safety of on-site Project personnel and to minimize wildlife attraction.

#### **4.5.4 Prevention of Wildlife Collisions**

- Educate on-site Project personnel of potential for wildlife-vehicle collisions.
- Vehicular traffic should be limited to designated access roads to minimize disturbance of wildlife.
- Use the fewest possible vehicles for transport of personnel and equipment to and from the work areas. Use carpool or use multi-passenger vehicles to transport workers.

- Ensure that wildlife observations, especially those along roadways, are distributed to all on-site staff to ensure that reduced speeds and care is taken in the area of the observed wildlife.
- Maintain appropriate speeds: 60 km/hr on all-season access roads and 30 km/hr within facilities or camps.
- Install warning signs and reduce posted speed limits in areas where there is high potential to encounter wildlife. Project personnel must yield to wildlife.
- Where patterns of habitual wildlife crossings emerge, erect warning signage where collision risk is high.
- Decrease speed adjacent to watercourses where culverts/bridges may be present as wildlife may be using these areas as crossings.
- Watch for wildlife on access trails and roads at night as headlights can temporarily affect night vision. Use effective vehicle lighting to expose ditches and side vegetation.

#### **4.5.5 Waste Management**

- All garbage and debris shall be kept in bags placed in a covered metal container or equivalent until disposed of at an approved facility. All such wastes shall be kept inaccessible to wildlife at all times.
- Where possible, use bear proof containers to contain garbage and debris.
- All areas of the site must be kept clean and any garbage spills are to be removed immediately.
- Incineration of all combustible wastes shall be conducted daily, including the removal of the ash from incineration activities and non-combustible wastes from the Project site to an approved facility for disposal.
- There should be daily removal of garbage (prior to night fall).
- There should be daily disinfectant (lime) of garbage receptacles.

### **5.0 WILDLIFE ENCOUNTER PROTOCOL**

Despite the measures outlined above, encounters with wildlife may occur. The following section provides information on actions to be taken by on-site Project personnel in the event of observing wildlife and recommendations regarding potential need for the cessation of activities until such time as wildlife have safely passed beyond the area of operations.

#### **5.1 Peary Caribou**

The following guidance is provided to on-site Project personnel if caribou enter the project area (Alaska Department of Fish and Game 2018):

- Approaching caribou should be given right of way. Never pursue the animal and keep at least 100 m distance at all times.
- If caribou are observed within 500 m of construction activity, activity will be suspended until the caribou move away from the area. On-site Project personnel will not attempt to move the animals away from the area but will wait until the caribou move away on their own.

- Peary caribou are not aggressive by nature and will likely run if confronted. However, if provoked to attack, it will bow its head and charge with antlers.
- If a Peary caribou charges, do not stand your ground. Run and get into or behind something solid such as secure building or vehicle.
- If knocked down by a caribou, roll into a ball, protect your head with your hands and hold still. Do not move until the caribou has left the area.
- Aggressive encounters with wildlife should be reported to the ECCC Station Manager. The ECCC Station Manager will immediately notify the ECCC/PSPC Project Team. In the case of an emergency where human or wildlife safety is at immediate risk or the ECCC/PSPC Project Team is not available, the ECCC Station Manager is responsible for determining the course of action. Any existing Eureka HAWS protocols shall be followed at this time (if applicable).
- Details of the incident are to be recorded on the Wildlife Observation Log (Appendix C).
- In the event of injury, the personnel should be directed to the closest medic for evaluation.

## 5.2 Muskox

The following is guidance on how to handle a muskox encounter (Alaska Department of Fish and Game 2018):

- Approaching muskox should be given right of way. Never pursue the animal and keep at least 200 m distance at all times.
- Do not box muskox in with people or vehicles
- Note that muskox are not as easily deterred as are caribou
- Male muskox are more aggressive during the fall breeding season (August through October). Precautions should be taken to avoid disturbing males when in rut.
- A muskox that has stopped feeding, walking, or resting is aware of the on-site Project personnel or work activities and therefore may become agitated. A stressed muskox group may form a defensive line and face you. Stressed and agitated animals may begin to sway their head from side to side.
- If a muskox charges, do not stand your ground. Run and get inside or behind something solid such as a secure building or vehicle.
- Aggressive encounters with wildlife should be reported to the ECCC Station Manager. The ECCC Station Manager will immediately notify the ECCC/PSPC Project Team. In the case of an emergency where human or wildlife safety is at immediate risk or the ECCC/PSPC Project Team is not available, the ECCC Station Manager is responsible for determining the course of action. Any existing Eureka HAWS protocols shall be followed at this time (if applicable).
- Details of the incident are to be recorded on the Wildlife Observation Log (Appendix C).
- In the event of injury, the personnel should be directed to the closest medic for evaluation.



### **5.3 Polar Bear**

#### **5.3.1 General**

- All on-site Project personnel should be trained in bear safety that is included in the site orientation program.
- Any bear observations including scat, tracks, hair should be immediately reported to the ECCC Station Manager. The ECCC Station Manager will immediately notify the ECCC/PSPC Project Team. In the case of an emergency where human or wildlife safety is at immediate risk or the ECCC/PSPC Project Team is not available, the ECCC Station Manager is responsible for determining the course of action. Any existing Eureka HAWS protocols shall be followed at this time (if applicable).
- Do not watch a polar bear from a safe distance to photograph or observe. This may result in a positive experience for the bear and it may approach more confidently next time.
- The pamphlets "*Bear Safety – Reducing Bear-People Conflicts in Nunavut*" and "*Safety in Polar Bear Country*" (Appendix A) provide additional measures for bear avoidance and self-protection that should be followed.
- When polar bear are identified within a km of the project site, an armed designated and training on-site Personnel will be posted to provide a lethal solution should the bear threaten the life of on-site Project personnel or visitors, or on the advice of the Government of Nunavut.

#### **5.3.2 Polar Bear Encounter**

Provided below is guidance on how to proceed when a polar bear is observed anywhere on the Project site.

##### **If a polar bear is observed >1 km away**

- Communicate the location of the polar bear to all construction and camp Project staff via radio. Regular updates on the polar bear's location and direction of travel will be provided.
- Work at all sites may continue, but stations should listen to communications and monitor the situation.
- An all clear can be called when the polar bear is beyond sight and there is confidence that
- the polar bear is gone and traveled in a direction that will not interact with other Project areas.

##### **If a polar bear is observed 200 m to 1 km away**

- Communicate the location of the polar bear to all construction and camp Project staff via radio. Regular updates on the polar bear's location and direction of travel will be provided.
- The designated and trained on-site Project personnel will be set to prepare non-lethal deterrents (e.g., air horn, bear spray) for deployment.
- Individuals away from camp or construction sites should be directed to retreat close to areas where protection is available.

- If the polar bear appears to be approaching the camp or construction site, the closest workers should be instructed to make noise that will identify the area as occupied by humans.
- The state of alert will continue until there is confidence that the polar bear is gone and traveled in a direction that is will not interact with other Project areas.

#### **If a polar bear is observed <200 m away**

- A radio alert will be issued and all persons away from camp or construction sites will be informed to retreat to a safe area immediately.
- The designated and trained on-site Project personnel will prepare non-lethal deterrents and a firearm will be prepared and made available upon instruction from the ECCC Station Manager.
- If the polar bear appears to be approaching the camp or construction site, the closest workers should be instructed to make noise *from a position of safety* that will identify the area as occupied by humans while the designated and trained on-site Project personnel will be in position to use deterrents. Wait to see if the bear moves away from the project area.

#### **5.3.3 Deterrents**

In the event a bear is close to camp or a construction site and shows no reaction to people, or approaches closely, then non-lethal or physical deterrents may need to be deployed by trained individuals to haze the polar bear away from potential conflicts and attempt to de-habituate the bear.

- As a first attempt to scare bears away, use non-lethal deterrents including air horns, sirens, bear bangers or flares. Given appropriate training, these deterrents can be deployed by all on-site Project personnel, although a responsible individual should be appointed at each camp to direct the use of aversion techniques on bears and ensure the safety of on-site Project personnel. The Government of Nunavut's booklet on *Bear Safety Reducing Bear People Conflicts in Nunavut* (Appendix A) provides a detailed summary of deterrents, their use, and effectiveness.
- Secured vehicles (not ATVs) or helicopters may also be used to haze bears away from camps and construction sites.
- If non-lethal deterrents prove ineffective, use of physical deterrents should be considered. These cause discomfort to bears without lethal injury. They include bear spray (could be used by all trained staff), and propellants (rubber bullets or bean bags shot from 12 gauge shotgun; requires designated trained individual) (see Government of Nunavut's booklet on *Bear Safety Reducing Bear People Conflicts in Nunavut* (Appendix A) for more details). Bear spray is most effective if the bear is within 8 m (26 feet) and it should not be sprayed upwind as it may be blown back in your face. To use bear spray:
  1. Check wind direction. Do not spray into the wind.
  2. Remove the safety clip.
  3. Aim for the eyes and nose of the bear.
  4. Depress trigger.

5. Do not use the full contents in the first spray, as it may be needed more than once.

Bear spray should not be stored in the passenger compartment of a vehicle. Exposure to the spray will cause severe irritation to eyes, nose, and respiratory system if inhaled, especially in a confined space.

- If hazing proves ineffective for a problem bear, then relocation and/or euthanasia may be considered as the next step. This decision and follow up is to be directed and conducted by the Government of Nunavut - Department of Environment Conservation Office in Iqaluit.

#### **5.3.4 Polar Bear Attack**

Each encounter with a polar bear is unique and these suggestions are guidelines for dealing with an unpredictable animal in potentially complex situations.

If a polar bear is not aware of your presence (Parks Canada 2018):

- Stop, and stand still to allow time to assess the situation.
- Remain calm.
- Stay downwind.
- Never take your eyes off the bear.
- Always leave an escape route for the bear.
- Quietly back away slowly and leave the area immediately.

If the polar bear is demonstrating curious behaviours such as:

- Slowly moving with frequent stops;
- Standing on hind legs and sniffing the air;
- Rotating its head side to side; and/or,
- Repositioning itself downwind of you to catch your scent.

Then the following actions should be taken:

- Stop, and stand still to allow time to assess the situation.
- Remain calm.
- Identify yourself by talking softly and waving your arms above your head.
- Move slowly upwind to help the bear get your scent.
- Never take your eyes off the bear.
- Always leave an escape route for the bear.
- When the bear stops approaching, slowly move away.
- If the bear does not retreat, quietly back away and leave the area immediately
- If the bear moves closer, move out of the path of the bear.
- If it continues to move closer, stand your ground and use your deterrent.

- As a last resort, act aggressively and try to defend yourself, fighting by any means necessary. **Do not play dead.**

If the polar bear is surprised at close range or shows signs of being threatened, such as:

- Huffing, panting, hissing, growling and jaw-snapping;
- Foot stamping;
- Displaying direct eye contact; and/or,
- Head lowering with ears pulled back.

Then the following actions should be taken:

- Try to appear non-threatening by talking in a calm voice.
- Do not make any sudden movements.
- Never huff or hiss.
- Avoid eye contact.
- Back away slowly and leave the area immediately.
- Be prepared to stand your ground and use your deterrent.
- If the bear charges, act aggressively and try to defend yourself, fighting by any means necessary. **Do not play dead.**

### **Offensive Attack**

An offensive attack may occur when polar bears show signs of stalking or hunting such as: (Parks Canada 2018):

- Following and/or circling you;
- Approaching without fear and with intent;
- Returning after being scared away; and/or,
- Appearing wounded, old or thin.

Bluff charges are rare during an offensive attack.

If an offensive attack occurs:

- Do not run.
- Fight back with any and all means possible (rocks, sticks, tools, utility knife or whatever you can find).
- Use deterrents; where appropriate (pepper spray) direct their use to sensitive areas such as the face and nose.

### **After a Polar Bear Attack (Parks Canada 2018)**

- Remain calm.
- Ensure you are safe before moving.
- Account for everyone and determine their state of health.

- Radio for help.
- Retrieve the field first aid kit and apply aid where appropriate.
- Immediately contact the ECCC Station Manager to communicate the presence of an aggressive bear on the Project site and to arrange for emergency medical assistance.
- The ECCC Station Manager will immediately notify the ECCC/PSPC Project Team. The Project team will be responsible for notifying the local Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235).
- Report the incident on the Wildlife Observation Log (Appendix C).

