Appendix 47

Meadowbank and Whale Tail 2022 Wildlife Monitoring Summary Report

REPORT

Agnico Eagle Mines Limited - Meadowbank Complex

2022 Wildlife Monitoring Summary Report

Submitted to:

Agnico Eagle Mines Limited

Submitted by:

WSP Canada Inc.

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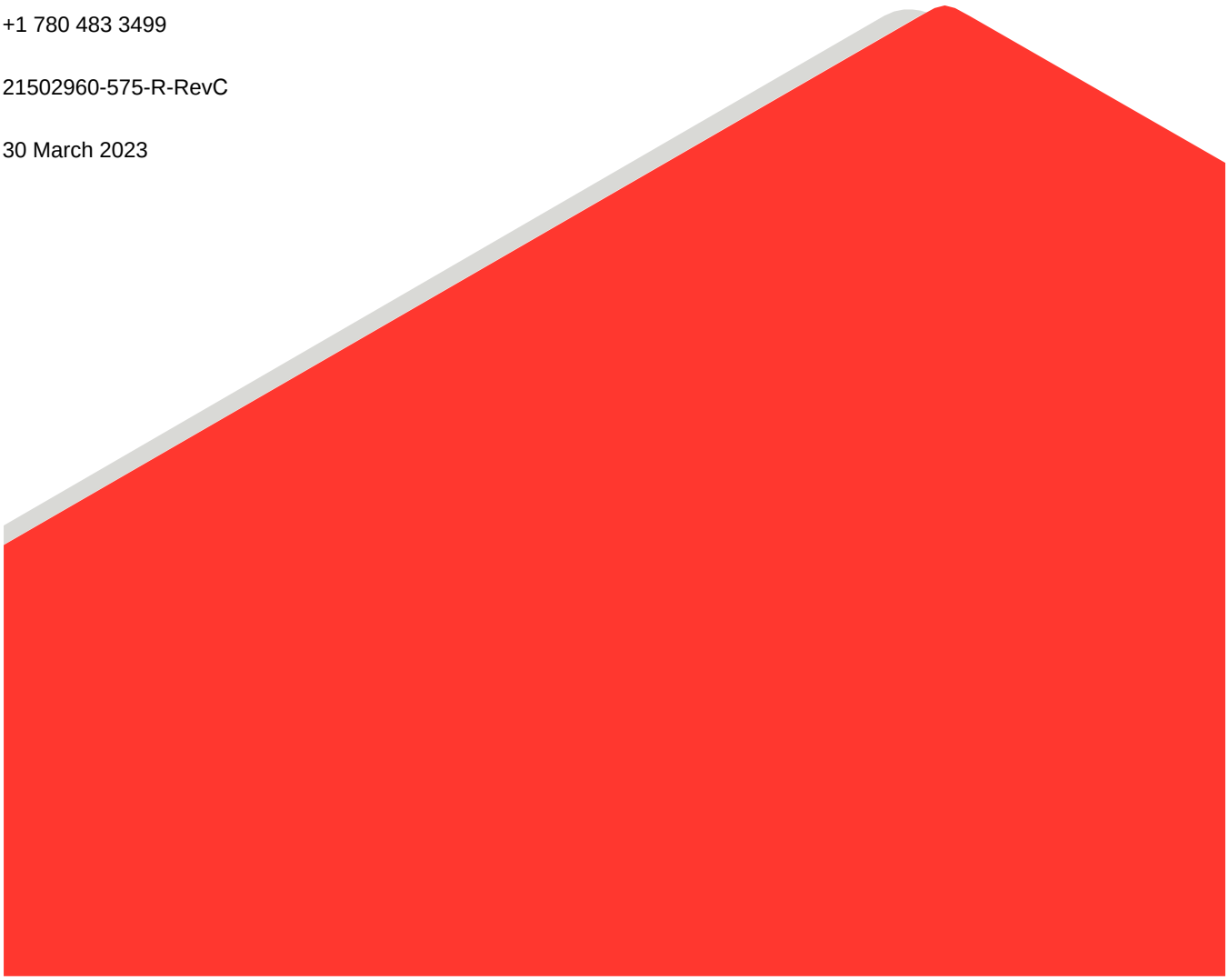
30 March 2023



Distribution List

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Executive Summary

As a requirement of the NIRB Project Certificate, the 2022 Wildlife Monitoring Summary Report (2022 Annual Report) represents the 17th of a series of annual reports for the Agnico Eagle Mines Limited (Agnico Eagle) Meadowbank Complex (the Project). Baseline and monitoring programs were first initiated in 1999 and will continue through the life of the Mine. Details of the wildlife monitoring program for the Project are provided in the Terrestrial Ecosystem Management Plan (Version 7, Agnico Eagle 2019). The 2022 Annual Report provides the monitoring objectives, methodology, historical and current year results, and management recommendations for each monitoring program. The 2022 Annual Report builds on data presented in previous reports and incorporates monitoring recommendations from these reports, as well as recommendations and requests from intervenors on past reports made during the NIRB review process. Below is a summary of the results from each component of the 2022 Annual Report.

Caribou Management Decision Tree

- Decision tree process used data from the road, Mine site, viewshed surveys, and satellite collaring to determine the scale of caribou monitoring and management required.

Road Surveys

- In 2022, 235 road surveys were conducted along the All-weather Access Road (AWAR) and 193 were conducted along the Whale Tail Haul Road (WTHR).
- A total of 50,093 caribou were observed along the AWAR (213 caribou per survey) and 6,355 caribou were detected along the WTHR (33 caribou per survey).
- Road surveys helped facilitate mitigation decisions along the AWAR and WTHR. The AWAR was fully closed (24-hour closure) on 45 days, closed for less than 24 hours on 71 days, and had speed restrictions applied for 84 days. In total the AWAR was closed for 1,808 hours. The WTHR was fully closed (24-hour closure) on 15 days, partially closed (less than 24-hour closure) on 63 days and had speed restrictions applied for 93 days. The WTHR was closed for 894 hours during 2022.
- A total of 11,242 caribou were observed crossing the AWAR and 849 caribou were observed crossing the WTHR in 2022. For annual caribou crossing observations on the AWAR, 96% (10,750 of 11,242 caribou) of observed crossing events occurred on dates with an AWAR closure. For annual caribou crossing observations on the WTHR, 83% (706 of 849 caribou) of observed crossing events occurred on dates with a WTHR closure.
- On eight occasions, observed caribou were identified as Project tolerant as defined in TEMP Version 7. One caribou was identified as Project tolerant at Meadowbank, 13 caribou were identified as Project tolerant at Whale Tail, 23 caribou were identified as Project tolerant on the AWAR, and 20 caribou were identified as Project tolerant on the WTHR.
- There were 10 road related mortalities recorded in 2022, including seven Arctic hares, one Arctic ground squirrel, one ptarmigan, and one wolverine. There were no road-related caribou, grizzly bear, or wolf mortalities associated with the AWAR or WTHR in 2022.

Pit and Mine Site Ground Surveys

- In 2022, environmental personnel conducted regular Mine site inspections focusing on waste management, spills, hazardous waste management, and wildlife monitoring. Formal Mine site inspections were carried out at least weekly as part of broader environmental on-site management.
- Wildlife deterrents were used on 42 occasions in 2022, and were used for Artic fox, caribou, muskox, red fox, wolf, and wolverine.
- There were six project-related mortalities in 2022 at Meadowbank and Whale Tail sites, including one wolverine, three Arctic fox, and two Artic hare.

Wildlife Habitat Monitoring

- A 109.2 ha, or 8.4% change in footprint at the Whale Tail site occurred between the assessment in 2021 and 2022. The change in footprint since the previous assessment less than 25%. Therefore, the next comprehensive analysis is scheduled for 2024.

Caribou Satellite-Collaring Program

- Agnico Eagle intends to continue collaboration with the Government of Nunavut Department of Environment (GN DoE) caribou satellite-collaring program. Collar data were not available to complete the 2022 analysis.

Viewshed Surveys

- A total of 739 viewshed surveys were conducted over 58 days in 2022. Of the 739 viewshed surveys, 41 surveys (6%) had caribou sightings, and a total of 461 caribou were reported. Survey efforts were conducted between 5 January and 28 December, with the highest survey effort occurring in the summer.

Remote Camera Program

- Artificial intelligence was used to pre-sort wildlife images from remote cameras on the Whale Tail Haul Road in 2022. Photographs flagged as containing wildlife by artificial intelligence were reviewed by a human observer. Caribou crossing events were detected in spring, summer, and winter; no caribou were detected in the fall on remote cameras.
- Approximately equal numbers of crossing events were observed while the road was open (n = 13) or when a restriction was in places (n = 14). Too few crossing events were detected to statistically compare crossing rates between different road heights, backfill materials, and backfill slopes.

Blast Monitoring

- Surveys for caribou prior to blasts were performed on 191 days between 23 January to 31 December 2022. One blast was cancelled, on 29 April 2022, due to caribou presence within 600 m of the blast.
- There were 18 surveys between 2021 and 2022 where behaviour monitoring following blasting could be linked to modelled peak particle velocity (PPV) and peak pressure level (PPL). Response behaviours (i.e., alert, walking, trotting or running) were observed following half of the blasts. However, preliminary analysis based on 18 surveys found overall that the proportion of caribou performing response behaviours in a six-minute interval following blasting was not correlated with modelled PPV and PPL values. Future

analyses using more behaviour monitoring sessions could account for other factors, such as caribou group size.

Hunter Harvest Study

- The Hunter Harvest Study (HHS) included 59 participants in 2022. A total of 766 caribou were reported as being harvested by 55 participants in the Baker Lake HHS.
- The 2022 HHS data indicated that 39% of reported harvest occurred within 5 km of the AWAR, and 70% occurred within the Meadowbank RSA.
- In 2022, no Caribou were harvested within 5 km of the WTHR. Given the low numbers of reported harvests close to the WTHR and the prohibition of the public from the WTHR, it is unlikely that the presence of the road has resulted in increased harvest.

Predatory Mammal Den Monitoring

- Monitoring of predatory mammal dens were conducted informally in 2022 through observations recorded during other monitoring programs. Potential effects due to Project-related activities were not identified to trigger monitoring of predatory mammal dens. No predatory mammal dens were observed or monitored in 2022.

Raptor Nest Monitoring

- Six peregrine falcon nests were documented in Quarries 2, 8, 18, 21, and 22 in 2022. No raptor nesting evidence was observed in quarries 10.5, 26, 30, 35, 50, and 52 along the WTHR in 2022. One peregrine falcon nest was identified on a communication tower on site. No other raptor nests were identified during pit checks or incidentally during other surveys in 2022.
- Raptor nest management plans were not developed at the active nest sites, as Mine-related activity was already restricted within the quarries where Falcons were observed.

Waterbird Nest Monitoring

- Trent University, in collaboration with Environment and Climate Change Canada (ECCC) and Agnico Eagle, conducted a research study to investigate mitigation options to minimize flooding-related impacts to birds in the Whale Tail South area.
- The complete analysis and report on behavioural responses will be included in a second Trent University MSc Thesis manuscript to be submitted in 2023. References for any publications produced in 2023 will be provided in the 2023 Annual Report, but otherwise reporting under the Migratory Bird Protection Plan is considered complete at this time.

Breeding Bird Monitoring

- Agnico Eagle will continue to survey 48 PRISM plots selected by the Canadian Wildlife Service over 10 years (2021 to 2031), and completion of AWAR and WTHR Breeding Bird Survey (BBS) routes opportunistically when qualified individuals are on site. At a minimum, these BBS routes will be conducted every three years during the operations, closure, and post-closure phases of the project. It is recommended that a minimum of

12 PRISM plots and both BBS routes be surveyed in June 2023. The four PRISM plots completed in 2022 will need to be revisited to take photographs of the plots from the plot corners.

Non-Native Plant Surveys

- No non-native plants, as identified by the CESCC, were recorded along the AWAR, WTHR, Baker Lake tank farm, Whale Tail and Meadowbank Mine sites. Eleven surveys were completed in undisturbed tundra to survey the presence/absence of non-native weeds. Recommendations for management of non-native plants are provided.

Special Studies

Snow Study

- In 2022 a power analysis was conducted using data from 2020-2022 to determine the total number of sampling locations required to detect very small, small and moderate effect sizes for snow hardness.
- Results of the power analysis indicate that sample sizes are already sufficient to evaluate at least moderate differences in snow hardness between plots (i.e., effect sizes of 50% or greater), but no such differences in snow hardness were observed. To assess differences in snow hardness for smaller effect sizes (e.g., 25%) for both study questions, snow data should be collected at a minimum of 65 locations, with six plots completed at each locations as per the study design.

Caribou Behaviour

- Agnico Eagle continued a caribou behaviour study that focussed on measuring different behaviour activities of caribou in relation to mine-related activities (Appendix I).

Road and Viewshed Comparison

- Following submission of the 2021 Wildlife Monitoring Summary Report, KivIA requested comparison of the distance and direction of caribou observations from road and viewshed surveys. A preliminary discussion of the comparison was presented at the November/December TAG meeting in 2022.
- It was expected that viewshed surveys would detect caribou farther from the road on average, as these surveys are intended to identify caribou approaching the road as an ‘early warning system’. This trend was observed in all seasons where both surveys were performed consistently, except fall 2021, however the sample size for comparison was relatively low. Results indicate that road surveys may be capable of detecting caribou at long distances (up to 4 km) from the road. Increased sample size of caribou observations from viewshed surveys would allow a more rigorous comparison of road and viewshed surveys.

Study Limitations

On behalf of Agnico Eagle Mines Limited (Agnico Eagle), WSP Canada Inc. (WSP) has prepared this Wildlife Monitoring Summary Report for the 2022 Monitoring Period at the Meadowbank Complex.

This report was prepared, based in part, on information obtained from Agnico Eagle and other external information sources. In preparing the report, WSP has relied in good faith on the information provided. We accept no responsibility for any deficiency or inaccuracy contained in this report because of our reliance on the aforementioned information.

The findings and conclusions documented in this report have been prepared for the specific application to this Project and have been developed in a manner consistent with that level of care normally exercised by environmental professionals currently practicing under similar conditions in the jurisdiction.

With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time and should be reviewed regularly.

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Acronyms

Acronym	Full Term
AEAR	Amaruq Exploration Access Road
ANOVA	Analysis of Variance
ANZEC	Australian and New Zealand Environment Council
ARGOS	Advanced Research and Global Observation Satellite
AWAR	All-weather Access Road
BBS	Breeding Bird Survey
CESCC	Canadian Endangered Species Conservation Council
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
COVID-19	Coronavirus Disease
ECCC	Environment and Climate Change Canada
ELC	Ecological Land Classification
FEIS	Final Environmental Impact Statement
GIS	Geographic Information System
GN	Government of Nunavut
GN DoE	Government of Nunavut Department of Environment
GPS	Global Positioning System
GST	Group Size Threshold
HHS	Hunter Harvest Study
HOL	Height-of-Land
HT	Heath Tundra
HTO	Hunters and Trappers Organization
IIBA	Inuit Impact Benefit Agreement
IQ	Inuit Qaujimajatuqangit
KivIA	Kivalliq Inuit Association
KM	Kilometer Marker
LSA	Local Study Area
NIRB	Nunavut Impact Review Board
NPAG	Non-potentially Acid Generating
NPC	Noise Pollution Control
NWB	Nunavut Water Board
PPL	Peak Pressure Level
PPV	Peak Particle Velocity
PRISM	Program for Regional and International Shorebird Monitoring
QA/QC	Quality Assurance/Quality Control
RSA	Regional Study Area
TAG	Terrestrial Advisory Group
TEMP	Terrestrial Ecosystem Management Plan
UTM	Universal Transverse Mercator
VEC	Valued Ecosystem Component
WTHR	Whale Tail Haul Road

1.0 INTRODUCTION

1.1 Background

The Agnico Eagle Mines Limited (Agnico Eagle) Meadowbank Complex (the Project) is located in the Kivalliq Region of Nunavut (Figure 1-1) and received a Project Certificate No. 004 from the Nunavut Impact Review Board (NIRB) in 2006. The subsequent Water Licence, Government of Nunavut (GN) and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) Land Lease, and Kivalliq Inuit Association (KivIA) Land Use Production Lease, allowed for the construction of a gold mine and ancillary facilities including an All-weather Access Road (AWAR), barge unloading facilities, lay-down area, and a fuel tank farm near the Hamlet of Baker Lake. The Whale Tail Mine, an extension of the Meadowbank Mine, received a Project Certificate No. 008 from NIRB in 2018.

Up to 2017, annual reports were based on the Terrestrial Ecosystem Management Plan (TEMP) developed by Cumberland Resources (Cumberland 2006). The TEMP was a requirement of the Meadowbank Project Certificate No. 004, Condition 54 and Whale Tail Mine Certificate No. 008, Condition 28. Since 2018, the TEMP Version 7 has incorporated the Whale Tail component of the Project and reflects changes in management and monitoring approaches since 2006 (Agnico Eagle 2019). The revised TEMP also benefitted from collaborative input from the GN, the KivIA, and the Hunters and Trappers Organization (HTO) of Baker Lake through annual report reviews, technical reviews, workshops, and discussions within the Terrestrial Advisory Group (TAG). The April 2020, Version 8 TEMP was prepared and reviewed by the TAG and to serve as the basis for the 2020 Annual Report. However, due to uncertainties and on-going discussions with TAG over TEMP Version 8 updates, Version 7 of the TEMP continued as the basis for 2022 monitoring and mitigation. The scope of the TEMP is to report on monitoring of the Mine during construction, operation, maintenance, reclamation, and closure.

This annual report includes data collected in 2022, the 13 year of Mine operation, and is the 17 of a series of annual Wildlife Monitoring Summary Reports for the Project. The purpose of this report is to summarize 2022 data collected from wildlife monitoring programs, and to describe natural variation and potential Mine-related changes in wildlife populations within and adjacent to the Meadowbank Complex. The 2022 Annual Report describes monitoring objectives and methods, historical and current year results, mitigation activities, and management recommendations based on 2022 monitoring results. Furthermore, comments received from various intervenors through the NIRB review of the 2021 annual report were incorporated, where possible, into analyses and reporting in this document.

1.2 Project Description

The Meadowbank Gold Mine is located approximately 90 km north of the community of Baker Lake. The Whale Tail Mine, with an expected operating life of seven years (2019 to 2025), is located approximately 180 km north of Baker Lake. The Whale Tail mine is an open-pit mine connected to Meadowbank Mine by a 64 km all season haul road. The local physiography is characterized by numerous lakes and low, rolling hills covered mainly by lichen/rock complexes, and heath tundra.

Environmental baseline studies were conducted prior to Meadowbank and Whale Tail Mine approvals and integrated into Project designs according to the Cumberland (2006) and Agnico Eagle (2019) TEMPs. Wildlife Valued Ecosystem Components (VECs) for the Meadowbank mine were identified in consultation with regulatory agencies and Baker Lake residents, and considered criteria such as conservation status, relative abundance within the Project study area, importance in subsistence lifestyle and economy, importance in predator-prey systems, habitat requirement size and sensitivity, and contribution to local area concerns. Based on these

selection criteria, key terrestrial VECs determined for the Meadowbank mine were wildlife habitat, ungulates, predatory mammals, small mammals, raptors, waterbirds, and upland breeding birds. Because of limited evidence that small mammals were affected by the Project, this VEC was not included in the Whale Tail mine or revised TEMP. Further details can be found in the Final Environmental Impact Statements (FEIS) for the Meadowbank Mine (Cumberland 2005) and the Whale Tail Mine (Golder 2016; Golder 2018).

Construction of a 106.8 km AWAR between the community of Baker Lake and the Meadowbank Mine was completed in March 2008 and provides Mine site access and re-supply, while on-site Mine haul and access roads connect open-pit areas to ancillary facilities. Meadowbank Mine site facilities include a mill, power plant, maintenance facilities, tank farm for fuel storage, water treatment plant, sewage treatment plant, airstrip, and accommodations. Mine components include open pits, waste rock storage facilities, and a tailings storage facility.

In 2008, construction of numerous camp infrastructure facilities was completed, while in 2009, the principal Mine site construction commenced. Mine operation commenced in early 2010. Mining at Goose Pit was finished in 2015 while Agnico Eagle continued ongoing mining operations at Portage and Vault pits and investigated expansion of the Vault area into Phaser Lake. In 2018, an expansion was made in pit E (Portage) to extend mining and mill feed to bridge the gap between the end of mining activities in Meadowbank and the start of mining activities at Whale Tail Mine. As a result, mining activities at Meadowbank in 2022 were only ongoing in Whale Tail Mine with ore from this pit being processed at the mill at the Meadowbank site.

To extend Mine operations and milling at Meadowbank Mine, Agnico Eagle has developed the Whale Tail Mine and Haul Road Project, approximately 55 km north of the Meadowbank Mine, on a satellite deposit located on the Amaruq property in the Kivalliq Region of Nunavut. The Amaruq Exploration Access Road (AEAR) was built in 2016 and 2017 to access the Amaruq exploration site from the Meadowbank Mine. The AEAR was modified into the WTHR (enlargement) following regulatory approval and was completed in 2018. Construction of the Whale Tail Dike in 2018 allowed for Whale Tail Lake North Basin dewatering starting in Q1, 2019, the pre-stripping of future Whale Tail Mine, and the construction of major infrastructures including the permanent camp, with accommodation and kitchen facilities, sewage treatment plan, tank farm for fuel storage, and freshwater intake. Open-pit mining operation at the Whale Tail deposit began in Q3 (30 September), 2019. Commercial operations at the IVR pit commenced on 31 December 2021. Permitting to expand the Whale Tail operation and extend the Mine life to 2026 was approved in February 2020 (refer to Project Certificate No. 008, Amendment 001).

1.3 Study Area Boundaries

1.3.1 Meadowbank Mine, Vault Pit, and AWAR

The Meadowbank Mine Local Study Area (LSA) includes a 5 km radius area centred on the Mine Site and a 5 km radius around the Vault Site creating an elliptical shape with a total area of 194 km^2. The AWAR LSA consists of a 3 km wide corridor centred on the AWAR between Baker Lake and the Meadowbank Mine. The Regional Study Area (RSA) encompasses an area that includes a 25 km radius area around the Meadowbank Mine and Vault sites and a 50 km wide corridor along the AWAR for a total area of 5,106 km^2 (Figure 1-1).

1.3.2 Whale Tail Mine and Haul Road

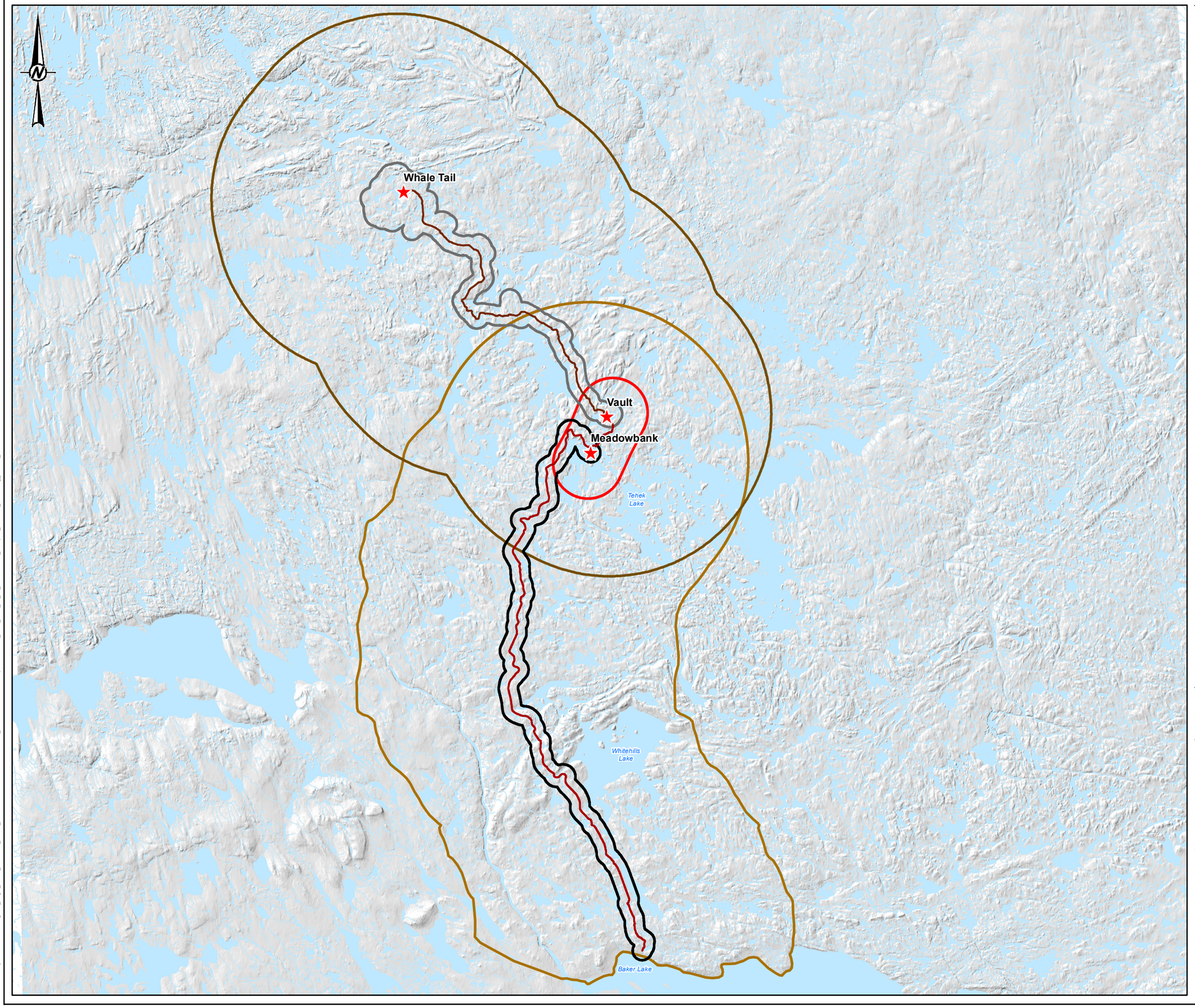
The Whale Tail LSA is a 3 km corridor centered on the WTHR and borrow site access roads (i.e., 1.5 km on either side of the road and 1.5 km around borrow areas) and includes an approximate 1.5 km buffer around development areas at the Whale Tail Mine area, for a total area of 282 km^2. The Whale Tail RSA is a 50 km

corridor centred on the WTHR alignment (i.e., 25 km on either side of the WTHR and borrow site access roads, and 25 km around borrow areas), with a total area of 5,017 km^2 (Figure 1-1).

1.4 Monitoring Approach

Wildlife monitoring is an essential tool in protecting and maintaining wildlife occurring near the Project. A comprehensive monitoring strategy, along with quantitative monitoring indicators, has been implemented and as required, is adapted to evaluate the accuracy of impact predictions and to meet the objectives of the management strategy set out in the TEMP (Agnico Eagle 2019). Version 7 of the TEMP (Agnico Eagle 2019) is the current version implemented. Monitoring programs are designed to assess Project-related impact predictions and the effectiveness of mitigation measures. Measures on the effectiveness of mitigation will inform on whether monitoring or mitigation require adaptive management. Adaptive management is an on-going process of learning by doing that evolves throughout the life of the Project. Outcomes of adaptive management include increasing or decreasing, or no change, to mitigation or monitoring. Further study intended to better understand Mine-related effects may also be an outcome based on requests from individual stakeholders or the TAG. Ongoing review of the TEMP and annual Wildlife Monitoring Summary Reports (which provide results of TEMP monitoring programs) by regulatory agencies, technical reviewers, and stakeholders will further support that local and regional concerns have been adequately addressed.

Environmental staff monitor wildlife near Project facilities (i.e., Meadowbank Mine and Whale Tail Mine) and along the AWAR and WTHR on a regular basis (Section 3.6). Where unacceptable risks to wildlife are observed, mitigation measures are implemented to avert animals from site activities and hazards in accordance with the TEMP (Agnico Eagle 2019). The decision trees used as mitigation and monitoring framework for caribou (*Rangifer tarandus groenlandicus*) and muskox (*Ovibos moschatus*) are outlined in Section 2.0. Detailed reporting protocols (e.g., a dangerous animal occurrence, monthly wildlife reports submitted to the GN, road closure notification to GN, KivIA, HTO, etc.) are established and implemented by on-site environmental staff. During these events, Agnico Eagle representatives communicate any issues directly with the GN Department of Environment (DoE) Conservation Officer, KivIA, and the local HTO.



LEGEND

- ALL-WEATHER ACCESS ROAD (AWAR)
- WHALE TAIL HAUL ROAD (WTHR)
- AWAR LOCAL STUDY AREA (LSA)
- WTHR LOCAL STUDY AREA (LSA)
- WTHR REGIONAL STUDY AREA (RSA)
- MEADOWBANK LOCAL STUDY AREA (LSA)
- MEADOWBANK REGIONAL STUDY AREA (RSA)
- WATERCOURSE
- WATERBODY

0 12 24

1:600,000 KILOMETRES

REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

MEADOWBANK COMPLEX LOCATION AND MONITORING STUDIES BOUNDARIES

CONSULTANT

wsp

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APPROVED	CDLM

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1.5 Report Objectives

The primary objectives of the 2022 Wildlife Monitoring Summary Report are to:

a) Report the results of the 2022 wildlife monitoring programs.

b) Summarize the monitoring strategy implemented over the course of the year.

c) Evaluate the function and validity of implemented monitoring strategies.

d) Summarize adaptive management strategies.

e) Provide management recommendations for 2023.

f) Allow regulators to contribute toward improvements of wildlife mitigation and monitoring.

g) Include a summary of all caribou-related monitoring, mitigation, and Project management actions in one consolidated section.