#### **5.4 Arctic wolf**

The following is guidance on how to handle a wolf encounter (Alaska Department of Fish and Game, 2018):

- An approaching wolf or wolf pack should be given right of way. Never pursue the animal(s) and keep a minimum 100 m distance at all times.
- If a wolf or wolf pack are observed within 500 m of construction activity, activity will be suspended until the animal(s) move away from the area. On-site project personnel will not attempt to move the animal(s) away from the area but will wait until they move away on their own.
- If a wolf or wolf pack is encountered at close range do not run or turn away. Retreat slowly while facing the wolf.
- If approached, act aggressively by stepping toward the wolf and yelling or clapping your hands and waving whatever is on hand (e.g., rocks, sticks, tools).
- Maintain eye contact if the wolf is looking at you. If you are with a co-worker and more than one wolf is present, place yourselves back to back and slowly move away from the wolves.

In the rare event that a wolf attacks:

- Stand your ground and fight with any means possible (rocks, tools, utility knife or whatever you can find).

#### **5.5 Arctic Fox and Wolverine**

It is doubtful these mammals would approach, although fox are more easily habituated to humans. Wolverine are shy creatures highly unlikely to approach but are occasionally attracted to industrial camps.

- An approaching fox or wolverine should be given right of way. Never pursue the animal(s) and keep at least 100 m distance at all times.
- If a fox or wolverine is observed within 500 m of construction activity, activity will be suspended until the animal(s) move away from the area. On-site Project personnel will not attempt to move the animal(s) away from the area but will wait until they move away on their own.
- Foxes and wolverines should be deterred by shouting, waving and making loud noises.

## 5.6 Other Mammals

- Other mammal species are unlikely to approach or do not pose a danger to humans. Allow these species to move away on their own. If necessary, deter by shouting, waving and making loud noises.

## 5.7 Nesting Birds, including Raptors

- If nests are encountered and identified, on-site Project personnel shall take precaution to avoid further interaction and or disturbance (e.g., a 100 m buffer around the nests).
- If active nests of any birds are discovered (i.e., with eggs or young), on-site Project personnel shall avoid these areas until nesting is complete and the young have left the nest.
- If birds are located within the active construction zone, they should be deterred by shouting, waving and making loud noises.

## 5.8 Wildlife Mortality

Wildlife mortality is to be avoided at the project site. Reporting of wildlife sightings and near misses in the Project area is very important to identify areas of concentration triggering increased awareness. The Wildlife Observation Log will identify wildlife sightings and where they occurred (Appendix C).

Any carcasses should be promptly removed from the Project area and disposed of to discourage human/wildlife interactions (e.g., scavengers feeding on carcass).

Any lethal take or injury must be reported within 24 hours to the local Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235).

## 5.9 Reporting

All Wildlife Observation Logs should be compiled by the Contractor Supervisor and provided to the ECCC/PSPC Project Team at the end of the year. ECCC shall submit an annual report with copies provided to the Nunavut Impact Review Board which will include the Wildlife Observation Logs.

The ECCC/PSPC Project Team will report any problem wildlife or any interaction with polar bears, caribou, foxes, wolverines or wolves to the local Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235).

The annual report to NIRB shall include a summary of wildlife encounters and any adaptive management measures undertaken with respect to applicable Terms and Conditions.

## 6.0 VEGETATION

As outlined in the EIA: Addendum (2018), no formal vegetation surveys (including rare or conservation-sensitive plants) have been conducted. Species that may be present include: arctic willow (*Salix arctica*), avens (*Dryas spp.*), birch, arctic poppy (*Papaver spp.*). Although it was concluded that the residual adverse environmental effect of this Project would not be significant, a pre-construction reconnaissance survey prior to commencement of construction work was recommended by the Government of Nunavut to determine the composition of local plant species that may be affected by project construction and operations and to implement adaptive management responses. It was agreed that the concern focused on potential habitat

for Porsild's Bryum (*Haplodontium* [formerly *Mielichhoferia*] *macrocarpum*)<sup>2</sup>, listed as Threatened on the SARA Schedule 1 in 2011.

## 6.1 Pre-construction Reconnaissance Survey

A pre-construction reconnaissance survey will be completed by on-site Project personnel to determine the presence of potential habitat within or near the Project footprint.

The *Recovery Strategy for the Porsild's Bryum in Canada* (2014) describes Porsild's Bryum as being, "a relatively small (0.3 – 1 cm tall) plant. Its stems grow tightly together to form compact cushions which are brilliant green and punctuated by a "sparkly" aspect not usually seen in other mosses. The branches and stems are green in their upper portions but are red-brown with age in the lower portions of the stems. The small leaves (0.6 – 1.0 mm long) are wide spreading and bent back when moist, and ovate with a short leaf tip. When sporophytes (spore-producing structures) are present, capsules are ovoid and produced on a short (4 – 11 mm) stalk (seta) that raises the capsule just above the leaves." For reference, pictures of Porsild's Bryum and its preferred habitat are located in Appendix D.

Most populations are associated with waterfalls, where colonies grow in continually shaded chalky rock crevices or rock faces that typically experience intermittent or continual seepage. At numerous sites, the species is associated with waterfalls that possess a rock overhang. Here, the moss finds suitable microhabitat on the cliff faces situated in the shade created by the overhang (Environment Canada 2014).

Porsild's Bryum is particularly sensitive to alterations in rock cliffs by way of off-road vehicle use, mining exploration, road construction, and heavy vibration. Additionally, road dust may adversely affect Porsild's Bryum populations that occur near roads (COSEWIC 2003).

The pre-construction reconnaissance vegetation survey shall:

- be undertaken by designated on-site Personnel prior to the initiation of any ground disturbance associated with any aspect of this Project (e.g., construction, road development);
- focus on identification of suitable Porsild's Bryum habitat. This consists of areas of wet, chalky cliffs with constant seepage during spring and summer months; and,
- include a search area of the Project footprint plus a buffer area of 50 m to allow for potential dust that may escape despite dust-suppression measures.

In the absence of suitable habitat, it shall be assumed that impacts on Porsild's Bryum associated with this Project are not likely.

If suitable habitat is identified, halt construction/disturbance activities and contact the local Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235) for further guidance.

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<sup>2</sup> Note that the scientific name for Porsild's Bryum has changed over time. The currently accepted name of the species is *Haplodontium macrocarpum* (ECCC 2017). The scientific name previously used during this Project (*Mielichhoferia macrocarpa*) is synonymous, however *Haplodontium macrocarpum* will be used in this document.

## 6.2 Reporting

Upon completion of the pre-construction reconnaissance survey, the results are to be reported to the ECCC Station Manager who will communicate it to the ECCC/PSPC Project Team. The following Information should be included in the report:

- Names of the surveyors
- Survey Methods
- Results
- Location of observed Porsild's Bryum colonies<sup>3</sup>, if applicable
- Pictures, if applicable
- What actions were taken to avoid effects and outcomes, if applicable

## 6.3 Adaptive Strategies

In the event that Porsild's Bryum is identified within the Project area or dust buffer, the following management measures or adaptive strategies are to be implemented, as per Government of Nunavut's letter 12XN020: *Notice of Screening and Comment Request for ECCC's "Amended Land Use Permit application for Eureka Weather Station" Project Proposal*, dated April 24, 2018):

- Alert all on-site Project personnel of the location of the colony of Porsild's Bryum.
- Install fencing, signage, etc. if deemed necessary for the protection of the colony.
- Ensure avoiding any activity in the vicinity of the Porsild's Bryum habitat area. The recommended buffer zone may be as large as 1 - 3 km dependent on activity and subject to assessment of impacts of vibration and air pollution and to be determined by the local Government of Nunavut - Department of Environment Conservation Office in Iqaluit (phone: (867) 924-6235).

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<sup>3</sup> A 'colony' is one individual plant, a 'sub-population' is a group of colonies, and a 'population' is a group of sub-populations within 1 km of each other.



## 7.0 REFERENCES

- Alaska Fish and Game. Living With Muskoxen.  
(<http://www.adfg.alaska.gov/index.cfm?adfg=livewith.muskoxen>). [Accessed on June 23, 2018].
- Alaska Fish and Game. Living With Wolves.  
(<http://www.adfg.alaska.gov/index.cfm?adfg=livewith.wolves>) [Accessed on June 23, 2018].
- Arcadis Canada Inc. 2016. *Environmental Impact Assessment, High Arctic Weather Station Project Improvements*. January 25.
- Arcadis Canada Inc. 2018. *Environmental Impact Assessment Addendum, High Arctic Weather Station Project Improvements for: Construction of a New Road, Construction of a Water Crossing over Black Top Creek and Development of a New Quarry Site*. March.
- Clark, D.A., I. Stirling and W. Calvert. 1997. Distribution, Characteristics, and Use of Earth Dens and Related Excavations by Polar Bears on the Western Hudson Bay Lowlands. *Arctic* 50 (2): 158-166
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2014. COSEWIC Assessment and Status Report on the Wolverine, *Gulo gulo* in Canada. COSEWIC, Ottawa. Xi +76 pp.
- Committee on the Status of Endangered Wildlife in Canada. 2008. COSEWIC Assessment and Update Status Report on the Polar Bear, *Ursus maritimus* in Canada. COSEWIC, Ottawa. Vii + 75 pp.
- Committee on the Status of Endangered Wildlife in Canada. 2003. COSEWIC assessment and status report on Porsild's bryum *Mielichhoferia macrocarpa* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 22 pp.  
([www.sararegistry.gc.ca/status/status\\_e.cfm](http://www.sararegistry.gc.ca/status/status_e.cfm))
- Environment Canada, 2017. General Nesting Periods of Migratory Birds. <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html>. Accessed June 26, 2018.
- Environment Canada. 2014. Recovery Strategy for the Porsild's Bryum (*Haplodontium macrocarpum*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. v + 38 pp.
- Environment and Climate Change Canada. 2017. Action Plan for the Porsild's Bryum 4 (*Mielichhoferia macrocarpa*) in Canada [Proposed]. *Species at Risk Act* Action Plan 5 Series. Environment and Climate Change Canada, Ottawa. v + 13 pp.
- Environment and Climate Change Canada. General nesting periods of migratory birds. <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html>. Accessed June 2018.
- Government of Canada, 2014. Recovery Strategy for the Ivory Gull (*Pagophila eburnea*) in Canada. [https://www.registrelep-sararegistry.gc.ca/virtual\\_sara/files/plans/rs\\_ivory\\_gull\\_e\\_final.pdf](https://www.registrelep-sararegistry.gc.ca/virtual_sara/files/plans/rs_ivory_gull_e_final.pdf). Accessed June 26, 2018.
- Government of Nunavut. Wildlife Fact Sheets – Arctic Fox (*Lepus lagopus*). <https://www.gov.nu.ca/sites/default/files/Arctic%20Fox.pdf>. Accessed June 26, 2018.
- Government of Nunavut. Wildlife Fact Sheets – Wolverine (*Gulo gulo*). [https://gov.nu.ca/sites/default/files/wolverine\\_0.pdf](https://gov.nu.ca/sites/default/files/wolverine_0.pdf). Accessed June 26, 2018.

Harington, C.R. 1968. Denning Habits of the Polar Bear (*Ursus maritimus* Phipps). Canadian Wildlife Service Report Series – Number 5. Ottawa. Department of Indian Affairs and Northern Development. 32 pp.

Klaczek, M.R. 2007. Denning Ecology of Barren-ground Wolves in the Central Canadian Arctic. M.Sc. Thesis University of Alberta, Natural Resources and Environmental Studies. 116 pp.

Lofroth, E.C. 2001. Northern Wolverine Project; 2000/01 Year End Report: Wolverine Ecology in Plateau and Foothill Landscapes 1996-2001. Prepared for Forest Renewal (BC) Activity #712260. 99 pp.

Messier, F., M.K. Taylor, M.A. Ramsay. 1994. Denning Ecology of Polar Bears in the Canadian Arctic Archipelago. J.Mammal. 75:420-430.

Parks Canada. "Safety in Polar Bear Country" pamphlet. <https://www.pc.gc.ca/en/pn-np/mb/wapusk/securite-safety/ours-bear>.

The Wolverine Foundation. 2018. Denning. <https://wolverinefoundation.org/denning> [Accessed June 25, 2018].

Toronto Zoo. Arctic Wolf. <http://www.torontozoo.com/ExploretheZoo/AnimalDetails.asp?pg=403>. Accessed June 26, 2018.

### **Personal communication**

Jean-Francois Dufour, August, 2018. Canadian Wildlife Service

## **FIGURES**

### **Wildlife and Wildlife Habitat Management Plan Eureka High Arctic Weather Station**


PSPC No.: Project # R.015446.003  
SLR Project No.: 209.40604.00000



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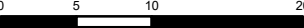


LEGEND

 Site Location

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NOTES  
This map is for conceptual purposes only and should not be used for navigational purposes.