1.6 Inuit Involvement

Since 1999, local Inuit from the community of Baker Lake have been involved in all wildlife-related baseline and monitoring surveys. The average number of Inuit involved in surveys varies annually. Programs with previous Inuit involvement include the LSA and RSA aerial survey, breeding bird plots and transects, waterfowl nest surveys, waterbird nest surveys for the Whale Tail mine, raptor nest surveys, road surveys, viewshed surveys, habitat mapping, and phenology plots. Local harvesters participate in the Hunter Harvest Study (Section 10.0).

Three Inuit workers were under the employment of the environmental department and were involved in the monitoring programs in 2022. Agnico Eagle environmental Inuit workers are involved in wildlife programs including caribou behavior monitoring, road surveys, viewshed surveys, and wildlife deterrence on site when required. In 2022, two Baker Lake Hunters and Trappers Organization (HTO) wildlife monitors completed road surveys regularly throughout the year.

As required by the Inuit Impact Benefit Agreement (IIBA), “Anything done by Agnico in order to implement the TEMP […] shall incorporate Inuit Qaujimanituqaugit”; therefore, Indigenous Traditional Knowledge or IQ has been incorporated in this annual report.

1.7 Terrestrial Advisory Group

As per Project Certificate No.008, Condition 27 of the Whale Tail Pit Final Environmental Impact Statement (FEIS) Addendum (Golder 2016), Agnico Eagle has established a Terrestrial Advisory Group (TAG) consisting of representatives from Agnico Eagle, the Government of Nunavut Department of Environment (GN-DoE), the KivIA, and the HTO.

An MOU and Terms of Reference has been developed and signed by all parties in July 2019. Agnico Eagle provided a summary of TAG meeting outcomes to the NIRB since 2019.

The purpose of the TAG is to:

- Measure the relevant environmental effects of the Project on terrestrial wildlife.

- Confirm that the Project and mining activities are carried out within the terms and conditions of the Project Certificates No.004 and No.008 relating to the protection of terrestrial wildlife.
- Assess the accuracy of the predictions contained in the final environmental impact statement filed by Agnico Eagle with NIRB.
- Identify and select appropriate target species, indicators, and linkages for monitoring.
- Evaluate the effectiveness of mitigation measures and to support any required adaptive management of those measures.
- Identify any unforeseen Project-related effects.
- Provide an early warning mechanism to identify any Project-related effects.
- Determine and identify any cause-and-effect interactions between the Project and the environment.

TAG meetings were held on 9 February, and from 29 November to 1 December (in person). A series of meetings were held in October and November 2022 regarding fall caribou migration.

The 9 February meeting ((Agnico Eagle 2022a) included discussion of vehicle traffic rates, roadside flags, review of 2021 road closures, the lead group size threshold (GST) approach, caribou migration patterns, the remote camera program, and the caribou behaviour monitoring program.

The 29 November to 1 December meeting (Agnico Eagle 2023b) included a site visit to the Whale Tail Mine, and discussion of project tolerant caribou, the lead GST approach, responses to comments on the 2021 annual report, the snow study, viewshed surveys, and caribou satellite collar data. Report sections influenced by these discussions include the road survey section (Section 3.0), road vs. viewshed comparison (Section 17.3), and snow study (Section 17.1).

1.8 Mitigation Audit

A mitigation audit is an annual requirement outlined in the 2019 TEMP (Agnico Eagle 2019). Mitigation approaches applied at the Project stem from current practices at existing mines or were suggested during the environmental assessment review process. However, an auditing system supports evaluation on the use and effectiveness of the mitigation consistent with the principals of adaptive management and may identify or recommend changes to mitigation or monitoring. As an example, per Project Certificate No.008, Condition 32, Agnico Eagle engages with the Baker Lake HTO and other relevant parties to ensure that safety barriers, berms, and designed crossings associated with Project infrastructure, including the WTHR, are constructed and operated as necessary to allow for the safe passage of caribou and other terrestrial wildlife.

The audit is to be undertaken annually and summarized in the annual report and will focus specifically on mitigation listed in Section 4.1 of the TEMP Version 7 (Agnico Eagle 2019). The audit will evaluate:

- what mitigation was implemented
- which mitigation is perceived or shown to be effective
- whether new mitigation has been implemented in response to new issues; and whether some mitigation is redundant or unnecessary

2.0 CARIBOU MANAGEMENT DECISION TREE

2.1 Overview

The 2019 TEMP Version 7 (Agnico Eagle 2019) describes the use of decision trees or charts that outline adaptive monitoring and mitigation for ungulates for each of five phases: 1) caribou and mining operations; 2) caribou and Whale Tail Haul Road; 3) caribou and the AWAR; 4) caribou and blasting; and 5) muskox and Operations (see Agnico Eagle 2019).

2.2 Objectives

The monitoring objectives are to:

1) Detect if effect thresholds have been exceeded.

2) Test the efficacy of mitigation.

3) Understand Project-related effects to ungulates. For ungulates, the decision trees are also an objective to manage sensory disturbance to caribou approaching the Project. Monitoring to detect caribou intensifies as caribou approach the Project and mitigation intensifies to reduce sources of sensory disturbance.

Monitoring activities for ungulates will be carried out prior to, during, and following construction. The use of decision trees for managing disturbance to ungulates is an ongoing and continuous monitoring strategy for the life of the Project. Monitoring intensity is increased as ungulates approach the Project.

2.3 Duration

Monitoring activities for ungulates were carried out prior to, during, construction and operations. The use of decision trees for managing disturbance to ungulates is an ongoing and continuous monitoring and mitigation strategy for the life of the Project. Monitoring and mitigation intensity is increased and decreased as ungulates approach the Project in accordance with the decision trees.

2.4 Methods

The approach involves monitoring the number of ungulates in close proximity to mining operations through various monitoring tools including caribou collaring data, Viewshed surveys, AWAR and Whale Tail Haul road surveys, and pit and Mine site ground surveys. Depending on the number of ungulates observed (i.e., caribou GST), proximity to the road, and time of year, different mitigation and monitoring levels are triggered (i.e., Level 1, Level 2, Level 3). For example, triggers may result in pit and Mine site ground surveys and/or haul road surveys increased up to every two days, and caribou satellite data reviewed daily. Example mitigations include daily site-wide notifications, road closures to non-essential vehicles, and speed restrictions.

For the purposes of monitoring, a “group of caribou” is defined as: “An aggregation of caribou that are sufficiently close together that they can see and react to another animal’s behaviour and have the potential of responding should one or more animal in the aggregation become startled.” Updated caribou GSTs by season used for Meadowbank in 2022 were developed based on instructions provided by the GN (Table 2-1; GN 2021). A GST of 13 muskox is used year-round, and mitigation and monitoring related to muskox is performed according to Figure 10 of 2019 TEMP Version 7 (Agnico Eagle 2019). For further details on the reasoning behind caribou GSTs and the decision chart approach, refer to the 2019 TEMP Version 7 (Agnico Eagle 2019). The GST approach and monitoring/management outcomes is reviewed by the TAG on a regular basis to determine whether an acceptable balance has been achieved between mining operations and conserving caribou populations. As

GSTs are the main trigger for mitigation and management, understanding their efficacy for overall herd protection is of high importance. Further information about the timing and implementation of caribou protection measures are found in Section 3.6.6.

Table 2-1: Seasonal Caribou Group Size Thresholds Applied During 2022.

Season	Dates	Group Size Threshold
Spring	1 April to 25 May	33
Summer	26 May to 21 September	25
Fall	22 September to 15 December	112
Winter	16 December to 31 March	25

2.5 Results

The decision trees were used throughout 2022. Data collection methods were implemented in 2022 to link individual observations to mitigations, through use of field tablets linked to a customizable EquIS Collect database. Paper data forms are carried in case issues arise with field tablets. All wildlife observations, and associated mitigations are provided in Appendix A (Wildlife Observations). Summaries of wildlife survey results are discussed in their respective sections. A summary of AWAR and WTHR closure are discussed in Section 3.6.6. The majority of mitigations were implemented based on road survey observations (Section 3.0; Appendix A). Few mitigations were implemented based on other survey types, including pit and mine site ground surveys (Section 4.0; Appendix A).

2.6 Accuracy of Impact Predictions

An objective of the decision tree approach is to reduce sensory disturbance to caribou approaching the Project. The objective is not linked to an impact prediction as the monitoring is to trigger mitigation rather than to test a prediction.

2.7 Management Recommendations

Wildlife observations should continue to be documented using approaches implemented in 2022 that allow individual observations to be linked to mitigations, providing evidence of use of decision trees.

3.0 ROAD SURVEYS

3.1 Overview

A systematic ground survey monitoring program for the AWAR, and WTHR has been designed to evaluate sensory disturbance for wildlife, particularly caribou (*Rangifer tarandus*), muskoxen (*Ovibos moschatus*), and predatory mammals utilizing habitats adjacent to the roads. The program also monitors incidental mortality of species as they are encountered within the Project infrastructure, but in particular near the roads. In 2017 and 2018, the Vault Road has been surveyed and reported on separately from the WTHR, but since 2020 the Vault Road observations are considered part of the WTHR observations and results.

3.2 Objectives

The primary objectives of the road ground survey monitoring program are to:

1) Document wildlife utilization along the AWAR and WTHR corridors.
2) Evaluate wildlife trends along the road corridors, including identifying areas where higher densities of wildlife are observed.
3) Inform on the need for adaptive mitigation, such as temporary road closures during peak caribou migration periods.
4) Inform whether mortality thresholds for wildlife are exceeded.
5) Monitor road-related injuries or mortalities of caribou. The Project-wide threshold mortality level for ungulates is two individuals per year (as per TEMP Version 7).
6) Monitor road-related injuries or mortalities of predatory mammals. The Project-wide threshold mortality level for predatory mammals is two individuals per year (as per TEMP Version 7).

3.3 Duration

The AWAR and WTHR systematic ground surveys are ongoing over the operational phase of the Mine and are scheduled to be conducted a minimum of once per week throughout the year, twice per week during the sensitive season (i.e., contingent on weather and road access), and daily if caribou or muskox GSTs are exceeded (see Figures 7 and 8 in TEMP). Agnico Eagle is committed to conducting a minimum of 75 road surveys per year along the AWAR and WTHR. Monitoring of vehicle collisions and wildlife mortality is continual along all road segments.

3.4 Methods

Agnico Eagle has signed an MOU with the Baker Lake HTO for a wildlife monitor on the road beginning in October 2018. An amended MOU was signed in February 2022, retroactive to 8 November 2021, to hire a second wildlife monitor that will work on the AWAR and WTHR. In 2021, the monitor was primarily on the AWAR due to COVID restrictions. In 2022, two Baker Lake Hunters and Trappers Organization (HTO) wildlife monitors completed road surveys regularly throughout the year.

The survey team typically includes two observers (one is the driver) in a vehicle. The terrain on both sides of the road (to a maximum horizontal distance of approximately 1 km perpendicular from the road edge, or as far as the observer can see pending site conditions) is surveyed as the vehicle progresses at a maximum speed of 30 km per hour. For each sighting, the vehicle is safely parked in a road pullout and UTM coordinates are recorded along

with the estimated distance of the animal(s) from the road, nearest road marker, species, number, direction of travel and a variety of other information (e.g., behavior of animals). All data are recorded electronically in tablet forms. Where animals are sighted close to roads and a risk of collision with vehicles is possible, the environmental monitor/observers report the number of animals, location, and direction of travel to the Mine radio dispatcher who informs all vehicle operators. In addition, all vehicle operators report ungulates and predatory mammals seen along the road to the dispatcher.

Regular data provided to Mine site personnel from the caribou satellite-collaring program are also used to track caribou movement and potential interactions with roads and Project facilities.

3.5 Historical Results

Ground surveys commenced shortly following the onset of AWAR construction in 2007. Sampling intensity has been comparable along the entire length of the AWAR since 2009. Surveys along the Vault Haul Road have been irregular since its completion but were included as part of regular AWAR surveys in 2016 and conducted separately beginning in 2017. Since beginning surveys in 2007, surveys along the AWAR have been conducted every 1.6 to every 6.1 days with an average survey frequency of every 4.3 days (Table 3-1). Surveys along the WTHR began in 2017 and have been conducted every 1.9 to every 7.7 days with an average survey frequency of every 3.7 days (Table 3-3).

3.6 2022 Results

3.6.1 AWAR Surveys

The number of AWAR surveys completed each season in 2022 is provided in Table 3-1. The number of systematic road surveys completed in 2022 (n=235) is higher than the number of surveys completed the previous year (n=177) and considerably higher than the annual goal of 75 surveys. In 2022, surveys were conducted on average every 1.6 days, and were conducted between 02 January and 29 December. The number of surveys completed was highest in the summer (n=78) and lowest in winter (n=38). By month, the highest numbers of surveys were conducted in October, November, and August, with October and November corresponding with higher numbers of caribou observed within the LSA.

Two Baker Lake Hunters and Trappers Organization (HTO) wildlife monitors completed road surveys regularly throughout the year (Section 1.6). Electronic recording of observations began in October 2019 and written data forms are no longer used.

A total of 50,093 caribou were detected across 235 AWAR road surveys (i.e., approximately 213 caribou per survey), and caribou were recorded in all months. The highest average caribou observed per survey occurred in November and October (Table 3-2). Record numbers of average caribou per survey were observed for January, July, October, and November in 2022 (Table 3-2). This is different than previous years and particularly 2020, when record numbers of average caribou per survey were observed for March, May, June, August, September, October, and November (Golder 2022).

Table 3-1: Details of All-Weather Access Road Wildlife Surveys from 2007 to 2022

Year	Annual range of surveys	Average Frequency[a]	Number of AWAR surveys				
			Spring[b]	Summer[b]	Fall[b]	Winter[b]	Annual Total
2007	Mar 01 – Dec 31	4.1 days	13	24	8	33	**78**
2008	Jan 02 – Dec 29	3.9 days	15	7	15	57	**94**
2009	Jan 09 – Dec 16	6.1 days	15	10	8	25	**58**
2010	Jan 21 – Dec 17	5.6 days	9	9	12	36	**66**
2011	Jan 10 – Dec 30	6.0 days	10	9	11	33	**63**
2012	Jan 04 – Dec 29	4.7 days	14	13	12	38	**77**
2013	Feb 02 – Dec 27	6.0 days	9	13	10	31	**63**
2014	Jan 12 – Dec 30	5.5 days	11	7	11	38	**67**
2015	Jan 03 – Dec 18	4.7 days	17	16	11	32	**76**
2016	Jan 02 – Dec 27	4.7 days	10	14	16	38	**78**
2017	Jan 03 – Dec 29	4.3 days	19	16	14	36	**85**
2018	Jan 03 – Dec 29	5.0 days	9	12	16	35	**72**
2019	Jan 04 – Dec 27	2.6 days	37	39	39	22	**137**
2020	Jan 17 – Dec 26	2.6 days	26	54	41	11	**132**
2021	Jan 01 – Dec 31	2.1 days	43	42	69	23	**177**
2022	Jan 02 – Dec 29	1.6 days	47	78	72	38	**235**

AWAR = All Weather Access Road.

a) Frequency refers to the average number of days between surveys over the year.

b) Spring = Apr 1 to May 25, Summer = May 26 to Sep 21, Fall = Sep 22 to Dec 15, Winter = Dec 16 to Mar 31.

Table 3-2: Monthly Averages of the Number of Caribou Observed per Survey Trip Along the All-Weather Access Road from 2007 to 2022

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2007	0	0	11.4	14	15.4	7.1	1.5	1.1	10.8	18.4	72.4	18.4
2008	14.3	11.5	11.4	12.7	12.1	3.5	13.3	5.4	12.5	44.3	90.7	10.3
2009	12	10.7	16.7	11.4	13	8.2	0	3.6	8.5	25.4	13	11
2010	5.3	4.1	6.7	10.8	18	9	1.1	5.6	4.8	197.2	106	7.9
2011	3	1	6	34	25.3	12.5	1	63	10.3	71.6	2.3	7.8
2012	5.1	5.3	6	15.2	14.2	3.1	0	1	1	60	116.5	169.7
2013	0	68.1	39.8	0	11	5.3	0	1	6.5	6	455.2	16.8
2014	3.2	10.5	10.5	27.2	8.4	1.5	0	1	33.1	101.8	48.4	17.6
2015	5.8	7	14.4	22.4	14.1	6.3	2	3	12.3	41.5	148.9	275
2016	3.7	2.3	6	23.8	13.2	6.9	0	2.7	3.3	73	2	15.7
2017	8	0	3.5	4	0	1	0	3.4	5.3	63.3	12.6	5.4
2018	6.4	12.3	14.4	51.4	27.7	12.3	1	23.4	23.7	38.8	40.6	1
2019	0	0	6	77.6	22.8	5.7	1	1.3	1	145.8	79	4
2020	0	0	107.6	263.2	430	52	0	185.2	483.9	485.7	556	2.3
2021	0	3	34.6	414.7	226.6	26.4	0.3	161.3	30.7	64.5	35.6	553.5
2022	44.8	48.8	7.5	23.8	8	8.6	32.6	9.2	32.1	756.9	820.3	0.3
Average	**7.0**	**11.5**	**18.9**	**62.9**	**53.7**	**10.6**	**3.4**	**29.5**	**42.5**	**137.1**	**162.5**	**69.8**

Data show the average number of caribou observed for a month of the year, including data from all road surveys completed that month. Data are based on the observed number, which might be more inaccurate for larger groups or groups that are further away.

3.6.2 WTHR Surveys

Survey routes were separated into the Vault and Whale Tail segments of the WTHR until 2019 but were analyzed as a single unit (WTHR) starting in 2020. In 2022 there were 193 surveys conducted between 02 January and 28 December with a survey being conducted every 1.9 days on average (Table 3-3). The number of surveys conducted in 2022 was higher than the number conducted in any previous years. More surveys were conducted in spring and summer compared to fall and winter (Table 3-3).

A total of 6,355 caribou were detected across 193 WTHR surveys (i.e., approximately 33 caribou per survey) in 2022, fewer than the 11,928 caribou detected in 2021 despite survey effort being higher in 2022 (Table 3-3). The majority of caribou sightings along the WTHR were observed in April corresponding with spring migration, with a total of 4,164 caribou observed and an average of 115.7 caribou sightings per survey (Table 3-4). August had the second highest caribou sighting per survey that was observed in 2022 with 36.3 caribou sightings per survey. Caribou were detected along the WTHR during every month in 2022, and December has the lowest average number of caribou detections per survey (Table 3-4). The average number of caribou observed along the WTHR in 2022 was lower than the monthly averages across years for most months, including March-July and September-December (Table 3-4). The largest discrepancy occurred in May with an average of 14.6 caribou detected per survey in 2022 versus average detections of over 300 caribou per survey in May 2020 and 2021. The average number of caribou observed in 2022 was higher than the average across years for January, February, and August.

Table 3-3: Details of Whale Tail Haul Road Surveys from 2017 to 2022

Year	Annual range of surveys	Average Frequency[a]	Number of WTHR surveys				
			Spring[b]	Summer[b]	Fall[b]	Winter[b]	Annual Total
2017	Jan 03 – Dec 29	7.7 days	9	7	7	24	**47**
2018	Jan 30 – Dec 30	5.7 days	4	1	7	47	**59**
2019	Jan 08 – Dec 23	2.0 days	62	39	45	27	**173**
2020	Jan 07 – Dec 26	2.2 days	47	50	32	32	**161**
2021	Jan 10 – Dec 31	2.5 days	49	48	26	21	**144**
2022	Jan 02 – Dec 28	1.9 days	59	66	44	24	**193**

WTHR = Whale Tail Haul Road.

a) Frequency refers to the average number of days between surveys over the year.

b) Spring = Apr 1 to May 25, Summer = May 26 to Sep 21, Fall = Sep 22 to Dec 15, Winter = Dec 16 to Mar 31.

Table 3-4: Monthly Averages of the Number of Caribou Observed per Survey Trip Along the Whale Tail Haul Road from 2007 to 2022

Year	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2017	Vault	0	5	9	5	0	0	0	0	3	0	6	0
2018	Whale Tail	0	0	0	120.4	0	0	8.4	0	15.2	104.7	18.3	13.5
2018	Vault	0	2	5	46.3	0	0	0	0	77	10	0	0
2019	Whale Tail	4	0	4	80	119.2	7.5	1.5	45	3	75.9	3.7	8.3
2019	Vault	0	0	89.2	27.9	0	0	0	0	0	0	0	0
2020	WTHR	1.3	2.8	64.3	235.1	523.8	5.8	0.3	7.4	6.2	0.3	8.6	2.4
2021	WTHR	0.3	0	0	164.7	304.2	59.5	0.5	49.7	25.1	4.1	6.3	2
2022	WTHR	4.1	7.1	1.3	115.7	14.6	6.7	0.2	36.3	9	6.7	7.1	0.3
Average		**1.4**	**1.6**	**2.8**	**28.8**	**132.5**	**160.3**	**13.3**	**1.8**	**23.1**	**23.1**	**33.6**	**8.3**

Data show the average number of caribou observed for a month of the year, including data from all surveys completed that month. Data are based on the observed number, which might be more inaccurate for larger groups or groups that are further away.

3.6.3 Caribou Counts along AWAR and WTHR

The total number of caribou observed in 2022 along the AWAR were slightly higher than numbers from 2019, 2020, and 2021 (Figure 3-1). The total number of caribou observed along the WTHR in 2022 was slightly lower than numbers observed in 2020 and 2021, and total numbers from 2020-2022 were much lower than 2019 counts (Figure 3-1). Note, total counts across years are not corrected for differences in sampling effort (i.e., the number of surveys), meaning that increases in caribou total counts may be a direct result of a higher number of surveys conducted annually.

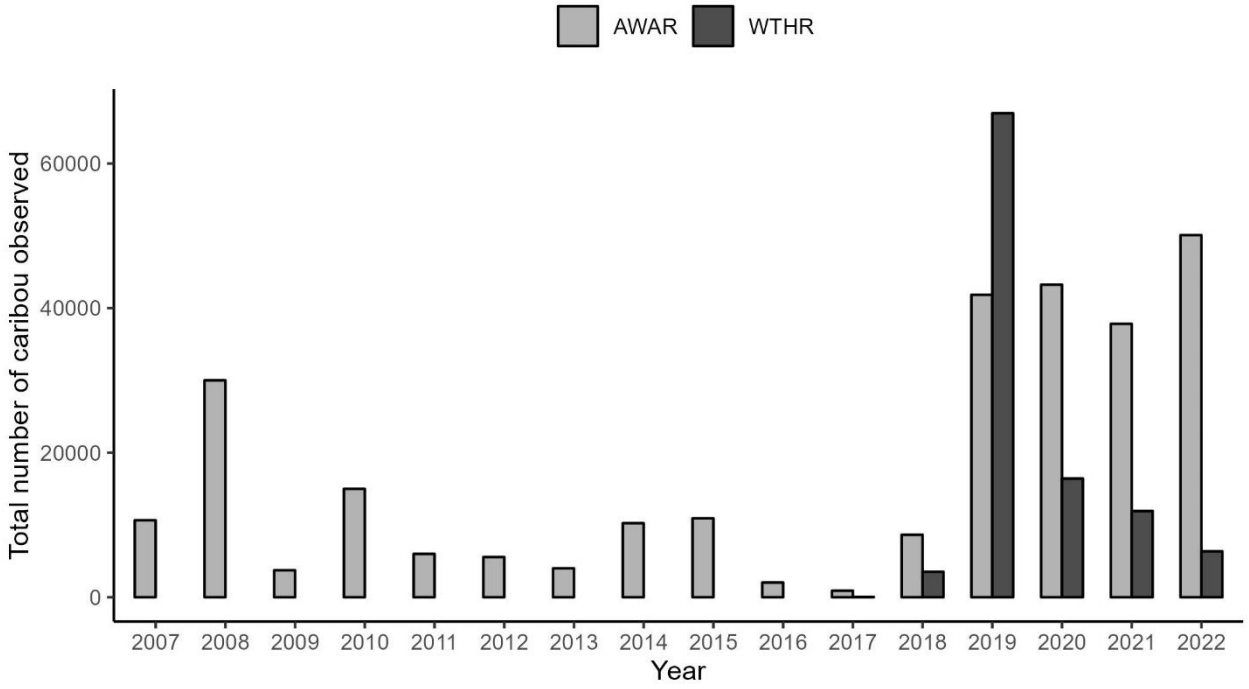


Figure 3-1: Total Number of Caribou Observed Each Year During All-Weather Access Road and Whale Tail Haul Road Surveys.

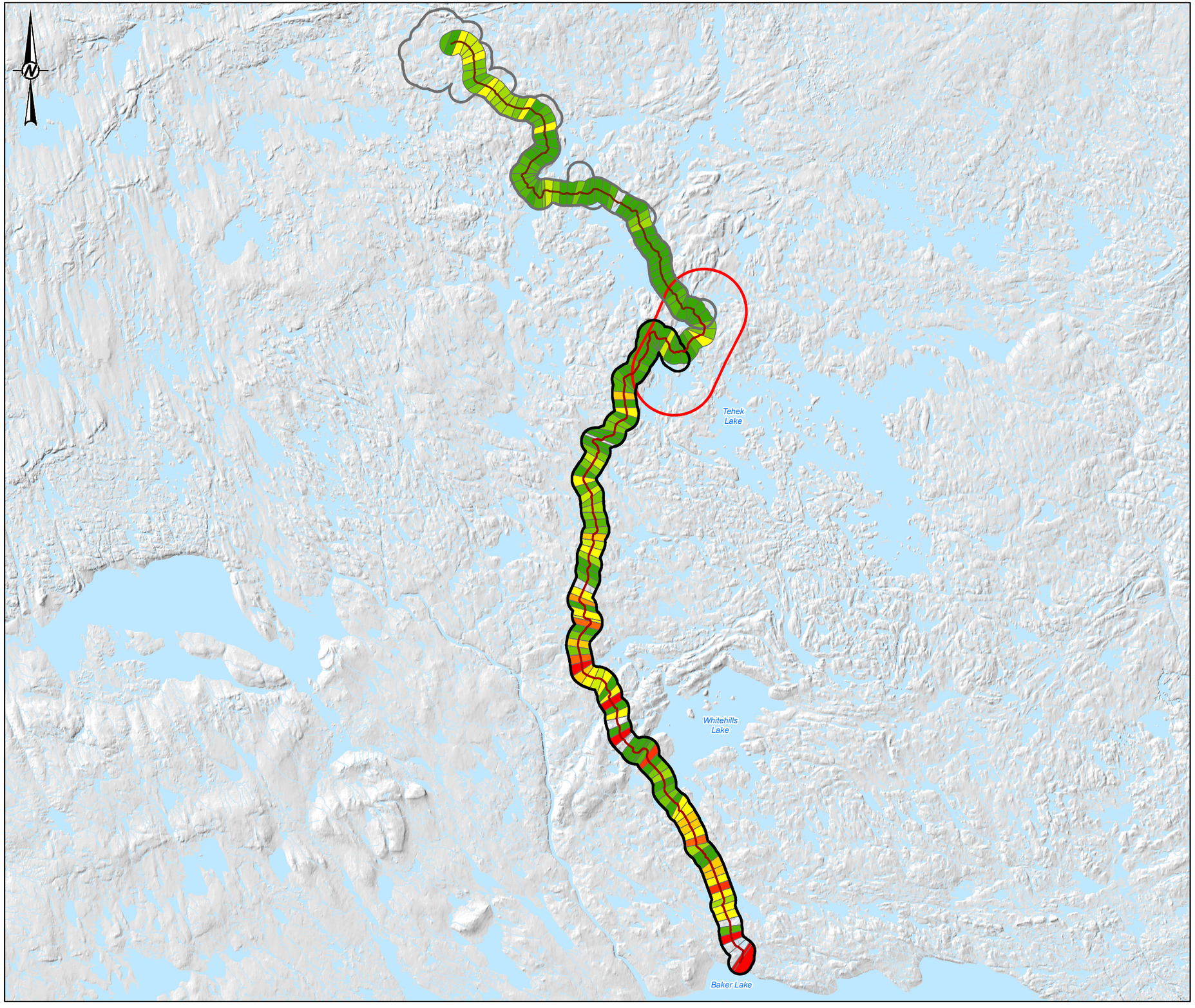
Maps were produced to depict the spatial variation of caribou counts along the AWAR and WTHR, summarized as the total number of caribou for each KM segment of road. Note, survey effort was not equal between the AWAR and WTHR in 2022 (235 AWAR surveys and 193 WTHR surveys), so caution should be taken when making comparisons between the two roads. Additionally, caribou observations determine the location and influence the frequency of road surveys. Caribou counts are shown for each segment of the AWAR and WTHR for 2022 for five different time intervals including year-round counts (Figure 3-2), spring and summer counts (Figure 3-3), and fall and winter counts (Figure 3-4). Considering both the AWAR and WTHR, caribou migration paths appear different across seasons with spring migration occurring primarily on the WTHR and near the Meadowbank complex and fall migration occurring primarily further south on the AWAR.