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**PSPC - ECCC**

EUREKA HIGH ARCTIC  
WEATHER STATION

**SITE LOCATION**

June 22, 2018	Rev	<b>0.0</b>	Figure No.
Project No.	209.40604.00000		<b>1</b>





**APPENDIX A**  
**HAWS Wildlife Photolog**

**Wildlife and Wildlife Habitat Management Plan**  
**Eureka High Arctic Weather Station**

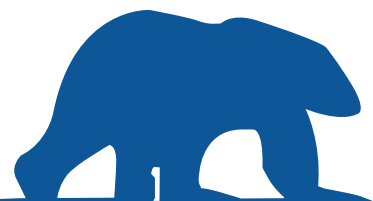
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Bâtir le *Nunavut* ensemble

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Department of Environment  
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Ministère de l'Environnement

# BEAR SAFETY



Reducing Bear-People Conflicts in Nunavut



# Table of Contents

## Deterrents

Rubber Bullets.....	1
Bean-bag Round.....	2
Cracker Shells.....	3
Warning Shots.....	4
15mm Scare Cartridges.....	5
Pen Launcher.....	6
Pepper Spray.....	7
Noisemakers.....	8
Electric Fencing.....	9
Vehicles.....	10

## Detection

Dogs.....	11
Trip Wire Fences.....	12
Motion Sensing Devices.....	13

## Camp Safety

Tent Camping.....	14
Cabins.....	15
Cabins Continued.....	16

## Appendix

Deterrent Ranges.....	17
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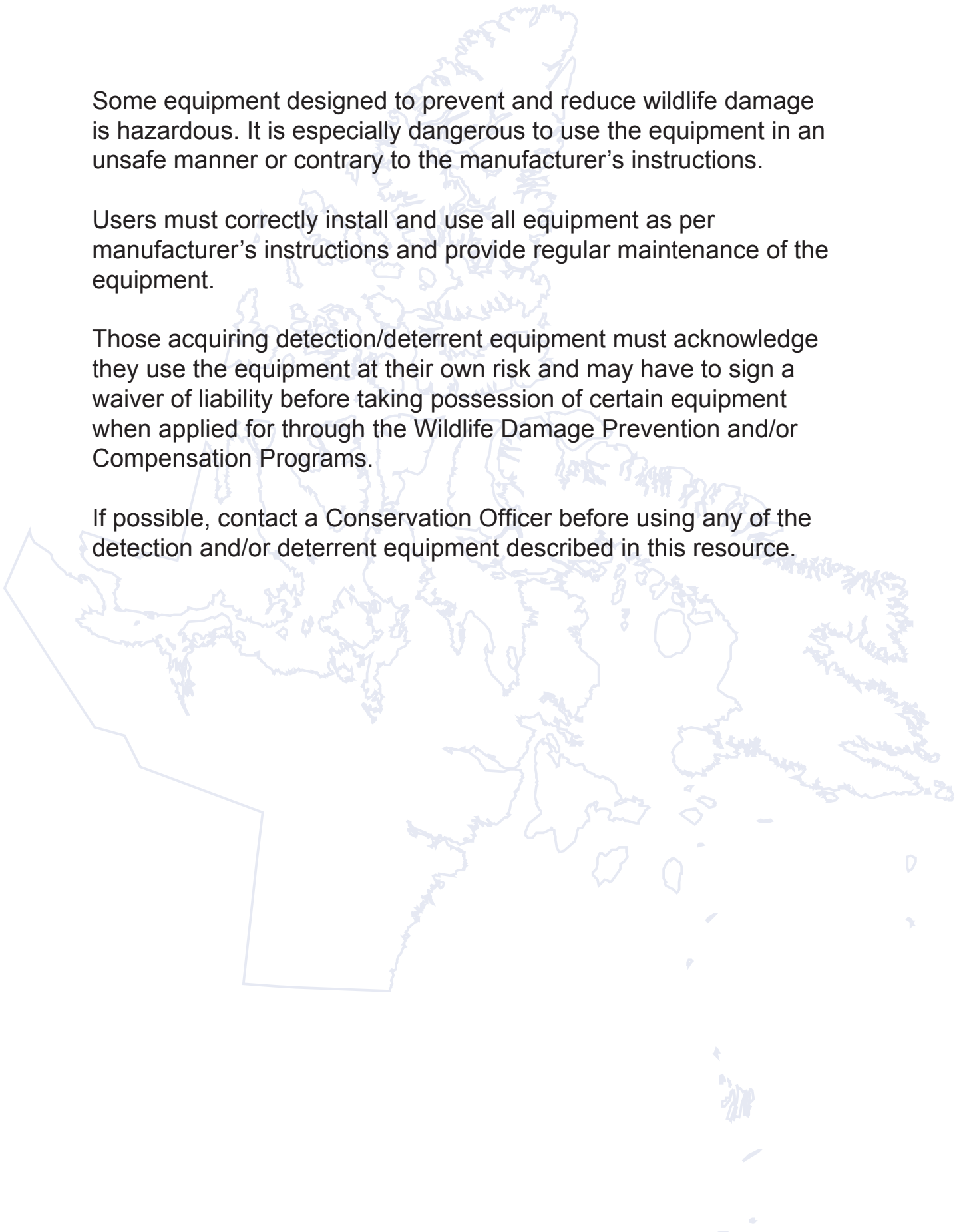
# Safety

Some equipment designed to prevent and reduce wildlife damage is hazardous. It is especially dangerous to use the equipment in an unsafe manner or contrary to the manufacturer's instructions.

Users must correctly install and use all equipment as per manufacturer's instructions and provide regular maintenance of the equipment.

Those acquiring detection/deterrent equipment must acknowledge they use the equipment at their own risk and may have to sign a waiver of liability before taking possession of certain equipment when applied for through the Wildlife Damage Prevention and/or Compensation Programs.

If possible, contact a Conservation Officer before using any of the detection and/or deterrent equipment described in this resource.





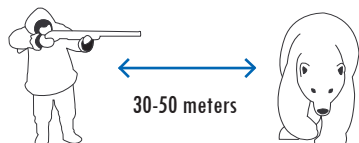
# DETERRENTS

## Rubber Bullets

Some bears are not deterred by noise. When noise is unsuccessful, rubber bullets are often the most effective alternative to lethal management. Less-lethal projectiles, such as rubber bullets, are used to inflict pain, creating a negative association with the situation and with humans. These rounds are designed to cause momentary discomfort and surprise; when used correctly they do not penetrate the hide or seriously injure the bear. Rubber bullets are effective between **30-50 meters (100-165 ft.)**.



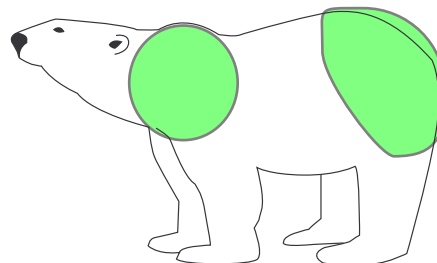
Load rubber bullets one at a time directly into the chamber of a shotgun with an open-choke (cylinder bore). Load the magazine with lead slugs (lethal ammunition) so you are prepared if the bear attacks. Do not use rubber bullets in semi-automatic shotguns, as the low powder loads in rubber bullets do not work properly with the action - rounds can jam and render the firearm useless. Use a pump-action shotgun with a chamber size of 2 3/4" or larger.



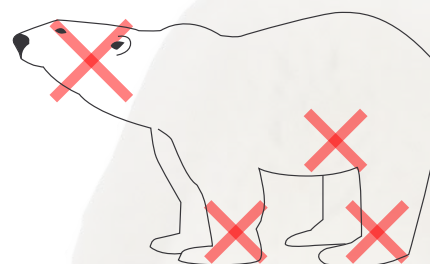
Call out to the bear before firing so that it associates you (humans) as the source of the pain. Make sure the bear has a clear path to escape.

### Safety Precautions

- Do not shoot at people; it may cause death or serious injury
- Do not shoot at wildlife closer than 30 meters
- Have a lethal firearm present and ready
- Use only in recommended firearm (12 gauge shotgun with open choke)
- Do not use rubber bullets in semi-automatic shotguns, as the low powder loads in rubber bullets do not work properly with the action - rounds can jam and render the firearm useless



- Load rubber bullets directly into the chamber of a shotgun with an open-choke (cylinder bore)
- Aim for a large muscle mass, such as shoulder or rump
- Let the bear know your location before firing
- Make sure the bear has a clear path to escape



- Do not shoot for the head, belly, hindquarters, or lower limbs. This could severely injure the bear.

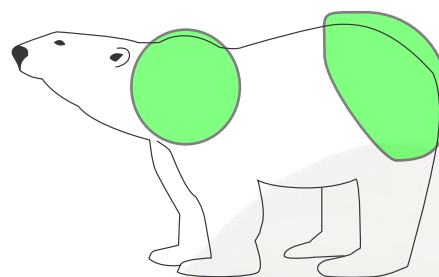
# DETERRENTS

## Bean-Bag Round

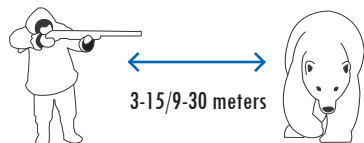
Similar to rubber bullets, bean-bag rounds are an effective alternative to lethal management. These less-lethal projectiles are used to inflict pain, creating a negative association with the situation and with humans. Bean-bag rounds are designed to cause momentary discomfort and surprise; when used correctly they do not penetrate the hide or seriously injure the bear. Bean-bag rounds can be used at close ranges: **3-15 meters (10-50 ft.)**. A “standard round” is also available, which works at a longer range: **9-30 meters (30-100 ft.)**



Call out to the bear before firing so that it associates you (humans) as the source of the pain. Make sure the bear has a clear path to escape.



- Load rubber bullets directly into the chamber of an open-choke shotgun
- Aim for a large muscle mass, such as shoulder or rump
- Let the bear know your location before firing
- Make sure the bear has a clear path to escape



- rounds can jam and render the firearm unusable. Use either a hinge or pump-action shotgun with a chamber size of 2 3/4" or larger.

### Safety Precautions

- Do not shoot at people; it may cause death or serious injury
- Do not shoot at wildlife closer than recommended
- Have a lethal firearm present and ready
- Use only in recommended firearm (12 gauge shotgun with open choke)
- Do not use rubber bullets in semi-automatic shotguns, as the low powder loads in rubber bullets do not work properly with the action - rounds can jam and render the firearm useless



- Do not shoot for the head, belly, hindquarters, or lower limbs. This could severely injure the bear

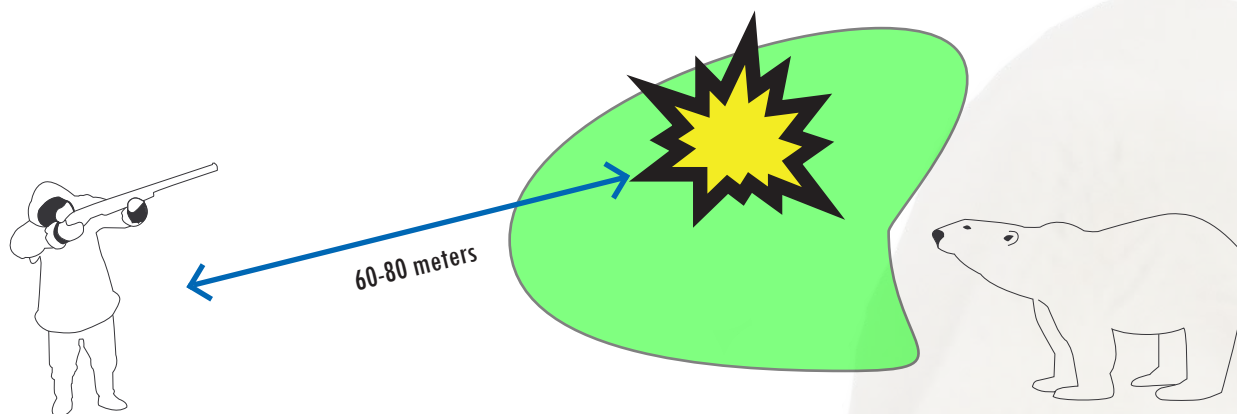
# DETERRENTS

## Cracker Shells

Bears dislike sudden loud noises. Cracker shells are fused projectiles that travel a certain distance before exploding. The abrupt loud noise creates a negative association with the situation and with humans. Most bears are scared off by cracker shells but others learn to ignore the noise, especially when there is nothing else to deter the bear or if there are attractants or food. 12 gauge Cracker shells are effective between **60-80 meters (165- ft.)**.