Year-round caribou counts along the AWAR varied substantially with totals ranging between 0 to 9,037 caribou for each 1-km section of road, though most kilometre sections had few caribou counts ranging between 1 and 150 caribou (Figure 3-2). Along the AWAR, caribou counts were lowest south of Meadowbank LSA with caribou count annual totals ranging between 0 and 98 caribou from KM 93 to 100. The highest counts were observed between

KM 1 to 5 near Baker Lake where 2,602 and 9,307 caribou were observed, which contradicts 2021 observations, where this section of the AWAR was lowest. During the spring months, caribou counts were very low along the AWAR. Most of the observation occurred northwest of Whitehills Lake, between KM 48 to 67, and north of KM 88. The fewest sightings were recorded near Baker Lake in the southern portion of the AWAR (Figure 3-3). During the summer months, caribou counts were relatively low along the AWAR, but caribou were still observed in most 1-km segments north of KM 11 (Figure 3-3). During the fall, caribou counts were more numerous in the southern portion of the AWAR, with a high-density pocket between KM 0 to 5 and KM 33 to 51 (Figure 3-4). Low caribou counts persisted near the Meadowbank LSA and west of Whitehills Lake during the fall. Caribou counts were very low along the AWAR during the winter, with scattered observations on the in the central portion of the AWAR between KM 46 to 58 and KM 73 to 78 (Figure 3-4).

Caribou distributions along the AWAR have changed across years. The 2019 analysis caribou counts revealed that from 2008 to 2019 the highest cumulative caribou counts along the AWAR occur in areas closest to the community of Baker Lake and south and north of Whitehills Lake (Agnico Eagle 2020b). Road survey results from 2020 found a similar pattern of year-round distribution along the AWAR and identified the stretch of road from KM 14 to 18 along the AWAR as a high-density congregation area for caribou, particularly in the summer and fall. The 2021 road survey data shows the opposite pattern with the lowest cumulative caribou counts occurring near Baker Lake across all seasons. The 2022 show similar patterns to the cumulative caribou counts prior to 2020, where the highest density of caribou were observed north of Baker Lake and northwest of Whitehills Lake (Figure 3-2).

Caribou counts ranged between 0 and 344 along the WTHR with caribou detections in almost every 1-km segment of road (Figure 3-2). Caribou counts were generally higher at the northern and southern ends of the WTHR, especially between KM 111 to 113 and KM 163 to 179. The observation of a high-density pocket near the south end of the WTHR is consistent with a high-density pocket observed during 2020 and 2021 road surveys within the Meadowbank complex. Caribou counts along the WTHR were highest in the spring (Figure 3-3). Summer counts were consistent along WTHR, and while lower than spring, caribou were still detected in almost every 1-km segment of road (Figure 3-3). Conversely, caribou detections were very low in fall and winter along the WTHR and only occurred at a few spots along the road (Figure 3-4).



LEGEND

- ALL-WEATHER ACCESS ROAD (AWAR)
- WHALE TAIL HAUL ROAD (WTHR)
- AWAR LOCAL STUDY AREA (LSA)
- WTHR LOCAL STUDY AREA (LSA)
- MEADOWBANK LOCAL STUDY AREA (LSA)
- WATERCOURSE
- WATERBODY

CARIBOU COUNT

- 1 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 500
- 500 - 750
- 750 - 1000
- 1000 - 1500
- 1500 - 2500
- 2500 - 10000

*EMPTY SECTIONS REFLECT CARIBOU COUNT = 0

0 10 20

1:500,000 KILOMETRES

REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

CARIBOU COUNTS ALONG THE ALL-WEATHER ACCESS ROAD AND WHALE TAIL HAUL ROAD, YEAR-ROUND (2022)

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	JF
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
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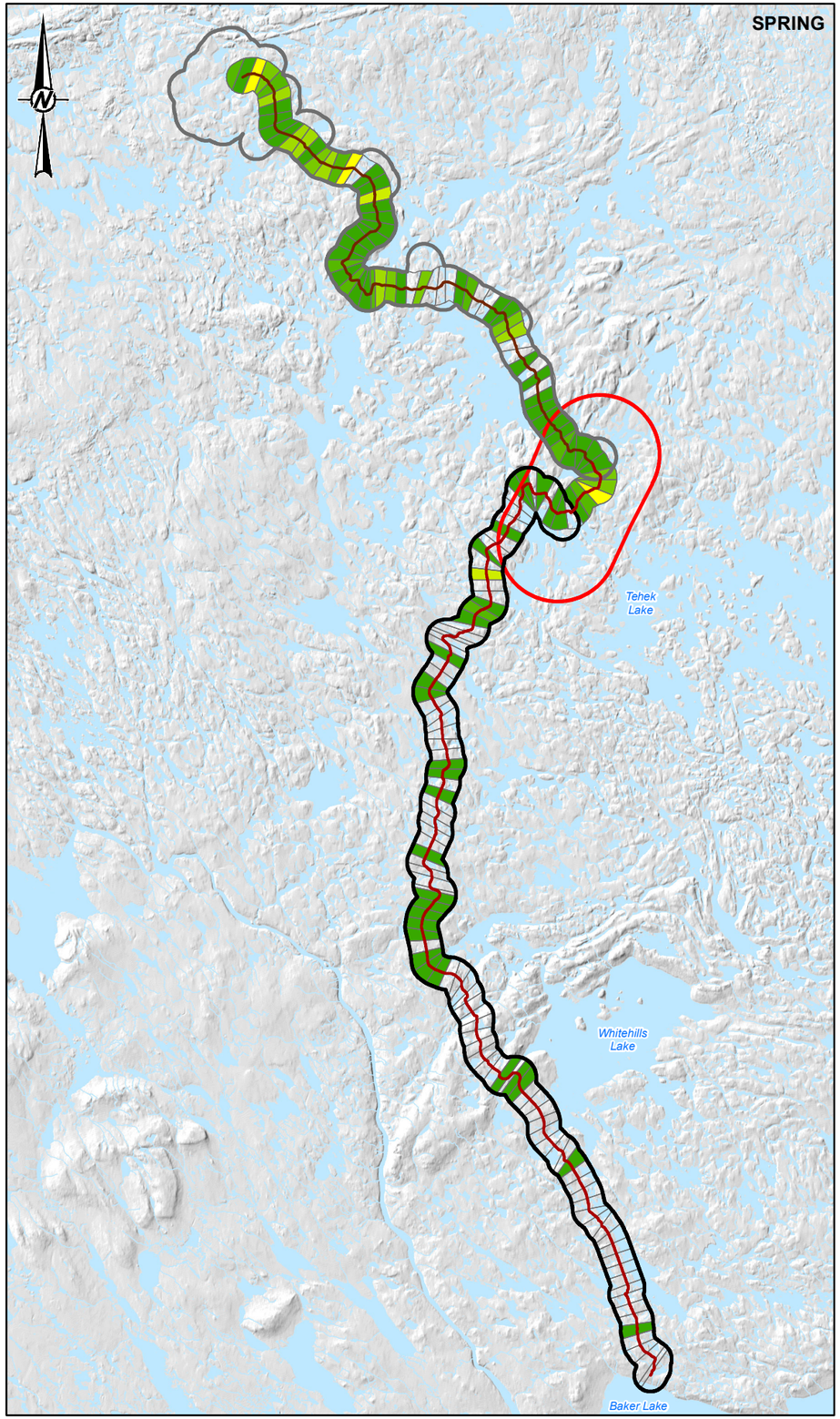

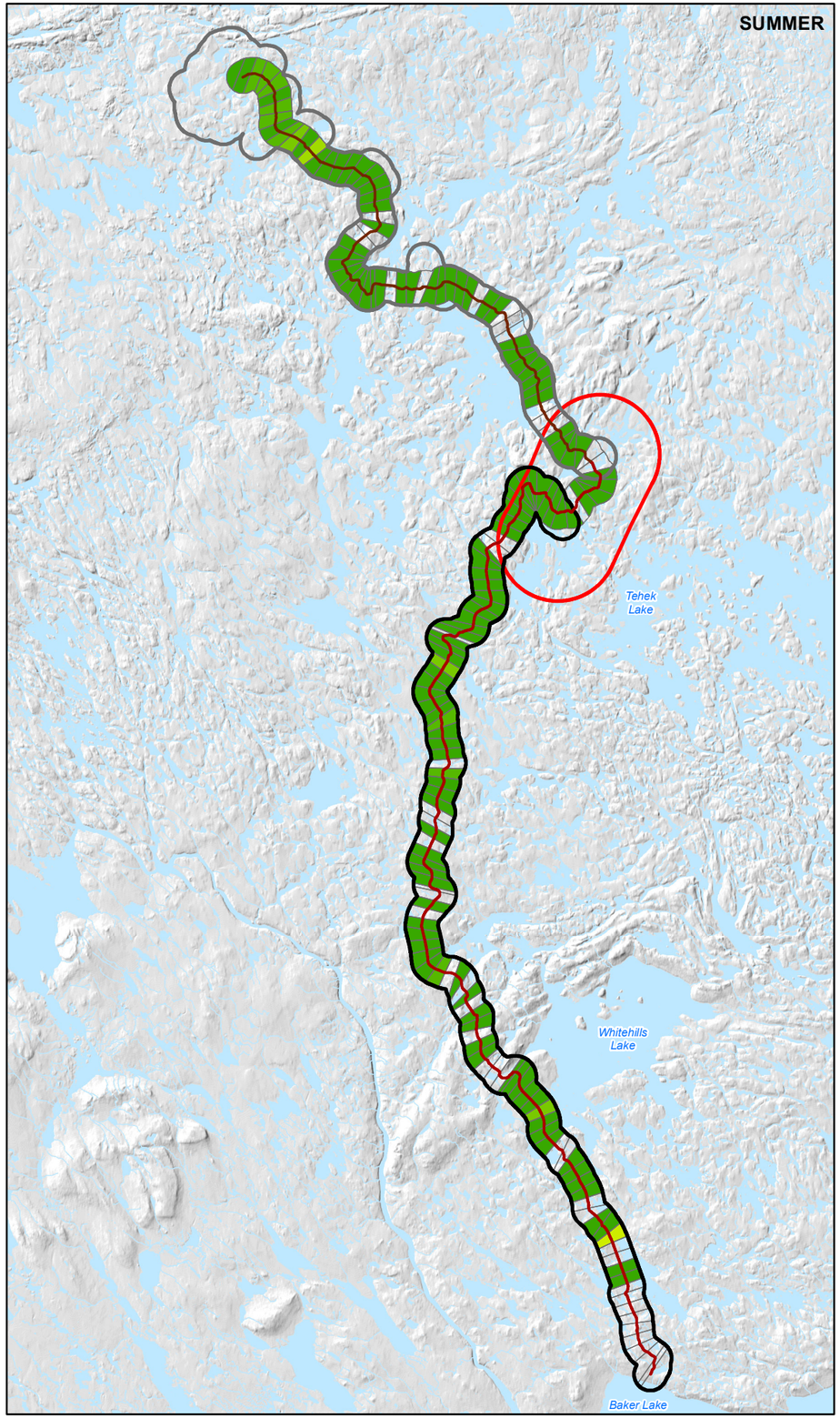

LEGEND

- ALL-WEATHER ACCESS ROAD (AWAR)
- WHALE TAIL HAUL ROAD (WTHR)
- AWAR LOCAL STUDY AREA (LSA)
- WTHR LOCAL STUDY AREA (LSA)
- MEADOWBANK LOCAL STUDY AREA (LSA)
- WATERCOURSE
- WATERBODY

CARIBOU COUNT

- 1 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 500
- 500 - 750
- 750 - 1000
- 1000 - 1500
- 1500 - 2500
- 2500 - 10000

*EMPTY SECTIONS REFLECT CARIBOU COUNT = 0

0 10 20

1:500,000 KILOMETRES

REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA.
COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

CARIBOU COUNTS ALONG THE ALL-WEATHER ACCESS ROAD AND WHALE TAIL HAUL ROAD, SPRING-SUMMER (2022)

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	JF
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
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25mm

0

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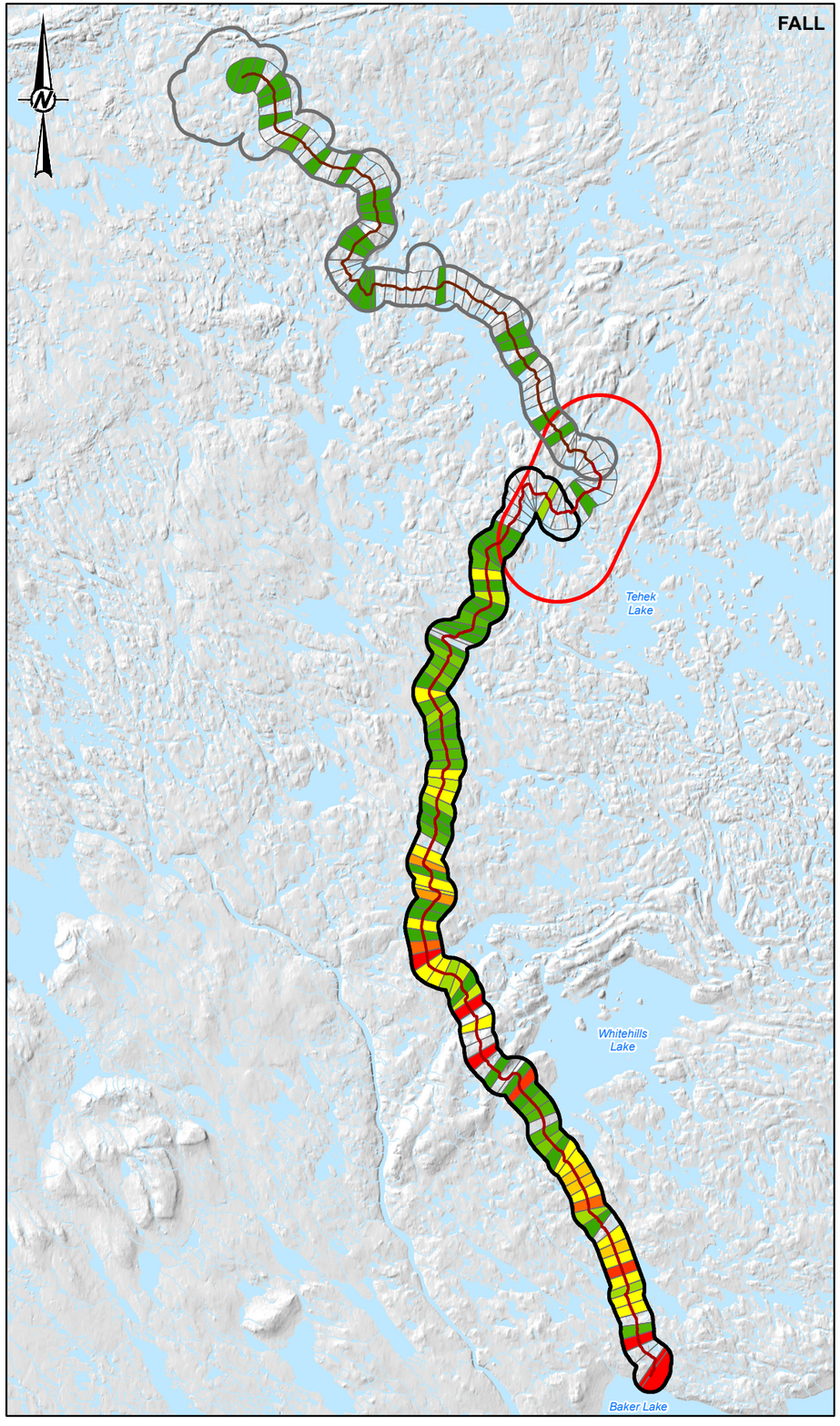
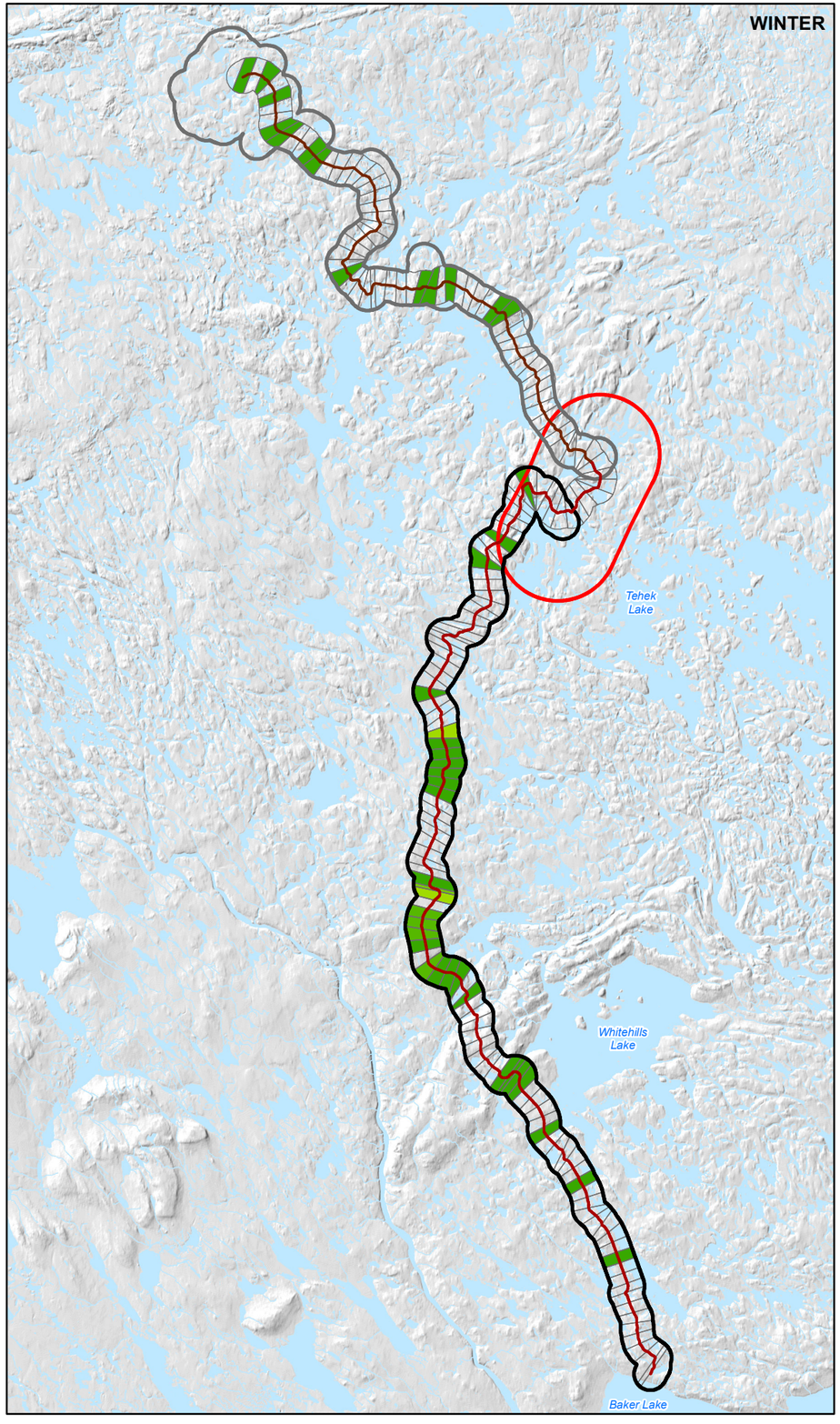




LEGEND

- ALL-WEATHER ACCESS ROAD (AWAR)
- WHALE TAIL HAUL ROAD (WTHR)
- AWAR LOCAL STUDY AREA (LSA)
- WTHR LOCAL STUDY AREA (LSA)
- MEADOWBANK LOCAL STUDY AREA (LSA)
- WATERCOURSE
- WATERBODY

CARIBOU COUNT

- 1 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- 200 - 250
- 250 - 500
- 500 - 750
- 750 - 1000
- 1000 - 1500
- 1500 - 2500
- 2500 - 10000

*EMPTY SECTIONS REFLECT CARIBOU COUNT = 0

0 10 20

1:500,000 KILOMETRES

REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

CARIBOU COUNTS ALONG THE ALL-WEATHER ACCESS ROAD AND WHALE TAIL HAUL ROAD, FALL-WINTER (2022)

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	JF
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
21502960	4000/4040	0	3-4

25mm

3.6.3.1 Group Size Threshold Calculation

Spring and fall GST for 2023 were calculated using 2022 caribou road survey data as well as historical data (Table 3-6). A GST is defined as the group size at, or above which, 75% of caribou observed interacting with Project infrastructure are expected to occur (Agnico Eagle 2019). Observations of caribou within 250 m of the road or greater than 1,000 m away from the road were excluded, based on methodology provided by GN (GN 2021). Spring and fall 2022 caribou road survey observations were grouped by season and observations were pooled between the AWAR and WTHR. The number of groups (i.e., number of observations), average group size, group size range, and 75th percentiles were summarized per season in Table 3-6. Spring and fall GSTs for 2023 were calculated by averaging GSTs for the corresponding season across all years with at least 100 caribou groups observed for that season. Variation due to low samples sizes may result in biased GSTs, and GST estimates were considered accurate (unbiased) if there were at least 100 groups observed for a season. There were five years of spring data with at least 100 caribou group observations (2008, 2018, 2019, 2020, and 2021; Table 3-6), and spring GSTs were averaged across those five years to calculate a spring 2023 GST of 35 caribou (Table 3-6). There were three years of fall data with at least 100 caribou group observations (2008, 2019, and 2022; Table 3-6), and fall GSTs were averaged across those three years to calculate a fall 2023 GST of 96 caribou (Table 3-6). For the purpose of calculating thresholds, GSTs were rounded down to the nearest whole number.

Table 3-5: Caribou group observation sample sizes for spring and fall road surveys, 2007-2022

Year	Sample Size[a]		Location[b]	Group Size 75th Percentile Spring	Group Size 75th Percentile Fall
	Spring	Fall			
2007	9	57	AWAR	N/A	N/A
2008	163	143	AWAR	12	100
2009	21	14	AWAR	N/A	N/A
2010	28	34	AWAR	N/A	N/A
2011	38	23	AWAR	N/A	N/A
2012	24	21	AWAR	N/A	N/A
2013	27	9	AWAR	N/A	N/A
2014	33	60	AWAR	N/A	N/A
2015	65	43	AWAR	N/A	N/A
2016	31	10	AWAR	N/A	N/A
2017	4	16	AWAR	N/A	N/A
2018	114	41	AWAR and WTHR	30	N/A
2019	437	127	AWAR and WTHR	60	125
2020	251	55	AWAR and WTHR	34	N/A
2021	373	63	AWAR and WTHR	31	N/A
2022	81	108	AWAR and WTHR	N/A	54

a) Sample size refers to the number of caribou groups observed during road surveys for a given year and season. A minimum of 100 observations is required for the season and year to be included in group size threshold (GST) calculations.

b) AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

N/A = not applicable.

Table 3-6: Caribou GST summaries for spring and fall based on 2022 data

Season[a]	Number of Observations[b]	Average group size	Group size range	Group size 75th percentile	Calculated GSTs for 2023[c]
Spring	81	33.9	1-250	44	**33**
Fall	108	46.4	1-350	54	**93**

a) 2022 caribou observations were summarized for the two sensitive seasons, spring and fall.

b) GSTs are considered unbiased when calculated using observations of at least 100 caribou groups.

c) GSTs for 2023 were calculated by taking the average of all group size thresholds across years for a given season that meet the minimum sample size requirement (n=100).

GST = group size threshold.

3.6.4 Wildlife Observations Along the AWAR and WTHR

Seven mammalian species and twelve avian species were detected and identified during road surveys in 2022 (Table 3-7). All seven mammal species were observed at both AWAR and WTHR, including Arctic fox (*Vulpes lagopus*), Artic ground squirrel (Urocitellus *parryii*), Arctic hare (*Lepus articus*), caribou, muskox, wolf (*Canis lupus*), and wolverine (*Gulo gulo*). Caribou and muskox were the most frequently observed mammals. Seven avian species were observed at both sites including American crow (*Corvus brachyrhynchos*), bald eagle (*Haliaeetus leucocephalus*), Canada goose (*Branta canadensis*), ptarmigan sp. (*Lagopus* sp.), rough-legged hawk (*Buteo lagopus*), sandhill crane (*Antigone canadensis*), and snow goose (*Chen caerulescens*). Hawk sp. (*Buteo*), osprey (*Pandion haliaetus*), and peregrine falcon (*Falco peregrinus*) were only observed at AWAR. Common raven (*Corvus corax*) and gull sp. (*Larus*) were only observed at WTHR. At both AWAR and WTHR Snow geese and Canada geese were the most frequently observed species.

Eight mammalian species and three avian species were detected and identified incidentally on the AWAR and WTHR in 2022 (Table 3-8). Grizzly bears (*Ursus arctos horribilis*) and wolverines were only observed on the AWAR, and Arctic ground squirrel were only observed on the WTHR. The remainder of the species observed were recorded on both roads, including Arctic fox, Arctic hare, caribou, muskox, and wolf. On both roads, caribou and muskox were the most frequently observed species. Peregrine falcon were observed at both the AWAR and the WTHR. Ptarmigan sp., which includes rock ptarmigan (*Lagopus muta*) and/or willow ptarmigan (*Lagopus lagopus*), as well as snowy owl (*Bubo scandiacus*) were observed incidentally at the AWAR only.

Table 3-7: Species Detected During Road Surveys at All-Weather Access Road and Whale Tail Haul Road in 2022 by Month

Species Group	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AWAR														
Mammal	Arctic fox	0	0	2	1	1	2	0	1	2	0	0	0	9
	Arctic ground squirrel	0	0	0	0	0	0	0	1	0	0	0	0	1
	Arctic hare	0	0	0	2	8	0	0	2	3	0	0	0	15
	Caribou	537	488	90	665	175	112	456	268	803	22,708	23,788	3	50,093
	Muskox	66	10	16	102	64	217	185	212	180	90	611	196	1,949
	Wolf	0	0	0	0	0	0	0	0	7	14	3	0	24
	Wolverine	0	0	0	0	0	1	0	0	0	0	0	0	1

Table 3-7: Species Detected During Road Surveys at All-Weather Access Road and Whale Tail Haul Road in 2022 by Month

Species Group	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Bird	Bald Eagle	0	0	0	0	0	0	1	1	0	0	0	0	2
	Canada goose	0	0	0	0	0	25	6	147	0	0	0	0	178
	Crow	0	0	0	0	3	0	0	0	0	0	0	0	3
	Hawk sp.	0	0	0	0	0	1	0	0	0	0	0	0	1
	Osprey	0	0	0	0	1	0	0	0	0	0	0	0	1
	Peregrine falcon	0	0	0	0	2	1	0	4	0	0	0	0	7
	Ptarmigan	0	0	0	18	49	2	0	0	25	0	0	0	94
	Rough-legged-Hawk	0	0	0	0	1	0	0	0	0	0	0	0	1
	Sandhill crane	0	0	0	0	56	5	18	11	0	0	0	0	90
	Snow goose	0	0	0	0	507	0	12	262	0	0	0	0	781
WTHR														
Mammal	Arctic fox	0	1	3	1	3	1	3	0	0	7	3	0	22
	Arctic ground squirrel	0	0	0	0	0	2	0	1	0	0	0	0	3
	Arctic hare	0	0	0	0	4	2	0	0	0	1	0	0	7
	Caribou	29	50	9	4,164	366	80	2	1,306	99	114	134	2	6,355
	Muskox	46	8	20	164	97	47	92	124	236	349	549	39	1,771
	Wolf	0	0	0	5	0	1	4	1	0	5	0	0	16
	Wolverine	0	1	0	0	0	0	0	0	0	0	1	0	2
Bird	Bald Eagle	0	0	0	0	0	1	0	1	0	0	0	0	2
	Canada goose	0	0	0	0	0	14	22	71	294	0	0	0	401
	Common raven	0	0	0	0	0	0	0	0	0	0	1	0	1
	Crow	0	0	0	1	0	0	0	0	0	0	0	0	1
	Gull sp.	0	0	0	0	1	0	0	0	0	0	0	0	1
	Ptarmigan	0	0	0	0	0	0	0	0	4	0	0	0	4
	Rough-legged-Hawk	0	0	0	0	2	0	0	0	1	0	0	0	3
	Sandhill crane	0	0	0	0	2	2	0	2	0	0	0	0	6
	Snow goose	0	0	0	0	350	0	0	13	0	0	0	0	363

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

Table 3-8: Species Detected Incidentally at All-Weather Access Road and Whale Tail Haul Road in 2022 by Month