When used properly, cracker shells cause no physical harm or discomfort to a bear. Load shells one at a time into an open-choke shotgun. Do not use cracker shells in semi-automatic shotguns, as the low powder loads in the shells do not work properly with the action - rounds can jam, making the firearm useless. Use either a hinge or pump-action shotgun with a chamber size of 2 3/4" or larger. Load the magazine with lead slugs (lethal ammunition) so you are prepared if the bear attacks.



- Do not shoot directly at the bear - **You want the shell to explode between you and the bear**
- Fire into the air at a **45 degree angle above the ground**, judging distance and wind speed/direction

- Judge your distance. **If the shell explodes behind the bear the blast may scare the bear towards you**
- Let the bear know your location before firing. If it does not know the source of the noise it may run in your direction
- Make sure the bear has a clear path to escape

### Safety Precautions

- Do not shoot at people; it may cause death or serious injury
- Cracker shells pose a fire risk. Ensure that there are no flammables downrange
- Do not shoot at dry vegetation, gas products, or wildlife closer than 60 meters
- Have a lethal firearm present and ready
- Use only in recommended firearm (12 gauge shotgun with open choke)
- Do not use cracker shells in semi-automatic shotguns, as the low powder loads in rubber bullets do not work properly with the action - rounds can jam and render the firearm useless



# DETERRENTS

## Warning Shots

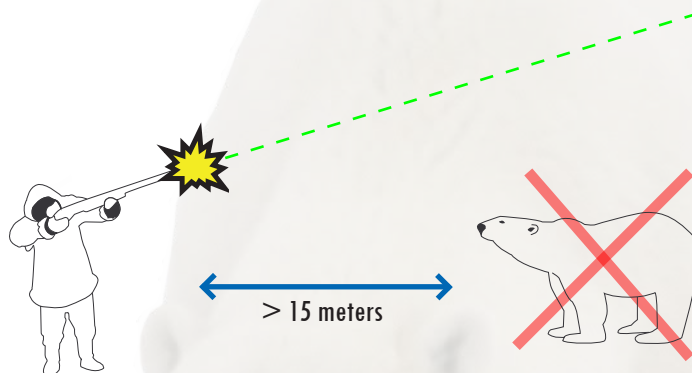
Warning shots create a loud abrupt noise at the gun's muzzle and a slight disturbance to the ground upon the bullet's impact. Shots fired from a firearm may scare a bear; however, some bears show little concern for warning shots and will continue to approach or remain in the area. Warning shots can also be a safety hazard for bears and people. Often bears are injured by ricocheting bullets intended to scare it away. Using a firearm to deter bears does allow for immediate use of lethal force.



- Let the bear know your location before firing. If it does not know the source of the noise it may run in your direction
- Do not shoot directly towards the bear. Shoot in the air and to the side of the bear
- Make sure the bear has a clear path to escape
- If the warning shots are not working switch to another technique (other deterrents, yelling and/or throwing things at the bear) - you do have a firearm if the bear turns its attention to you

Warning shots can be fired from any firearm that makes a loud noise when discharged. Keep track of the number of warning shots fired - each one fired means that there is one less shell or cartridge left in the firearm for you to use if you must shoot the bear.

Think about where you are shooting. Do not fire warning shots in the direction of people, communities, known campsites/ cabins, or other populated areas.



### Safety Precautions

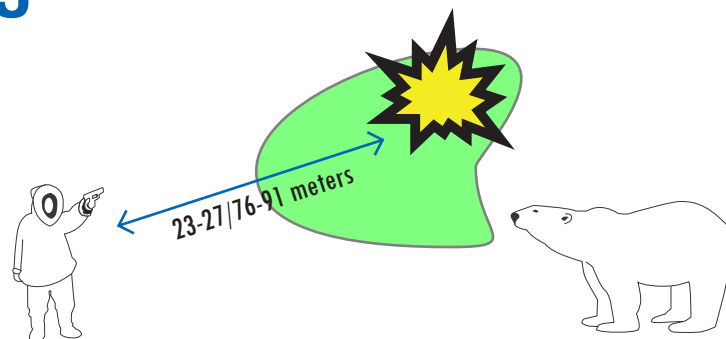
- Be conscious of where your warning shot will land - do not shoot at or near people, or objects off which a bullet may ricochet
- Do not shoot directly at wildlife
- Do not fire all rounds - you may need to shoot the bear if it turns its attention to you



# DETERRENTS

## 15mm Scare Cartridges

Bear Scare Cartridges are 15mm projectiles that create loud noises when fired. The abrupt loud noise creates a negative association with the situation and with humans. Most bears are scared off by scare cartridges but others learn to ignore the noise, especially when there is nothing else to deter the bear or if there are attractants or food. 15mm cartridges are fired from a 'pistol launcher', which uses blanks to project the cartridge. There are three different types of bear scare cartridges:



**Bangers** - A flash bang cartridge that explodes, creating a sudden loud noise and flash of light. Bangers are effective between **23-27 meters (75-90 ft.)**

**Screamers** - Make a loud screeching sound while traveling through the air. In low light conditions they produce a strong visual effect. Screamers are effective between **76-91 meters (250-300 ft.)**

**Flaming Whistles** - Produce a loud whistling noise and a sparkling tracer effect as they travel through the air. Flaming Whistles are effective between **76-91 meters (250-300 ft.)**

- Fire into the air at a **45 degree angle above the ground**, judging distance and wind speed/direction
- Judge your distance. **If the shell explodes behind the bear the blast may scare the bear towards you**
- Let the bear know your location before firing. If it does not know the source of the noise it may run in your direction
- Make sure the bear has a clear path to escape
- Do not shoot directly at the bear - **You want the shell to explode between you and the bear.**

### Safety Precautions

- Do not shoot at people; it may cause death or serious injury
- 15mm scare cartridges pose a fire risk. Ensure that there are no flammables downrange
- Do not shoot at dry vegetation, gas products, or wildlife closer than recommended
- Have a lethal firearm present and ready
- This ammunition must only be used to deter nuisance wildlife or wildlife that is endangering human safety. If possible, contact a conservation officer before using this deterrent



# DETERRENTS

## Pen Launcher

A different style of 15mm Bear Scare Cartridges can be fired from a 'pen launcher'. The cartridges are screwed into the end of the launcher one at a time; the thumb lever is then drawn back and released to fire the cartridge. A variety of signal and safety flares can also be fired from pen-type launchers. There are two different types of bear scare cartridges that can be fired from the pen launcher.



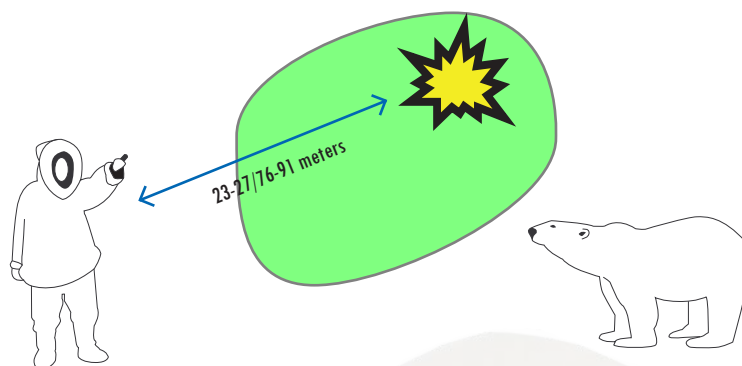
**Salute Flares** - Also known as Bear Bangers, these cartridges explode with an extremely loud bang after traveling approximately 125 ft. Salute Flares are effective between **23-27 meters (75-90 ft.)**

**Siren Flares** - Also known as Screammers, these cartridges make a loud high pitched screeching sound while traveling through the air. Siren Flares are effective between **76-91 meters (150-200 ft.)**



### Safety Precautions

- Do not shoot at people; it may cause death or serious injury
- 15mm scare cartridges pose a fire risk. Ensure that there are no flammables downrange
- Do not shoot at dry vegetation, gas products, or wildlife closer than recommended
- Have a lethal firearm present and ready
- This ammunition must only be used to deter nuisance wildlife or wildlife that is endangering human safety. If possible, contact a conservation officer before using this deterrent



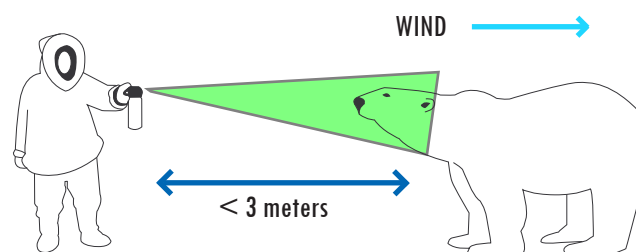
- Judge your distance. **If the shell explodes behind the bear the blast may scare the bear towards you.**
- Let the bear know your location before firing. If it does not know the source of the noise it may run in your direction
- Make sure the bear has a clear path to escape



# DETERRENTS

## Pepper Spray

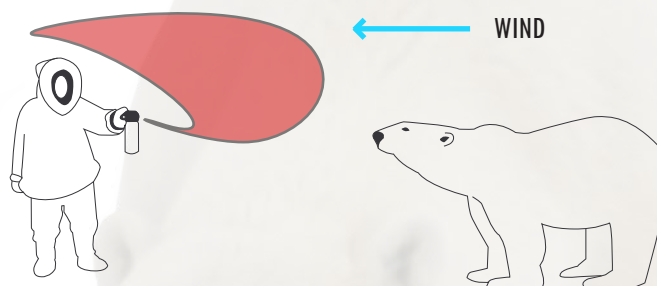
Pepper spray, also known as capsicum spray or bear spray, is a chemical deterrent that causes temporary burning, tearing and swelling in the eyes and nose, and inflammation of the throat and lungs, which restricts breathing to shallow gasps. It also causes severe irritation to the surface of the skin. These effects are only temporary and cause no permanent damage to bears, or people who accidentally come into contact with the spray. Unlike other projectile deterrents, pepper spray is only effective at short distances: **< 3 meters (165- ft.)** Therefore, it should only be used as a last resort.



- Remove the “safety wedge”
- Discharge the pepper spray with the wind at your back
- Aim for the animal’s face, specifically the eyes, nose and mouth
- Leave the area immediately after using the pepper spray

Pepper spray does not work well in damp, rainy or cold weather. Keep the canister in a holster under your jacket to keep the canister at an effective working temperature.

Pepper spray is not a repellent - it will not keep bears from investigating or damaging property.



### IMPORTANT

**Judge wind direction - do not discharge the pepper spray into a head-wind, as it may blow back into your face**



Bear reacts to pepper spray - © Bob Saunders

### Safety Precautions

- Do not use on people; it may cause serious injury
- It is illegal to use pepper spray for any purpose other than defending yourself from an animal attack
- Do not use in cabins, tents, vehicles or other enclosed areas, as it will incapacitate the user(s)
- Effects are only temporary and a predatory bear may resume its approach once it has recovered
- This product must only be used to deter nuisance wildlife or wildlife that is endangering human safety. If possible, contact a conservation officer before using this deterrent



# DETERRENTS

## Noisemakers

Noisemakers can be considered anything that makes loud, unfamiliar noise. Commercial products such as rattlers or air horns are available for purchase. However, simple home solutions are also effective; pots and pans, banging on the walls of a shed or cabin, etc. Use whatever is available to you.

Noisemakers are a simple, first level deterrent. However, bears quickly become accustomed to sounds when no other negative effect is present. Have other deterrents or a lethal firearm present and ready in case the noisemakers are ineffective.



### Safety Precautions

- Do not use sirens or horns on/near people; it may result in hearing damage or loss
- Have a lethal firearm present and ready
- Use noise makers when bears show interest in your camp, cabins, or persons



# DETERRENTS

## Electric Fencing

Electric fences deliver a shock to bears that come into contact with the wires. The shock causes momentary surprise and discomfort. The effects are only temporary and cause no permanent damage to bears, or people who accidentally come into contact with the wires.

Alternating positive and negative charges between wires will deliver a shock even on dry ground or rocky conditions. Permanent fences can be erected to protect outpost camps, cabins, caches, etc. Portable fences can be used at temporary camps.

Fence charging units can be recharged either by generators or by solar power. Fences do require regular maintenance and monitoring to ensure that an appropriate level of charge is being delivered. When snow begins to accumulate they may become grounded out or buried.

Consult the manufacturer's guidelines for safety and installation instructions.