Species Group	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AWAR														
Mammal	Arctic fox	0	3	0	0	0	0	0	0	0	0	0	0	3
	Arctic hare	0	1	0	0	0	0	0	0	0	0	2	0	3
	Caribou	160	173	5	647	245	5	362	102	29	684	1,161	0	3,573
	Grizzly bear	0	0	0	0	1	0	0	2	0	0	0	0	3
	Muskox	0	0	3	110	27	26	105	45	55	0	124	80	575
	Wolf	0	0	0	1	2	0	1	0	0	0	0	0	4
	Wolverine	0	0	0	0	0	0	0	1	0	0	0	0	1
Bird	Peregrine falcon	0	0	0	0	0	0	0	0	3	0	0	0	3
	Ptarmigan	0	0	0	1	0	0	0	0	0	0	0	0	1
	Snow goose	0	0	0	0	0	0	0	0	600	0	0	0	
	Snowy owl	0	0	0	0	0	0	0	0	1	0	0	0	1

Table 3-8: Species Detected Incidentally at All-Weather Access Road and Whale Tail Haul Road in 2022 by Month

Species Group	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
WTHR														
Mammal	Arctic fox	0	0	0	0	0	0	0	0	1	1	4	0	6
	Arctic ground squirrel	0	0	0	0	0	0	0	0	1	0	0	0	1
	Arctic hare	0	0	0	0	0	0	2	0	2	0	0	0	4
	Caribou	20	22	50	3,803	289	24	2	159	47	309	3	6	4,734
	Muskox	11	111	30	20	4	9	22	22	136	59	114	3	541
	Wolf	0	6	33	8	0	0	0	0	0	4	0	0	51
Bird	Peregrine falcon	0	0	0	0	0	0	3	0	0	0	0	0	3

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

3.6.5 Road-related Mitigation

Road-related monitoring and mitigation were implemented according to Figures 7 and 8 of the TEMP version 7 (Agnico Eagle 2019). Collar location maps were instrumental in assessing the need for increased road monitoring. Road-related mitigation related to caribou presence in 2022 resulted in road closures and a corresponding reduction in total vehicle movements (Section 3.6.7). Outside of the fall migration period, road closures were implemented, or vehicle movements were restricted (e.g., light vehicles only, speed limited enforced) in response to high caribou numbers. During the fall migration period, road closures were implemented if there were two collared caribou in the regional study area. Convoys were organized by Mine Environment staff, who had the training to decide whether vehicles could continue along the road when caribou were sighted, and at times assisted by the BLHTO or the KivIA.

Regular wildlife warnings were dispatched based on observation and monitoring data. The road supervisors and operators also ensured protection of wildlife by assisting in surveillance and closing roads as needed. Radio notices reminding operators of the appropriate speed limit were made frequently by dispatchers. During caribou peak migration, notices were sent to all road occupants, regulatory agencies, local groups, and wildlife consultants were notified, and road survey efforts were increased.

3.6.6 AWAR and WTHR Closures

Sightings of caribou that appeared to be travelling a migration route were noted in late summer and the fall migration decision tree for implementing road closures was implemented starting 31 July 2022. Significant movements of caribou and muskox occurred along the AWAR throughout October and November 2022, resulting in multiple closures to Project-related traffic. The AWAR was closed (i.e., 24-hour closure) on 45 days in 2022, with 23 days due to caribou, 21 days due to weather, and 1 day due to maintenance activities (Table 3-9). The AWAR was had closure days with less than 24 hours of closure on 71 occasions, including 28 closure days due to caribou (Table 3-9). October and November had the highest number of days with closures (both for 24-hour closures and less than 24-hour closures), aligning with caribou fall migration. In total, the AWAR was closed for a total of 1,808 hours in 2022, with the highest number of closure hours reported in October and November due to caribou migration and January due to weather (Table 3-10). Speed restrictions were applied on 84 days on the AWAR and were mostly applied in response to both caribou and muskox presence (Table 3-9). Mitigation measures such as reduced speeds were instituted due to the presence both muskox and caribou herds throughout the year. Traffic restrictions were applied on the AWAR on two days, during which traffic was restricted to light vehicles only due to weather. In total, there were 134 days in 2022 with road closures and speed

restrictions applied on the AWAR in response to caribou and/or muskox (Table 3-9). Full summaries of AWAR road closures, restrictions, and reason for reopening are available in Appendix B in Table B-1.

Significant movements of caribou occurred along the WTHR in spring during April, resulting in multiple closures to Project-related traffic. The WTHR was fully closed (i.e., 24-hour closure) on 15 days, with seven closure days due to caribou and eight closure days due to weather (Table 3-9). On 63 days, the WTHR experience closures occurring for less than 24 hours, with 20 closure days related to caribou and one closure day related to muskox (Table 3-9). In total, the WTHR was closed for a total of 894 hours in 2022, with the highest number of closure hours reported in April due to caribou spring migration and January due to weather (Table 3-10). Speed restrictions were applied on 93 days on the WTHR and in all cases were applied in response to caribou and/or muskox presence (Table 3-9). Reduced speeds were instituted due to the presence of both muskox and caribou herds throughout the year. There were three days in 2022 during which a closure and speed restriction on the WTHR were implemented for separate reasons (Table 3-9). On each of these three days, a speed restriction was in place due to muskox and a closure was implemented for less than 24 hours due to either weather or maintenance. Traffic restrictions were applied on the WTHR on six days, during which traffic was restricted to light vehicles only for some sections of road. In total, there were 129 days in 2022 with road closures and speed restrictions applied on the WTHR in response to caribou and/or muskox (Table 3-9). Full summaries of WTHR road closures, restrictions, and reasons for reopening are available in Appendix B in Table B-2.

Table 3-9: Number of Road Closures and Restrictions Implemented Due to Ungulate Activity, Weather, or Maintenance Along the All-Weather Access Road and Whale Tail Haul Road, 2022.

Closure Status	Cause	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AWAR														
Closure 24 hours	Caribou	1	-	-	1	-	-	1	-	-	10	10	-	23
	Maintenance	-	-	-	-	-	1	-	-	-	-	-	-	1
	Weather	12	2	-	1	3	-	-	-	-	-	1	2	21
Closure < 24 hours	Caribou	1	-	-	11	1	-	1	1	-	8	5	-	28
	Cyanide Convoy	-	-	-	-	-	-	-	-	4	-	-	-	4
	Maintenance	-	-	2	-	-	1	-	-	-	-	-	-	3
	Weather	2	3	11	1	2	-	-	-	-	4	2	11	36
Speed Restriction	Caribou	5	6	1	3	8	-	1	14	7	4	-	-	49
	Caribou/Muskox	1	-	-	-	-	-	-	-	1	-	-	-	2
	Muskox	2	-	-	4	-	3	9	6	5	-	3	-	32
	Not Specified	-	-	-	-	-	-	-	-	1	-	-	-	1
Traffic Restriction[(a)]	Weather	-	-	-	-	-	-	-	-	-	2	-	-	2
WTHR														
Closure 24 hours	Caribou	-	-	-	7	-	-	-	-	-	-	-	-	7
	Weather	6	-	1	-	-	-	-	-	-	-	-	1	8
Closure < 24 hours	Caribou	-	-	-	15	2	-	-	1	-	2	-	-	20
	Maintenance	1	-	-	-	-	-	-	-	-	-	-	-	1
	Muskox	-	-	1	-	-	-	-	-	-	-	-	-	1
	Visible Smoke	-	2	-	-	-	-	-	-	-	-	-	-	2
	Weather	6	-	7	-	1	2	-	-	-	10	3	7	36

Table 3-9: Number of Road Closures and Restrictions Implemented Due to Ungulate Activity, Weather, or Maintenance Along the All-Weather Access Road and Whale Tail Haul Road, 2022.

Closure Status	Cause	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Closure/ Speed Restriction[b]	Maintenance/ Muskox	-	-	-	-	-	-	-	-	-	-	1	-	1
	Weather/Muskox	-	-	-	-	-	-	-	-	-	1	1	-	2
Speed Restriction	Caribou	-	1	-	6	18	1	-	19	2	-	-	-	47
	Caribou/Muskox	-	-	-	-	-	-	-	1	-	-	-	-	1
	Muskox	2	2	-	-	2	2	3	4	9	5	13	-	42
Traffic Restriction	Covid	-	1	-	-	-	-	-	-	-	-	-	-	1
	Not Specified	-	-	-	-	-	-	-	-	-	1	-	-	1
	Weather	-	-	-	-	-	-	-	-	-	2	2	-	4

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

a) Traffic restricted to light vehicles only.

b) Closure (less than 24 hours) and speed restriction occurred on the same date for separate reasons. Closure was related to maintenance or weather while the speed restriction was related to muskox.

Table 3-10: Number of Road Closure Hours Due to Ungulate Activity, Weather, or Maintenance Along the All-Weather Access Road and Whale Tail Haul Road, 2022.

Closure Status	Cause	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AWAR														
Closure 24 hours	Caribou	24.0	-	-	24.0	-	-	24.0	-	-	240.0	240.0	-	552.0
	Maintenance	-	-	-	-	-	24.0	-	-	-	-	-	-	24.0
	Weather	288.0	48.0	-	24.0	72.0	-	-	-	-	-	24.0	48.0	504.0
Closure < 24 hours	Caribou	11.0	-	-	151.8	4.5	-	11.5	17.5	-	87.3	69.8	-	353.3
	Cyanide Convoy	-	-	-	-	-	-	-	-	0.0	-	-	-	0.0
	Maintenance	-	-	26.0	-	-	18.0	-	-	-	-	-	-	44.0
	Weather	17.5	16.0	114.5	9.5	13.3	-	-	-	-	48.3	18.0	94.2	331.2
WTHR														
Closure 24 hours	Caribou	-	-	-	168.0	-	-	-	-	-	-	-	-	168.0
	Weather	144.0	-	24.0	-	-	-	-	-	-	-	-	24.0	192.0
Closure < 24 hours	Caribou	-	-	-	143.8	31.6	-	-	6.8	-	3.9	-	-	186.0
	Maintenance	4.5	-	-	-	-	-	-	-	-	-	-	-	4.5
	Muskox	-	-	2.0	-	-	-	-	-	-	-	-	-	2.0
	Visible Smoke	-	2.0	-	-	-	-	-	-	-	-	-	-	2.0
	Weather	48.3	-	63.3	-	5.0	28.0	-	-	-	127.0	12.9	55.7	340.1

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

The percentage of caribou that encountered the AWAR when closed was 76% of caribou observed during spring (1,276 of 1,683 caribou observed in spring) and 98% of caribou observed in fall (47,802 of 48,575 caribou observed in fall; Table 3-11). The percentage of caribou that encountered the WTHR when closed was 91% during the spring (8,366 out of 9,236 caribou observed in spring) and 66% during the fall (414 of 632 caribou observed in fall; Table 3-11). Percentages were calculated based on the sum of caribou counts on each road based on closure status for the day of observation (i.e., open versus closure), with both 24-hour closures and less than 24 hour closures considered together for the purpose of this calculation.

Table 3-11: Percentage of Caribou Encountering Closed Roads

Road	Season	Number of Caribou Encountering Closed Roads	Total Caribou Observations	Percentage of Caribou Encountering Closed Road
AWAR	Spring	1,276	1,683	75.82
	Summer	882	1,954	45.14
	Fall	47,802	48,575	98.41
	Winter	381	1,454	26.20
	Annual	50,341	53,666	93.80
WTHR	Spring	8,366	9,236	90.58
	Summer	321	1,757	18.27
	Fall	414	632	65.51
	Winter	27	203	13.30
	Annual	9,128	11,828	77.17
AWAR + WTHR	Spring	9,642	10,919	88.30
	Summer	1,203	3,711	32.42
	Fall	48,216	49,207	97.99
	Winter	408	1,657	24.62
	Annual	59,469	65,494	90.80

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

3.6.7 Traffic Data

Total one-way traffic along the AWAR in 2022 included 90 heavy equipment, 15,055 medium equipment, and 11,283 light equipment vehicles for a total of 26,428 vehicles (Table 3-12). Total traffic along the WTHR included 54,856 heavy equipment, 2,943 medium equipment, and 3,271 light equipment vehicles, for a total of 61,070 vehicles (Table 3-13). Total traffic along the AWAR was about 10% higher in 2021 (n=29,516) than the 2022 total of vehicles, and traffic along the WTHR was 2% lower in 2022 compared to the vehicles in 2021 (n=62,037) (Golder 2021). Monthly vehicle traffic for the AWAR and WTHR fluctuated throughout the year (Figure 3-5). Lowest traffic rates on the AWAR occurred in January, and highest traffic rates occurred in September (Table 3-12; Figure 3-5). On the WTHR, lowest traffic rates were recorded in January, and highest traffic rates were recorded in August (Table 3-13; Figure 3-5). While caribou counts for the month of August were relatively high along the WTHR (Table 3-7) and seemingly coincided with high traffic rates, group sizes were generally small and only triggered traffic mitigation on two days resulting in a less than 24 hour road closure on 10 August and a speed restriction on 11 August (Appendix B). Although only two days in August had caribou observations on the WTHR that exceeded GSTs and triggered mitigation and there were no days with muskox

observations that exceeded the GST, speed restrictions were implemented on the WTHR on 24 days in August due to observed ungulate activity as a precaution.

During periods of road closures or Level 3 status, a daily meeting is held with all departments to validate the essential needs requiring access to the roads (road maintenance, food, etc.). From this meeting, departure time, departure location, and the list of vehicles authorized to travel on the road will be determined. Only essential vehicles are permitted in convoys. Environment personnel will meet the vehicles at agreed upon time and departure location and validate the list of authorized vehicles to escort them along the road. Vehicles in a convoy are instructed to stay a minimum of 1 km behind the pilot vehicle unless otherwise instructed by Environment pilot vehicle. KivIA and HTO representative regularly participate in leading the essential vehicles.

There were 9 convoys between 7 October and 22 November along the AWAR, and 22 convoys between 3 April and 10 August along the WTHR in 2022 (Table 3-14). Note, convoys were included as one-way trips, meaning a round trip on a single day would be considered two separate convoys. Convoys occurred during road closures, but convoys did not occur on all days where roads were closed. Medium vehicles were the most common vehicle type (n=89), followed by light vehicles (n=84; Table 3-14).

Table 3-12: Monthly Traffic Data for the Meadowbank All-Weather Access Road in 2022

Month	Heavy Equipment	Medium Equipment	Light Equipment	Total
January	0	836	698	1,534
February	0	1,174	730	1,904
March	5	1,462	1,060	2,527
April	8	1,178	1,107	2,293
May	2	1,306	1,155	2,463
June	0	1,190	911	2,101
July	2	1,128	860	1,990
August	0	1,987	829	2,816
September	1	1,906	1,023	2,930
October	35	781	1,079	1,895
November	14	1,114	1,000	2,128
December	23	993	831	1,847
Total	**90**	**15,055**	**11,283**	**26,428**

Heavy equipment = haul trucks, long haul trucks; Medium equipment = tankers, graders, snowplows, cement trucks, fuel trucks, and other similar sized vehicles; Light equipment = pick-up trucks, bus, water trucks, and other similar sized vehicles.