### Safety Precautions

- Have other deterrents and/or a lethal firearm present and ready in case the fence is damaged and/or ineffective
- Follow the manufacturers guidelines for installation, operation and maintenance



A permanent high tensile electric fence and a solar-powered charger



Temporary electric fencing around a camp site

# DETERRENTS

## Vehicles

Bears are less of a risk to people who are travelling by all-terrain vehicles (ATV), snowmobiles, on-road vehicles (cars and trucks), boats or aircraft. When chasing problem wildlife away from people and/or property, consider the following when traveling with a vehicle:



- Do not depend entirely on your vehicle for protection. If it breaks down you may be forced to stay on the land longer than you anticipated, or you may have to travel on foot
- If a bear is approaching, and it is safe to do so, start the engine of your ATV, boat, or snowmobile. The noise and/or movement may encourage the bear to leave



### Safety Precautions

- Never chase a bear if you are unarmed. If your vehicle breaks down you may be vulnerable
- Remain at a safe distance
- Do not chase a bear alone. Have a second person present, following in an additional vehicle if possible
- Vehicles must only be used to deter nuisance wildlife or wildlife that is endangering human safety. If possible, contact a conservation officer before chasing any animal

- Do not use your vehicle as an excuse to approach wildlife. This includes watching bears and other wildlife at garbage dumps. The more experience a bear has with any deterrent the less effective it becomes.
- Do not use your vehicle to chase an animal if the terrain makes it unsafe to do so. Do not chase a bear with your vehicle while towing a trailer or sled. You may need to stop and turn abruptly.
- If using a helicopter stay 100m behind the bear and 30m above the ground, in this position, drive the bear towards an obvious, or desired escape route

## WARNING

Bears, particularly during the summer, may overheat and die from the stress and overexertion caused by a fast and/or long chase

### Wildlife Act - Section 74 - Pursuit of a wild animal

- (1) No person shall chase, weary, harass or molest a wild animal
- (2) A person does not contravene subsection (1) by lawful harvesting
- (3) Notwithstanding anything else in the Act, a person may use a vehicle to chase a bear away from a dwelling, municipality, camp or settlement or its immediate vicinity if it is necessary to defend life or property and may avoid killing the bear

# DETECTION

## Dogs



A trained dog and an experienced handler can effectively detect and deter bears. Certain breeds of dogs, such as the Canadian Inuit Dog (sled dog), the Blackmouth Cur and the Karelian Bear Dog, are well known for their ability to avert bears and chase them from areas where they may come into contact with people. Regardless of the breed, it is important to know beforehand how your dog(s) will react to an approaching bear. An inexperienced dog, or one which fails to warn of an approaching bear, is more of a hazard than a help.

Dogs used to detect and deter bears should not be treated as pets and are best kept on a leash when travelling, or chained outside of tents and/or cabins. A loose dog may not be useful in you encounter a bear, as the dog could run away.

Dogs are naturally pack animals and may be more confident when two or more are kept together for bear detection and defense.

A small group of dogs may be able to chase and scare a bear from the area, creating an unpleasant encounter that may discourage the bear from returning. A single barking dog may be enough to prevent a bear from approaching a camp. However, some dogs may not bark at bears when tied up because they may feel vulnerable to an attack.

Additional care must be taken when travelling on the land with a dog. Dog food can attract bears; uneaten food should not be left out overnight and care should be taken to ensure a dog does not cache uneaten food around camp.

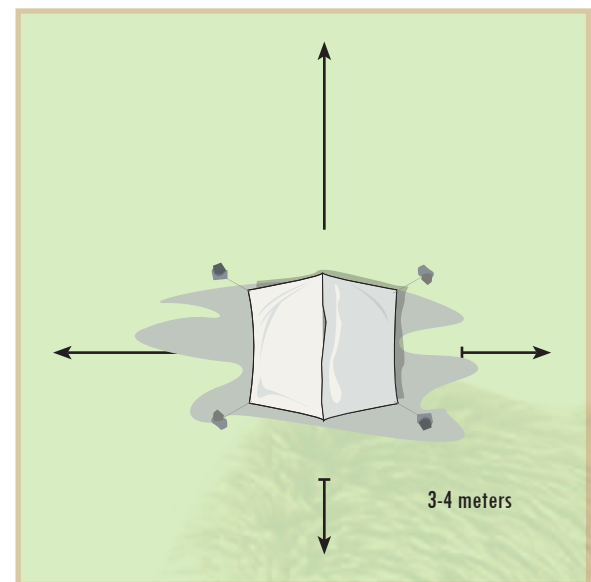




# DETECTION

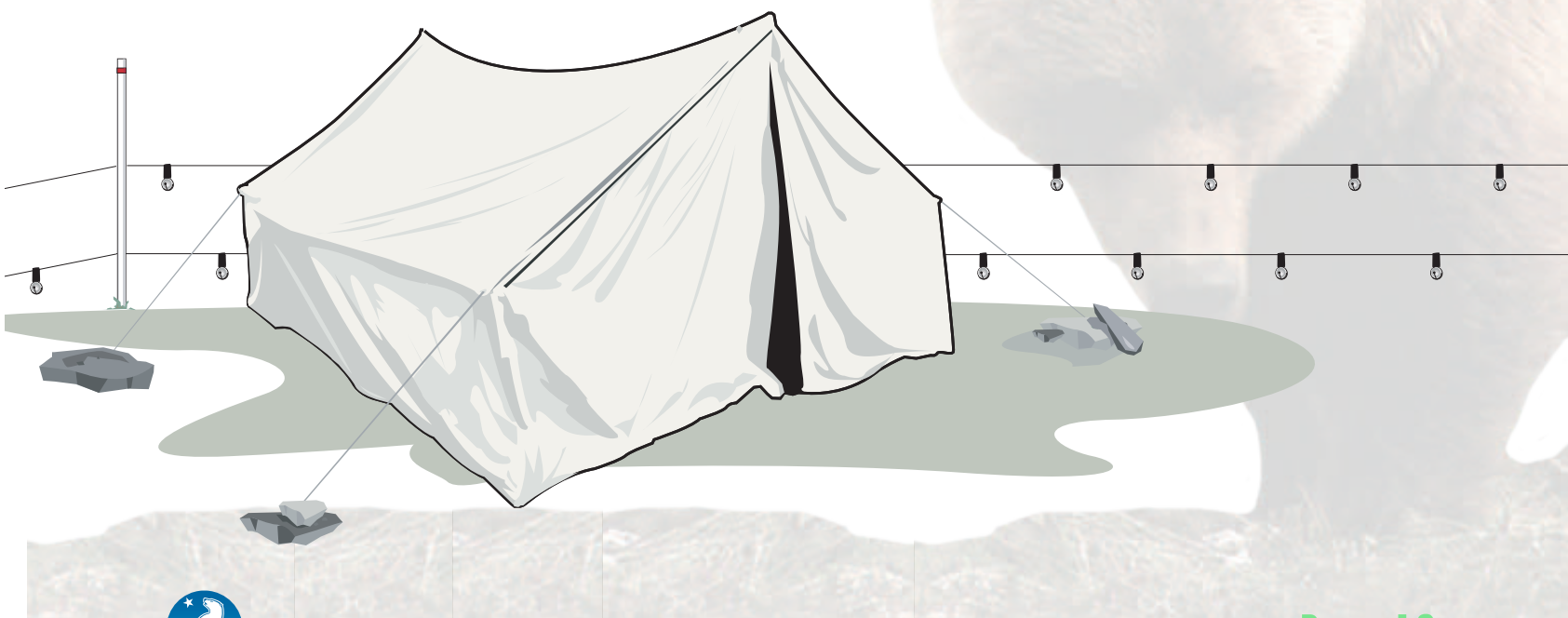
## Tripwire Fences

Tripwire fences can provide advanced warning of an approaching bear. In some cases the noise produced by a tripwire fence may be enough to deter a bear. However, they are intended to be a means of detection, and you should always carry additional deterrents or firearms. Tripwire fences can be as basic as setting up a rope with noisemakers (pots and pans, bells, etc.) attached at various points. There are also commercially available models that, when triggered, set off loud sirens and lights.



Tripwire fences, whether homemade or commercially purchased, should be placed at a distance of several meters around your camp in order to allow for easy movement and enough time to react to an approaching bear.

The fence should be set a height that cannot easily be stepped over, or passed under by a bear.



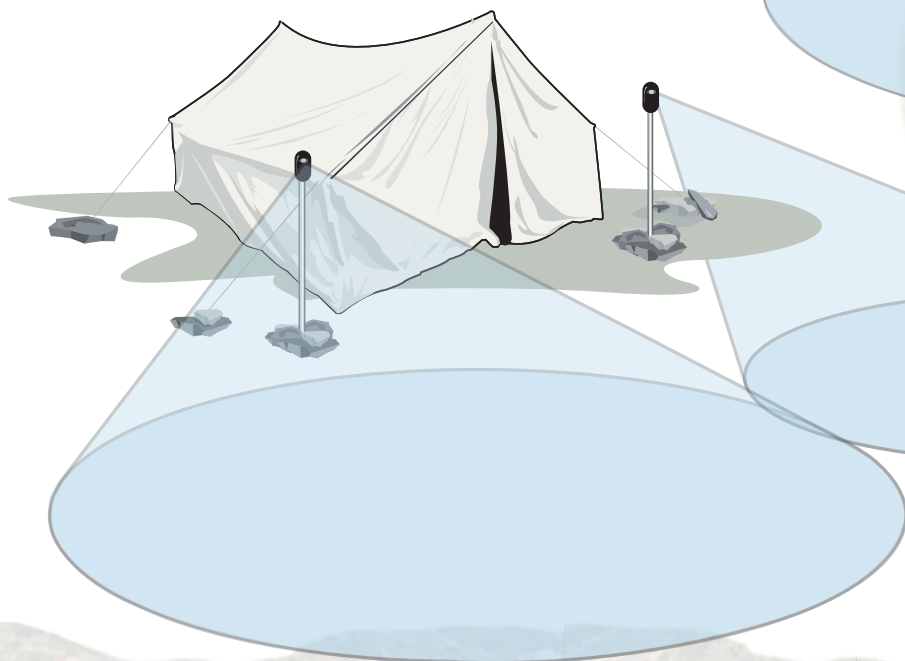
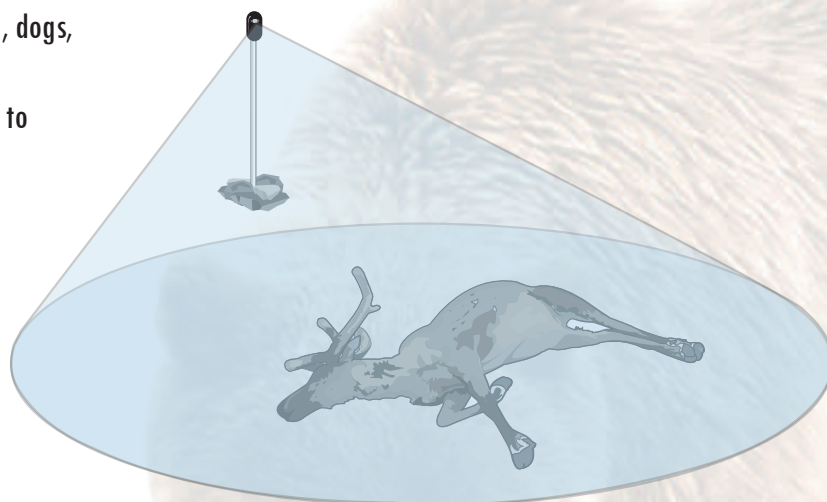
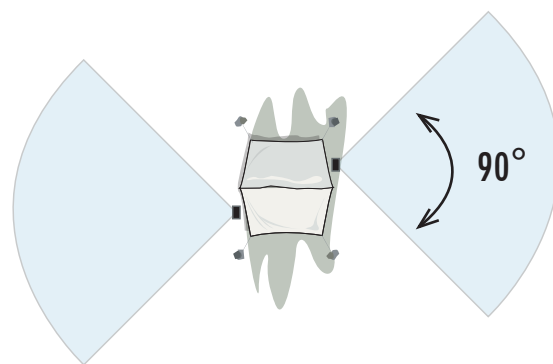
# DETECTION

## Motion Sensing Devices

Commercially-made devices are available that set off alarms and flashing lights when heat and movement are detected. Most motion sensors detect movement within 40 meters of the unit, but only in the direction in which the sensors face. There may be issues with short battery lifespan in periods of cold weather.



- Lights and sirens may be enough to scare away some curious animals but not all animals will be deterred;
- Detection systems are meant to alert you that animals have entered the protected area;
- You must be prepared to deter the animal with other methods;
- Motion sensing devices are not specific to bears. Caribou, dogs, humans, etc. may set off the alarm;
- Test equipment before taking it with you out on the land to ensure that it is working correctly.



# CAMP SAFETY

## Tent Camping

When choosing where to camp, safety should be your top priority. Regardless of whether you are in polar bear or grizzly bear habitat, you should choose campsites that meet the following criteria:

- Ensure that you have a clear view of the surrounding area;
- Avoid camping in areas with bear signs (scat, tracks, hair, daybeds, and kills);
- Avoid camping near rushing water and waterfalls - water features can make it difficult to hear approaching bears and may make it difficult for a bear to hear you and your deterrents;
- Place camps well back from any coast, river bank, flow edge, pressure ridge, or open water as these are likely travel/hunting routes for bears;
- Valleys and passes are also more frequently used and may contain more of the bear's natural food than higher ground
- In the summer, remnant snow banks can attract bears as it provides a cool place to rest and an escape from nuisance insects;
- Do not camp near animal carcasses or areas of recent whaling or havest;

- Avoid preexisting campsites if they are littered. Visitors before you may have allowed a bear access to food or garbage, which increases the likelihood of future bear problems in that area.



Tents surrounded by a temporary electric fence.





# CAMP SAFETY

## Cabins

When staying overnight in cabins the same care should be taken to reduce the chance of attracting a bear to the area; this means proper handling of food and garbage. Failure to maintain a clean cabin may result in a bear approaching the area looking for food.

- Cooking areas (inside or outside the cabin) need to be kept clean. Cooking stoves and other equipment must be kept free of grease;
- If possible, maintain separate sleeping and food storage/cooking areas;
- Honey buckets should be emptied daily into the latrine;
- Bear deterrents should be at hand;
- Having a flashlight or other lights may be helpful. Remember that if you leave a lit building into the darkness it is difficult to see. Exterior lights can make working in and around the cabin safer in the dark season;
- Be careful when exiting the cabin and look around for bears;
- Consider using additional detection and deterrent systems to protect yourself and your cabin.



A cabin window covered by a bear board



(Above) Barrels with a metal ring and lever/bolt system provide reasonable resistance to bears. These containers are ideal for storing or transporting large quantities of food (or wastes) and other attractants for longer stays at camps or cabins.



(Left) A metal, bear-proof box that can be used to secure country foods and waste from bears. These boxes are well-suited for use around homes and permanent camps.

# CAMP SAFETY

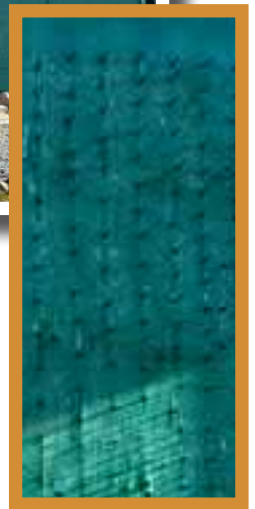
## Cabins

When cabins are unoccupied for a period of time, special considerations should be taken to prevent damage from bears.

- Treat grey water and latrines with lime and bury with earth;
- Remove any attractants (food, garbage, dirty clothes, oil, anti-freeze, fuels) or store them in a bear resistant or airtight container;
- Bears have been known to chew on inflatable boats, plastic gas cans, sleeping bags, tents, and snow machine seats. These should be made inaccessible;
- Board windows and doors for extra protection to prevent bears from breaking in. Bears often gain entry by pushing on the doors or windows;
- Build “bear boards” by driving plenty of nails or screws through plywood so that 1 1/2 - 2 inch points are exposed on the outside of the board. This will discourage a bear from pushing on windows or doors;
- To maintain year-round emergency access you can still secure a “bear board” on the doors and windows, allowing them to be opened by human hands only. The boards can be removed when staying at the camp to prevent injury or damage to clothing;
- When bear boards are placed on vertical surfaces you reduce the risk of severe injuries to bears. Also, they remain in place and work when snow buildup might make boards placed on the ground ineffective.



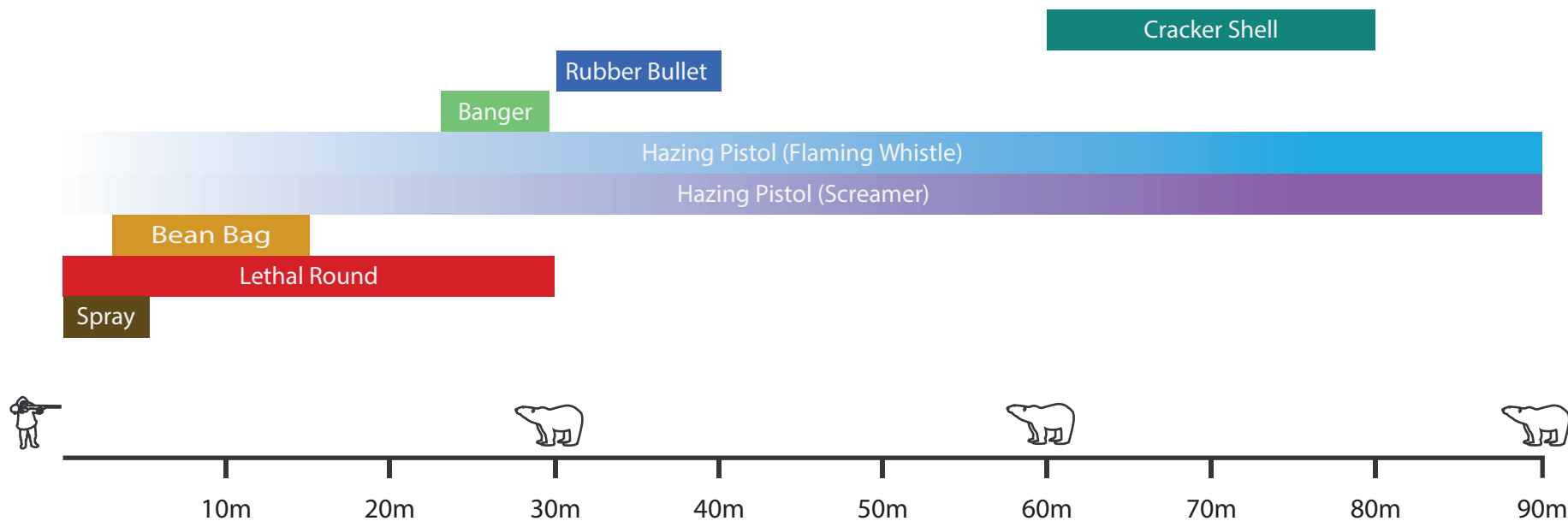
The main cabin door is protected by a bear board on hinges. The bear board door can be removed when the cabin is being used regularly



Properly-spaced nails on a bear board covering a cabin door



# DETERRENT RANGES



- Bear spray is an option of last defense, as its effective range is less than 3 meters.
- A bean bag round should be used when the bear is 3-15 meters away; a “standard round” is also available, which is effective between 9 and 30 meters (consult the manufacturer’s guidelines). A bean bag round fired from closer than the prescribed range could penetrate the bear’s hide and severely wound the bear.
- The explosive screamer round makes a continuous noise right from the muzzle of the pistol to a maximum distance of 90 meters. Bears typically flee from the source of the noise, so the screamer can be used throughout its range of travel.

- The flaming whistle round makes a continuous noise right from the muzzle of the pistol to a maximum distance of 90 meters. Bears typically flee from the source of the noise, so the screamer can be used throughout its range of travel.
- The explosive noise of the banger must occur between the shooter and the bear. A banger can travel 23-27 meters before exploding, so they are not to be used on a bear closer than 30 meters.
- A rubber bullet should be used when the bear is 30-50 meters away. A rubber bullet fired from closer than 30 meters could penetrate the bear’s hide and severely wound the bear.

- The explosive noise of the cracker shell must occur between the shooter and the bear. A cracker shell can travel 60-80 meters before exploding, so they are not to be used on a bear closer than 60 meters.

**MAKE SURE THE BEAR HAS A CLEAR AND OBVIOUS ESCAPE PATH BEFORE FIRING DETERRENTS**

This pamphlet was developed for national parks in the Arctic. Polar bears and bear encounters are more numerous in Ukkusiksalik and Wapusk National Parks than other Arctic national parks. Independent travelling in these parks is not recommended, but guided trips are available. Contact Ukkusiksalik or Wapusk National Parks for further information.

**CREDIT:** Bromley, Marianne. 1996. *Safety in Polar Bear Country*. Northwest Territories Renewable Resources, Yellowknife, NWT. 24 pp.

Bromley, Marianne. 1996. *Safety in Polar Bear Country*. Northwest Territories Renewable Resources, Yellowknife. 24 pp.

Canadian Wildlife Service. *Hinterland Who's Who*. <http://www.hww.ca/hww2.asp?id=99>

Stirling, I. 1988. *Polar Bears*. University of Michigan Press. Available in soft cover from Fitzhenry and Whiteside, Markam, ON. 220 pp.  
Safety in Bear Country Society. 2006. *Polar Bears: A Guide To Safety*. Available from Distribution Access, 1-866-999-5292. DVD.

## Polar Bear CONSERVATION

Nanuq, the great white bear, is found in many of Canada’s northern national parks and in some national historic sites. Whenever bears and people occupy the same area, conflict can arise. Polar bears and people have coexisted for thousands of years but contact between the two must be minimised to continue this legacy. Successful polar bear conservation requires your co-operation.

**For your safety, and the safety of the bears, learn about safe travel in polar bear country and take precautions.**

By choosing to travel in polar bear country you not only accept the associated risks, but also the responsibility to alter your plans, actions and attitudes to accommodate these magnificent animals.

**Report all polar bear sightings and signs to park staff, as soon as possible.**

### FOR MORE INFORMATION:

**Auyuittuq National Park and Quttinirpaaq National Park**  
Box 353  
Pangnirtung, NU X0A 0R0  
PHONE: **867-473-2500**  
E-MAIL: [nunavut.info@pc.gc.ca](mailto:nunavut.info@pc.gc.ca)

**Sirmilik National Park**  
Box 300  
Pond Inlet, NU X0A 0S0  
PHONE: **867-899-8092**  
E-MAIL: [sirmilik.info@pc.gc.ca](mailto:sirmilik.info@pc.gc.ca)

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E-MAIL: [ukkusiksalik.info@pc.gc.ca](mailto:ukkusiksalik.info@pc.gc.ca)

**Torngat Mountains National Park**  
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Nain, NL A0P 1L0  
PHONE: **1-800-922-1290** or **709-458-2417**  
E-MAIL: [torngats.info@pc.gc.ca](mailto:torngats.info@pc.gc.ca)

**Wapusk National Park**  
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**Western Arctic**  
Ivvavik National Park  
Aulavik National Park  
Tuktut Nogait National Park  
Pingo Canadian Landmark  
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PHONE: **867-777-8800**  
E-MAIL: [inuvik.info@pc.gc.ca](mailto:inuvik.info@pc.gc.ca)

#### Margo Supplies

A supplier of bear deterrents and warning devices.  
**[www.margosupplies.com](http://www.margosupplies.com)**

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[parks canada.gc.ca](http://parks canada.gc.ca)

# Safety in Polar Bear Country

Bringing you Canada's natural and historic treasures

WAVE LUNCH



Parks Canada

Parcs Canada

Canada

## After a polar bear attack or encounter follow this emergency check list:

**1. STAY CALM** and ensure you are safe.

**2.** Check that all people in your group are accounted for.

**3.** Call for help by radio or satellite phone. (Get contact numbers at your orientation to the park.)

**4.** Report location and time of incident.

**5.** Report number of people involved.

**6.** Report extent of injuries and property damage.

**7.** Report numbers and last locations of all polar bears involved in the incident.

**8.** Report reason for the attack if known (female protecting cubs, surprise, defending food source, etc.)

**9.** Report description of bears (male or female, size, markings, etc.).

**10.** Stand by to provide additional information to rescuers.

Polar bear behaviour is very different from that of grizzly and black bears.

Polar bears are predators, primarily hunting seals, while grizzlies and black bears mostly eat plants. As predators, polar bears will investigate humans, their camps and may even consider humans as a food source.



**Travel in groups and stay together to increase your safety.** The larger the group the greater the chances of deterring a bear.

**Travel in daylight and avoid areas of restricted visibility.** Be especially careful in areas along the coast, where a polar bear may be hidden behind boulders, pressure ridges (pushed up sea ice), driftwood or vegetation.

**Be alert and aware of your surroundings.** Scan all around with binoculars at regular intervals. Be vigilant! Watch for signs such as tracks, droppings, diggings, wildlife carcasses and polar bear dens.

**Ask Parks Canada staff about current bear activity.** Some areas may be closed due to bear activity; obey written and oral warnings.

**Use sealed bags and containers or bear-proof canisters to store food and garbage. Pack out all garbage.**

**Eliminate or reduce odours from yourself and your camp.** Avoid using scented soaps and cosmetics and avoid bringing strong smelling foods.

**Consider hiring a guide if you are uncertain about your ability to deal with polar bears.**

Ask about their experience, how they will avoid encountering a polar bear and about plans of action should you encounter a bear. A larger group can also increase safety, ask about the size of group.

**Never feed bears.** A bear that finds food from a human source begins to associate humans with food. This can result in the bear losing its natural tendency to avoid people and becoming persistent in its search for human food. The consequences for you and the bear can be serious. A bear that associates food with humans is more likely to injure people and these bears may have to be relocated or killed. It is also illegal to feed any wildlife in a national park.

**Never approach a fresh kill or carcass as polar bears will defend their food.** Adult polar bears will often only eat the fat of beached whales, seals and other kills, but other bears may scavenge from these carcasses.

**Never approach a bear for any reason.** Every bear defends a “critical space”, which varies with each bear and each situation: it may be a few metres or a hundred metres. Intrusion within this space is considered a threat and may provoke an attack. Approaching a bear could be considered disturbing wildlife which is an offence under the National Parks Wildlife Regulations.

## AVOIDING an ENCOUNTER

### MORE about Polar Bears

Polar bears are the largest land carnivore in North America. An adult male typically weighs 300–450 kg, stretching 3 metres from nose to tail. They are strong, fast, agile on land or ice, and are expert swimmers and divers. Their sense of smell is exceptional, their eyesight comparable to a human’s. Polar bears are naturally curious, not fearless as they have been labelled. They are shy and prefer to avoid confrontations with humans and other polar bears. Their primary prey is the ringed seal but they will also prey on birds, eggs, small mammals, and even humans. They also scavenge anything from beached whales to human garbage. In the heat of summer, polar bears may appear slow and docile, but they are capable of moving swiftly and with purpose.



Avoid bear feeding areas.

A polar bear's primary food source is seal so these species are often found in the same places.

- **In fall, winter and early spring** most polar bears are on the sea ice hunting seals by the floe edge, open water leads and along pressure ridges. Bears and seals can also be found in places where the ice is thin or cracked, such as tide cracks in land-fast ice or at toes of glaciers. Seals can more easily maintain breathing holes in these areas.
- **In early spring**, females with cubs tend to hunt along pressure ridges and cracks in land-fast ice (particularly in bays) where seal birthing dens are found.
- **During the ice-free summer season**, when polar bears are forced ashore, they can be found anywhere but they generally hunt and scavenge along coastlines, beaches and rocky islands. Keep an eye on the ocean, polar bears are often well hidden when swimming.

Stay away from polar bear den sites.

Unlike other bears, there is no time when all polar bears are inactive in dens.

- **Maternity dens** are excavated by pregnant females in snow drifts on leeward (wind protected) slopes of coastal hills and valleys. In the Baffin Region, dens can be found at high elevations on snowfields and glaciers. Maternity dens are occupied from fall to early spring. The dens are inconspicuous, however, bear tracks leading to and from the site in early autumn or late spring or ventilation holes can indicate their presence.
- **Temporary dens** are excavated in snow drifts or pressure ridges by polar bears (males, females and females with cubs) that are active over the winter. The dens can be used as resting places or as temporary shelter from bad weather. They can be used from a few days to several months.
- **Summer retreat dens** are excavated during the open water season in the remaining snow banks or into the permafrost. These can also be at higher elevations on snowfields and glaciers or the valleys leading up to them. Male and female bears of all age groups use them to keep cool and avoid insect harassment.

Avoid camping on beaches, islands, along coastlines and on obvious movement corridors.

- Before making camp, look around for tracks or other signs of bear activity.
- Polar bears often travel along coastlines using points of land and rocky islets near the coast to navigate.
- In the summer, blowing sea ice may transport polar bears into coastal areas. Avoid areas where the pack ice is blowing in to shore.
- Valleys and passes are often used to cross peninsulas or islands and to move from one area to another.
- Polar bears travel and hunt along the edges of ice floes.

**Camp inland on a butte or bluff with a good view of surrounding terrain.** Avoid areas where bears might hide, such as blind corners, snow banks, pressure ridges and other places with visual impediments.

**Set up tents in a line rather than a circle and maintain at least 5 metres between them.** If a bear comes into camp, it will not feel surrounded and will have an avenue of escape without feeling threatened. Keep watch 24 hours per day. Take turns keeping watch during sleeping periods.

**Do not sleep in the open without a tent.** You may look like a seal and polar bears are very curious. People sleeping in the open have been attacked.

**Cook at least 50 metres from your sleeping area in a place visible from your tent.** Strain food particles from dishwater and store with garbage. Dump dishwater at least 50 metres from your sleeping area, rivers, streams and lakes.

**Store food and garbage in bear-proof containers or sealed bags and containers secured under rocks within view of your tent. A permit is required to set up a food cache.** Placing pots on top may serve as an alarm. If you have a warning system, store your food within its perimeter. DO NOT store food inside your tent.

HANDLING an ENCOUNTER

**Before your trip, discuss possible plans of action for dealing with bears in a variety of circumstances and be sure everyone understands.** The actions of each individual either contribute to or detract from the safety of everyone else.

**Every attack or encounter is different. To find out more about bear behaviour, hire a guide or talk to knowledgeable people in the community.**

**Stay calm, notify everyone in the group, be aware of your surroundings and assess the situation.** What is the bear doing? What is the bear's behaviour?

If a bear does not know you are there:

- **quietly back away and leave the area** either in the direction you came or make a wide detour around the bear. Do not run, move quickly or make motions that might attract the bear's attention.
- **stay downwind**, so the bear cannot smell you and detect your presence.
- **keep an eye on the bear.**

**If a bear knows you are there and shows signs of being curious, such as:**

- moving slowly with frequent stops,
  - standing on hind legs and sniffing the air,
  - holding its head high with ears forward or to the side,
  - moving its head from side to side, or
  - trying to catch your scent by circling downwind and approaching from behind.
- THEN:**
- **help it to identify you as a human,**
  - **wave your arms over your head and talk in low tones,**
  - **move slowly upwind** of the bear so it can get your scent.

**If the bear has been surprised at close range or shows signs of being agitated or threatened, such as:**

- huffing, panting, hissing, growling or jaw-snapping,
  - stamping its feet,
  - staring directly at a person, or
  - lowering its head with ears laid back.
- THEN:**
- **act non-threatening.** Do not shout or make sudden movements, which might provoke the bear. Never huff or hiss as this can cause a polar bear to charge.
  - **avoid direct eye contact.**
  - **back away slowly.** DO NOT RUN.
  - **be prepared to use deterrents.**

**If the bear shows signs of stalking or hunting you, such as:**

- following you or circling you,
  - approaching directly, intently and unafraid,
  - returning after being scared away, or
  - appears wounded, old or thin.
- THEN:**
- **fight back!** Use any potential weapon, group together and make loud noises.
  - **DO NOT RUN.**
  - **be prepared to use deterrents.**

If a bear charges:

- **stand your ground and be prepared to fight!** Focus on hitting the bear in sensitive areas, especially the face and nose if possible. Bluff charges are rare.

Never get between a bear and her cubs.

If a female with cubs is surprised at close range or separated from her cubs she will likely attack to defend her cubs.

- **leave the area immediately.**
- **stay in a group.**
- **fight back if she attacks.**



WAYNE LYNCH

**Always leave an escape route for the bear.**

**Carry deterrents and know how to use them.**

Report all bear sightings and signs to park staff.

CONTACT PARKS CANADA FOR MORE INFORMATION.

DETERRENTS

Reducing the threat posed by a polar bear during an interaction may be difficult. Non-lethal deterrents cannot be depended on to ensure safety. The best way to live safely with bears is to avoid contact with them.

Any potential weapon must be considered, such as skis, poles, rocks, blocks of ice or even knives.

Stay together as a group. This can be a deterrent and actions, such as making noise, jumping, waving arms, throwing things, may help to drive a polar bear away.

COMMERCIAL deterrents

- **Noisemakers** including air horns, pistol and pen launched bear bangers may scare a bear away.
- **Pepper spray** is effective against polar bears, but has some limitations. It must be warm enough to atomize and it must be used at close range. Also be aware of wind direction to avoid having the spray blow into your face.
- **Know how and when to use these deterrents and practice beforehand.**
- **Availability of commercial deterrents is limited in the north**, most will have to be purchased elsewhere and transported as dangerous goods.
- **Portable solar electric fences** may deter a bear at your campsite if properly installed and maintained.
- Contact Parks Canada for more information.

**In Canada's national parks it is unlawful to possess a firearm unless you are a licensed guide or bear monitor with a permit.** Consider hiring a guide or a bear monitor for increased safety. If you operate a guiding or outfitting business and wish your guides to be considered for a firearms permit, please contact the National Park or Site or Field Unit Office.

The exception to this regulation is for beneficiaries of the Inuvialuit Final Agreement, the Nunavut Land Claim Agreement, the Labrador Inuit Land Claims Agreement, the Nunavik Inuit Land Claim Agreement and any future land claim agreements, who can carry firearms when engaged in traditional activities within national parks within their land claim area.

you for protection and stake them downwind from your sleeping area. Be sure to clean up any dog food leftovers. Dogs must be under control at all times within national parks to avoid wildlife harassment.

**Designate a bear monitor** to keep watch if a polar bear might be nearby. Consider moving your camp if there is a bear in the area.

WARNING systems




**Set up a portable trip-wire or motion detector alarm system around your tent** to alert you if a polar bear approaches your camp. Before leaving home, contact Parks Canada for more information.

**You may wish to take a dog, but only one that has proven experience with polar bears.** Several dogs are better than one. Know how to handle them. Keep them staked so they cannot run to




**APPENDIX B**  
**HAWS Wildlife Photolog**




**Wildlife and Wildlife Habitat Management Plan**  
**Eureka High Arctic Weather Station**

PSPC No.: Project # R.015446.003  
SLR Project No.: 209.40604.0000

Species and Life Stage	Photo	Notes
<b>Peary Caribou</b> <b>Adult Winter</b>	 <p>Photo credit: wall.alphacoders.com</p>	<p><b>Characteristics</b></p> <ul style="list-style-type: none"> <li>- White coat in winter, dark grey coat in summer</li> <li>- Adults average 1.7m in length.</li> <li>- Often travel in packs of 5 to 20 individuals</li> </ul> <p><b>Behaviours</b></p> <ul style="list-style-type: none"> <li>- Not aggressive by nature, will likely run if confronted</li> <li>- If provoked to attack, it will bow head and charge with antlers</li> </ul>
<b>Adult Summer</b>	 <p>Photo credit: nature.ca</p>	
<b>Juvenile</b>	 <p>Photo credit: nature.ca</p>	









Species and Life Stage	Photo	Notes
<b>Muskox</b> <b>Adult Female</b>	 <p>Photo credit: art.com</p>	<p><b>Characteristics</b></p> <ul style="list-style-type: none"> <li>- Shaggy, horned cattle with humped shoulders and short legs</li> <li>- Adults are 130cm tall</li> <li>- Herds have male bull leaders when a dominance hierarchy is present</li> <li>- Live in small herds in summer and large herds in the winter</li> </ul> <p><b>Behaviours</b></p> <ul style="list-style-type: none"> <li>- When confronted they face attackers and line up</li> <li>- They are susceptible to stampeding when harassed</li> </ul>
	 <p>Photo credit: fienartamerica.com</p>	
<b>Family</b>	 <p>Photo credit: science.psu.edu</p>	



Species and Life Stage	Photo	Notes
<b>Polar Bear</b> <b>Adult Female</b>	 <p>Photo credit: outdoorphotographer.com</p>	<p><b>Characteristics</b></p> <ul style="list-style-type: none"> <li>- Adult males weigh over 400kg, females are about half the size</li> <li>- Average body length of 245cm and possesses thick white fur</li> <li>- Travels alone or in a pack with cubs</li> </ul> <p><b>Behaviours</b></p> <ul style="list-style-type: none"> <li>- Solitary in nature and often avoid contact with humans</li> <li>- Will act aggressively and attack if starving or if they or their cubs feel threatened</li> </ul>
<b>Adult Male</b>	 <p>Photo credit: expeditionalaska.com</p>	<ul style="list-style-type: none"> <li>- If starving they may stalk and prey on people</li> <li>- If provoked will stand tall on hind legs, vocalize loudly to get people to move away, and charge, but stop short of contact</li> </ul>
<b>Juvenile</b>	 <p>Photo credit: allposter.it</p>	




Species and Life Stage	Photo	Notes
<b>Wolverine</b> <b>Adult Male</b>	 <p>Photo credit: printertest.com</p>	<p><b>Characteristics</b></p> <ul style="list-style-type: none"> <li>- Appearance of a miniature bear, very stocky muscular build, male average body length of 110cm, females half the size of males</li> <li>- Known as good hunters and scavengers, will stock and ambush its predators</li> </ul> <p><b>Behaviours</b></p> <ul style="list-style-type: none"> <li>- Aggressive by nature, but not susceptible to attacking humans, although best to avoid contact</li> <li>- Has little fear, willing to hunt and eat anything and has been documented attacking animals as large as moose</li> </ul>
<b>Adult Female</b>	 <p>Photo credit: sites.google.com</p>	<ul style="list-style-type: none"> <li>- Has sharp teeth, powerful jaw and sharp claws</li> <li>- Often travels alone and likes to roam great distances, males may have a harem of females with it</li> </ul>
<b>Juvenile</b>	 <p>Photo credit: printertest.com</p>	







Species and Life Stage	Photo	Notes
<b>Arctic Fox</b> <b>Adult - winter</b>	 <p>Photo credit: animal-wildlife.blogspot.com</p>	<b>Characteristics</b> <ul style="list-style-type: none"> <li>- White/grey fur in the winter and dark brownish hair in the summer</li> <li>- Often have dens housing a large group of them</li> <li>- Average body length of 55 cm</li> </ul> <b>Behaviours</b> <ul style="list-style-type: none"> <li>- Inconspicuous by nature, subtle and cunning, often avoid contact with humans and will likely run if confronted</li> <li>- Hunts smaller animals and scavenge</li> </ul>
<b>Adult - summer</b>	 <p>Photo credit: animaila-life.club</p>	
<b>Juvenile</b>	 <p>Photo credit: flickr.com</p>	




Species and Life Stage	Photo	Notes
<b>Arctic Wolves</b> <b>Adult</b>	 <p>Photo credit: true-wildlife.blogspot.com</p>	<p><b>Characteristics</b></p> <ul style="list-style-type: none"> <li>- Average body length of 150cm</li> <li>- Possesses white and grey fur</li> <li>- Usually travel in packs as large as 20</li> </ul> <p><b>Behaviours</b></p> <ul style="list-style-type: none"> <li>- Territorial and unafraid of humans, likely to approach cautiously out of curiosity</li> <li>- Rarely dangerous to humans, although there has been several documented wolf attacks on humans</li> <li>- Usually travel in packs as large as 20</li> </ul>
<b>Pack</b>	 <p>Photo credit: Pinterest.com</p>	<ul style="list-style-type: none"> <li>- Will stock its prey, with head lowered, eyes widened, ears standing straight up, and taking calculated steps</li> <li>- If a wolf is suspect of stocking you, do not run or make eye contact, get out of the wolf's line of sight.</li> <li>- Climb to a higher position (like a tree) instead of trying to outrun it</li> </ul>
<b>Juvenile</b>	 <p>Photo credit: coolantartica.com</p>	<p>Arcadis (2016) reported wolf research ongoing in the vicinity, showing movements in the region and a known den site over 10km from the EC property to the north and west.</p>



Species and Life Stage	Photo	Notes
<b>Arctic Hare</b> <b>Adult - winter</b>	 <p>Photo credit: king-animal.blogspot.com</p>	<b>Characteristics</b> <ul style="list-style-type: none"> <li>- Average body length of 60cm</li> <li>- Herbivore, eating primarily wooded plants</li> <li>- White in winter, brown in summer</li> </ul> <b>Behaviours</b> <ul style="list-style-type: none"> <li>- Timid by nature and will likely run if confronted</li> </ul>
<b>Adult - summer</b>	 <p>Photo credit: arctichaven.com</p>	




Species and Life Stage	Photo	Notes
<b>Short-Tailed Weasel</b> Adult - winter	 <p>Photo credit: flickriver.com</p>	<b>Characteristics</b> <ul style="list-style-type: none"> <li>- Small in size, but feisty hunters and attackers of prey</li> <li>- Hunts mice and insects</li> <li>- Tail is black-tipped and fur is white (winter) or brown/grey (summer)</li> </ul> <b>Behaviours</b> <ul style="list-style-type: none"> <li>- Not likely to approach humans, if confronted will likely run away</li> </ul>
<b>Short-Tailed Weasel</b> Adult - summer	 <p>Photo credit: birdscalgary.files.wordpress.com/</p>	
<b>Nearctic Collard Lemming</b> Adult	 <p>Photo Credit: gettyimages.it</p>	<b>Characteristics</b> <ul style="list-style-type: none"> <li>- Average body length of 15cm</li> <li>- Herbivores that eat willows and herbaceous plants</li> </ul> <b>Behaviours</b> <ul style="list-style-type: none"> <li>- Timid by nature and will likely run if confronted</li> </ul>






Species and Life Stage	Photo	Notes
<b>Rock Ptarmigan</b> <b>Adult winter</b>	 <p>Photo credit: Audubon.org</p>	<b>Characteristics</b> - White in the winter and a mixture of brown and white in the summer - Average body length of 34cm  <b>Behaviours</b> - Timid by nature and will likely run/fly if confronted
<b>Adult summer</b>	 <p>Photo credit: beautifulnow.is</p>	
<b>Female on nest with eggs</b>	 <p>Photo credit: allaboutbirds.com</p>	
<b>Nest with eggs</b>	 <p>Photo credit:  <a href="https://n7.alamy.com/zooms/36f2e4af30f642cd9e8eedaa1ca919b4/nest-and-eggs-of-a-rock-ptarmigan-lagopus-lagopus-johan-petersen-fjord-dgydb8.jpg">https://n7.alamy.com/zooms/36f2e4af30f642cd9e8eedaa1ca919b4/nest-and-eggs-of-a-rock-ptarmigan-lagopus-lagopus-johan-petersen-fjord-dgydb8.jpg</a> </p>	




Species and Life Stage	Photo	Notes
<b>Snow Bunting</b> <b>Adult Male</b>	 <p>Photo Credit: flickr.com</p>	<b>Characteristics</b> <ul style="list-style-type: none"> <li>- Average body length of 15cm</li> <li>- Transition between an assortment of colours throughout the year</li> <li>- Males are white with black on their backs</li> <li>- Females are white with a red-brownish colour on their backs</li> </ul>
<b>Adult Female</b>	 <p>Photo credit: Audubon.org</p>	<b>Behaviours</b> <ul style="list-style-type: none"> <li>- Timid by nature and will likely run/fly if confronted</li> </ul>
<b>Nest with eggs</b>	 <p>Photo credit:  <a href="http://www.seagrant.wisc.edu/birds/snow_bunting_nest_eggs.html">http://www.seagrant.wisc.edu/birds/snow_bunting_nest_eggs.html</a> </p>	

Species and Life Stage	Photo	Notes
Ivory Gull	 <p>Photo Credit: lloydspitalnikphotos.com</p>	<p><b>Characteristics</b></p> <ul style="list-style-type: none"> <li>- Average body length of 43cm</li> <li>- Ivory white colour</li> </ul> <p><b>Behaviours</b></p> <ul style="list-style-type: none"> <li>- Timid by nature and will likely run/fly if confronted</li> <li>- Vocalizes loudly with a “fox-call” when any other animal is close to its nest including humans</li> </ul>
Nest with young	 <p>Photo credit:  <a href="http://www.seagrant.wisc.edu/birds/snow_bunting_nest_eggs.html">http://www.seagrant.wisc.edu/birds/snow_bunting_nest_eggs.html</a> </p>	

Species and Life Stage	Photo	Notes
<b>Red Knot</b>	 <p>Photo Credit: wikiwand.com</p>	<p><b>Characteristics</b></p> <ul style="list-style-type: none"> <li>- Average body length of 24cm</li> <li>- Predominately red with a brownish-red back</li> </ul> <p><b>Behaviours</b></p> <ul style="list-style-type: none"> <li>- Timid by nature and will likely run/fly if confronted</li> </ul>
<b>Nest with eggs and young</b>	 <p>Photo Credit:<a href="http://www.conservewildlifenj.org/blog/2013/07/17/update-from-the-arctic-5-knots-at-last/">http://www.conservewildlifenj.org/blog/2013/07/17/update-from-the-arctic-5-knots-at-last/</a></p>	
<b>nest</b>	 <p>Photo Credit:<a href="http://www.conservewildlifenj.org/blog/2013/07/17/update-from-the-arctic-5-knots-at-last/">http://www.conservewildlifenj.org/blog/2013/07/17/update-from-the-arctic-5-knots-at-last/</a></p>	



Species and Life Stage	Photo	Notes
<b>Snowy Owl</b> <b>Adult Female</b>	 <p>Photo Credit: wikiwand.com</p>	<b>Characteristics</b> <ul style="list-style-type: none"> <li>- nearly half a metre tall, with a wingspan of almost 1.5 m</li> <li>- average weight of the female is 2.3 kg compared to 1.8 kg for the male</li> <li>- Adult males may be almost pure white in colour. Adult females are darker, their white feathers barred with dark brown.</li> </ul>
<b>Adult Male</b>	 <p>Photo Credit: audubon.org/field-guide/bird/snowy-owl</p>	<b>Behaviours</b> <ul style="list-style-type: none"> <li>- active during the day as well as at night</li> <li>- shy and usually silent, unless nesting</li> <li>- will hiss, scream, or snap their bill at those intruding on their territories, and will dive at, or even strike, human intruders at their nests</li> </ul>
<b>In flight</b>	 <p>Photo Credit: hdwallpapers.in/walls/snowy_owl_2-wide.jpg</p>	

Species and Life Stage	Photo	Notes
With young	 <p>Photo Credit:  <a href="https://upload.wikimedia.org/wikipedia/commons/1/11/SnowyOwl2.jpg">https://upload.wikimedia.org/wikipedia/commons/1/11/SnowyOwl2.jpg</a></p>	
	 <p>Photo Credit:  <a href="http://www.cen.ulaval.ca/bylot/fr_photos.htm">http://www.cen.ulaval.ca/bylot/fr_photos.htm</a></p>	
	 <p>Photo Credit:  <a href="http://elaineakers.blogspot.com/2014/02/off-to-see-snowy-owls-again.html">http://elaineakers.blogspot.com/2014/02/off-to-see-snowy-owls-again.html</a></p>	

**APPENDIX C**  
**Wildlife Observation Log**

**Wildlife and Wildlife Habitat Management Plan**  
**Eureka High Arctic Weather Station**

PSPC No.: Project # R.015446.003  
SLR Project No.: 209.40604.00000

# Eureka High Arctic Weather Station WILDLIFE OBSERVATION LOG

Date (d/m/y)	Time (24 hr)	Observer Name	Location <sup>1</sup>	Wildlife						Weather <sup>2</sup>			Comments <sup>3</sup> (e.g., habitat, behavior of animal, reaction to disturbance, and other relevant information)	
				Species	Total No. Animals	No. Adults			Juv.	Wildlife Activity <sup>4</sup>	Temp. (°C)	Wind		Precip.
						Fem.	Male	Unk.						

<sup>1</sup> Location: GPS coordinate, km along road or associated with site infrastructure

<sup>2</sup> Weather Codes – Wind: N (none), L (light), M (moderate), S (strong); Precipitation – N (none), M (misty rain), LR (light rain), HR (heavy rain), S (snow)

<sup>3</sup> Comments – include information on habitat (e.g., what type of environment was the animal seen), animal's behaviour, reaction to disturbance (e.g., did the animal run away?), or other useful information

<sup>4</sup> Wildlife Activity Codes: W (walking), R (running), F (foraging or feeding), S (swimming), R (resting or bedded down), FL (flying), N/D (on nest or in den), O (other activity, specify in comments)

**APPENDIX D**  
**Porsild's Bryum and its Preferred Habitat**

**Wildlife and Wildlife Habitat Management Plan**  
**Eureka High Arctic Weather Station**

PSPC No.: Project # R.015446.003  
SLR Project No.: 209.40604.00000



Photo 1: Close up of Porsild's Bryum (*Haplodontium macrocarpum*) with sporophytes (spore-producing structures)



Photo 2: Porsild's Bryum on a shaded chalky rock face



Photo 3: Porsild's Bryum on a shaded rock overhang





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