Table 3-13: Monthly Traffic Data for the Meadowbank Whale Tail Haul Road in 2022

Month	Heavy Equipment	Medium Equipment	Light Equipment	Total
January	1,944	163	278	2,385
February	3,890	194	272	4,356
March	4,316	257	254	4,827
April	3,126	192	236	3,554
May	5,278	336	205	5,819
June	5,392	345	304	6,041
July	6,098	283	286	6,667
August	6,238	319	235	6,792
September	5,270	206	228	5,704
October	3,572	191	467	4,230

Table 3-13: Monthly Traffic Data for the Meadowbank Whale Tail Haul Road in 2022

Month	Heavy Equipment	Medium Equipment	Light Equipment	Total
November	4,630	243	332	5,205
December	5,102	214	174	5,490
Total	**54,856**	**2,943**	**3,271**	**61,070**

Heavy equipment = haul trucks, long haul trucks; Medium equipment = tankers, graders, snowplows, cement trucks, fuel trucks, and other similar sized vehicles; Light equipment = pick-up trucks, bus, water trucks, and other similar sized vehicles.

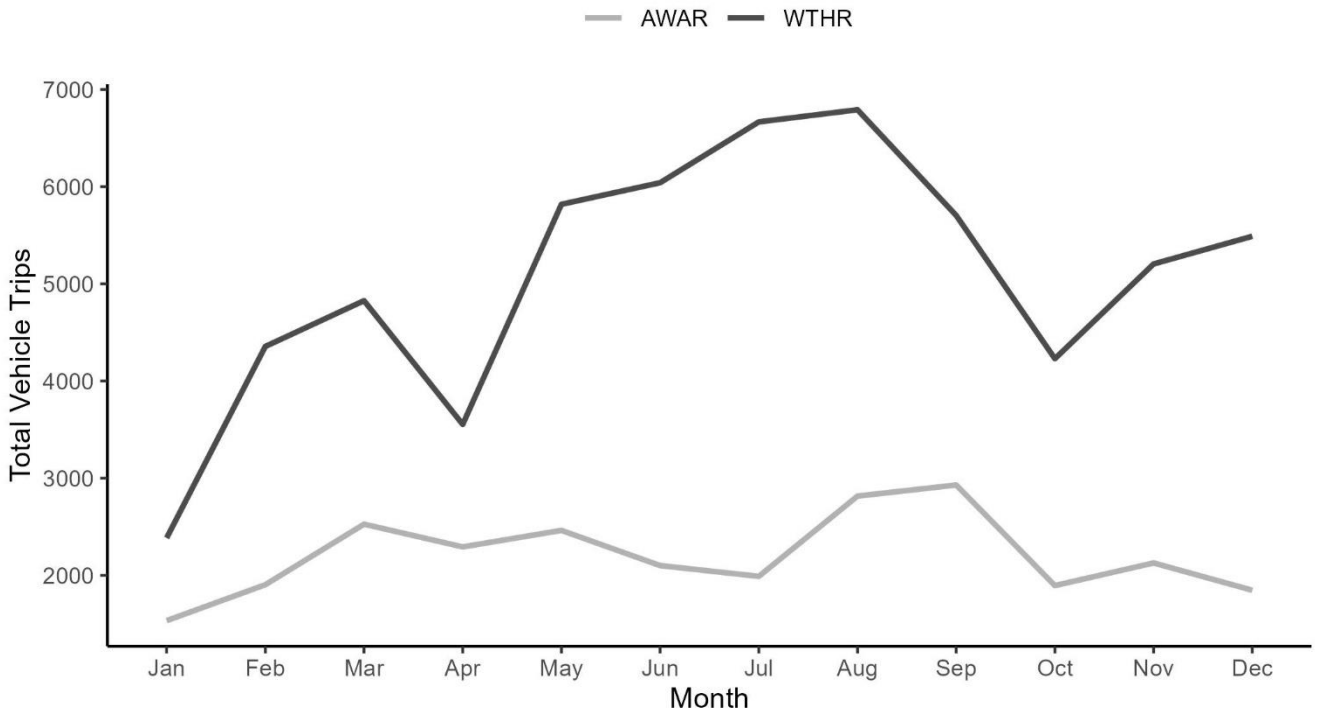


Figure 3-5: Total Vehicle Traffic (One-way Trips) Along All-Weather Access Road and Whale Tail Haul Road per Month in 2022

Table 3-14 Convoy Tracker for the AWAR and WTHR in 2022

Date	Direction of Travel	Convoy Type	Light	Medium	Heavy	Total[(a)]
AWAR						
2022-10-07	North & South (twice)	Passenger transport escort	2	0	0	2
2022-10-21	South	H&S (medical escort to Baker Lake)	2	0	0	2
2022-10-23	South/North	H&S (medical escort to Baker Lake)	2	0	0	2
2022-10-24	South	H&S (medical escort to Baker Lake)	2	0	0	2
2022-11-02	South	Escort back to hubs	1	8	0	9
2022-11-03	South	Essential Needs (food, etc.)	2	0	0	2
2022-11-12	South	Escort back to hubs	1	3	0	4
2022-11-13	North	Escort back to hubs	1	3	0	4
2022-11-22	North	Fuel Convoy	4	6	0	10
WTHR						
2022-04-03	South	Passenger transport escort	5	2	0	7
2022-04-03	North	Passenger transport escort	5	3	0	8
2022-04-07	South	Passenger transport escort	5	2	0	7
2022-04-10	South	Essential Needs (food, etc.)	1	2	0	3
2022-04-10	North	Essential Needs (food, etc.)	3	2	0	5
2022-04-11	South	Passenger transport escort	7	3	0	10
2022-04-11	North	Passenger transport escort	4	4	0	8
2022-04-14	North	Passenger transport escort	3	5	0	8
2022-04-15	North	Passenger transport escort	2	1	0	3
2022-04-15	South	Essential Needs (food, etc.)	1	2	0	3
2022-04-16	North	Essential Needs (food, etc.)	2	3	0	5
2022-04-16	South	Essential Needs (food, etc.)	2	4	0	6
2022-04-17	North	Essential Needs (food, etc.)	2	5	0	7
2022-04-21	South	Passenger transport escort	3	3	0	6
2022-04-21	North	Passenger transport escort	3	4	0	7
2022-04-22	South	Passenger transport escort	2	2	0	4
2022-04-22	North	Passenger transport escort	6	5	1	12
2022-04-23	South	Essential Needs (food, etc.)	2	6	0	8
2022-04-23	North	Essential Needs (food, etc.)	2	3	0	5
2022-04-24	South	Essential Needs (food, etc.)	2	2	0	4
2022-08-10	South	Passenger transport escort	3	6	0	9
2022-08-10	North	Passenger transport escort	2	0	0	2
Total[(b)]			84	89	1	174

Heavy equipment = haul trucks, float; Medium equipment = cube trucks, emulsion, fuel tanker, tractor trailer, roll off, vacuum, lube truck, and other similar sized vehicles; Light equipment = wildlife monitors, pick-up trucks, bus, and other similar sized vehicles.

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road

a) Total number of vehicles per convoy

b) Total number of vehicles by vehicle type summed across all AWAR and WTHR convoys

3.6.8 Caribou Responses to Mitigation

Caribou Crossings

The frequency of road surveys in 2022 demonstrate Agnico Eagle's commitment to preventing impacts to caribou from the AWAR, WTHR (including Vault Haul Road). Mitigation measures such as reduced speeds, convoys, and multiple road closures function to minimize road-related effects including mortality and injury, and to increase caribou passage. Incidental sightings in 2022 recorded in the Wildlife Log (Appendix A) and road surveys showed that caribou crossed roads throughout the year, with especially high numbers during spring and fall migration (Table 3-15).

A total of 11,242 caribou were observed crossing the AWAR and 849 caribou were observed crossing the WTHR in 2022. Additionally, at Meadowbank there were two records of caribou crossings with one group of four observed on 14 June 2022, and another group of four observed on 27 July 2022. For the AWAR, the majority of caribou crossing observations occurred during fall migration with 95% (10,673 of 11,242 caribou) of observed AWAR caribou crossings occurring during this season. The months with the greatest number of caribou observed crossing the AWAR included October (over 4,000 observed crossings), and November (over 4,000 observations; Figure 3-6). During fall migration, 100% (10,673 of 10,673 caribou) of observed caribou crossings on the AWAR occurred on dates with an AWAR closure (Table 3-15). For annual caribou crossing observations on the AWAR, 96% (10,750 of 11,242 caribou) of observed crossing events occurred on dates with an AWAR closure and 4% (455 of 11,242 caribou) occurred on a day with a speed restriction in place.

For the WTHR, the majority of caribou crossing observations occurred during the spring migration with 62% (527 of 849) of observed WTHR caribou crossing occurring during this season. The month with the greatest number of caribou crossing the WTHR was April with 254 caribou crossings observed. There were no observed caribou crossings on the AWAR in May and December, and there were no observed caribou crossings on the WTHR during January, November, June, and December (Figure 3-6). During spring migration, 91% (478 of 527 caribou) of observed caribou crossings on the WTHR occurred on dates with a WTHR closure (Table 3-15). For annual caribou crossing observations on the WTHR, 83% (706 of 849 caribou) of observed crossing events occurred on dates with a WTHR closure and 15% (128 of 849 caribou) occurred on a day with a speed restriction in place. Caribou movement patterns continue to require close monitoring and analysis in 2023.

Table 3-15: Observations of Caribou Crossing AWAR and WTHR in 2022

Season	Date	Closure Status	Crossing KM Marker	Number of Caribou Crossing
AWAR				
Winter	2022-01-27	Speed Restriction	57	15
	2022-02-03	Speed Restriction	56	80
	2022-02-11	Speed Restriction	56	23
	2022-02-11	Speed Restriction	57	1
	2022-02-11	Speed Restriction	58	100
	2022-02-15	Speed Restriction	54	10
	2022-02-15	Speed Restriction	49	10
	2022-02-18	Open	56	19
	2022-02-25	Speed Restriction	56	20
	2022-03-05	Speed Restriction	102	9

Table 3-15: Observations of Caribou Crossing AWAR and WTHR in 2022

Season	Date	Closure Status	Crossing KM Marker	Number of Caribou Crossing
Spring	2022-04-03	Closure (< 24 hours)	50	10
	2022-04-06	Open	55	2
	2022-04-19	Closure (< 24 hours)	94	28
	2022-04-20	Closure (< 24 hours)	32	3
	2022-04-21	Closure (< 24 hours)	54	16
Summer	2022-06-02	Open	101	2
	2022-06-15	Open	79	5
	2022-07-22	Speed Restriction	93	1
	2022-07-26	Speed Restriction	90	1
	2022-07-27	Open	93	1
	2022-07-31	Closure (24 hours)	49	2
	2022-08-01	Closure (< 24 hours)	93	18
	2022-08-04	Open	68	2
	2022-08-06	Speed Restriction	78	1
	2022-08-07	Speed Restriction	104	1
	2022-08-10	Speed Restriction	78	1
	2022-08-10	Speed Restriction	103	2
	2022-08-14	Speed Restriction	52	1
	2022-08-14	Speed Restriction	101	6
	2022-08-16	Open	36	1
	2022-08-22	Speed Restriction	11	10
	2022-08-24	Speed Restriction	41	4
	2022-08-28	Open	104	3
	2022-09-12	Speed Restriction	58	12
	2022-09-13	Speed Restriction	15	101
	2022-09-14	Speed Restriction	16	45
	2022-09-16	Speed Restriction	93	1
	2022-09-18	Open	102	2
Fall	2022-10-08	Closure (24 hours)	60	14
	2022-10-08	Closure (24 hours)	48	294
	2022-10-16	Closure (< 24 hours)	18	200
	2022-10-23	Closure (24 hours)	60	310
	2022-10-26	Closure (24 hours)	5	4000
	2022-10-27	Closure (24 hours)	19	420
	2022-10-27	Closure (24 hours)	14	210
	2022-11-02	Closure (< 24 hours)	81	124
	2022-11-02	Closure (< 24 hours)	81	338
	2022-11-02	Closure (< 24 hours)	83	87
	2022-11-08	Closure (24 hours)	9	270
	2022-11-09	Closure (< 24 hours)	82	3
	2022-11-13	Closure (24 hours)	38	4000
	2022-11-19	Closure (24 hours)	68	153
	2022-11-20	Closure (24 hours)	60	250
			Total	**12115**

Table 3-15: Observations of Caribou Crossing AWAR and WTHR in 2022

Season	Date	Closure Status	Crossing KM Marker	Number of Caribou Crossing
WTHR				
Winter	2022-02-23	Speed Restriction	169	3
	2022-03-01	Open	161	4
Spring	2022-04-07	Closure (< 24 hours)	165	20
	2022-04-07	Closure (< 24 hours)	173	17
	2022-04-13	Speed Restriction	112	9
	2022-04-13	Speed Restriction	114	14
	2022-04-14	Closure (< 24 hours)	154	4
	2022-04-22	Closure (24 hours)	111	254
	2022-04-26	Closure (< 24 hours)	113	120
	2022-04-26	Closure (< 24 hours)	112	8
	2022-04-27	Closure (< 24 hours)	151	10
	2022-04-27	Closure (< 24 hours)	157	6
	2022-04-28	Closure (< 24 hours)	112	39
	2022-05-23	Speed Restriction	112	26
Summer	2022-07-07	Open	119	1
	2022-07-11	Open	155	1
	2022-08-09	Speed Restriction	166	8
	2022-08-10	Closure (< 24 hours)	117	2
	2022-08-10	Closure (< 24 hours)	167	133
	2022-08-10	Closure (< 24 hours)	171	13
	2022-08-10	Closure (< 24 hours)	170	10
	2022-08-11	Speed Restriction	140	34
	2022-08-18	Speed Restriction	136	2
	2022-08-20	Speed Restriction	158	4
	2022-08-20	Speed Restriction	161	3
	2022-08-21	Speed Restriction	174	5
	2022-08-22	Speed Restriction	128	1
	2022-08-22	Speed Restriction	112	1
	2022-08-24	Speed Restriction	171	1
	2022-08-25	Open	148	5
	2022-08-28	Speed Restriction	111	3
	2022-08-30	Speed Restriction	145	3
	2022-08-31	Speed Restriction	172	5
	2022-09-01	Open	171	4
	2022-09-07	Speed Restriction	167	6
Fall	2022-10-07	Closure (< 24 hours)	169	70
			Total	**849**

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

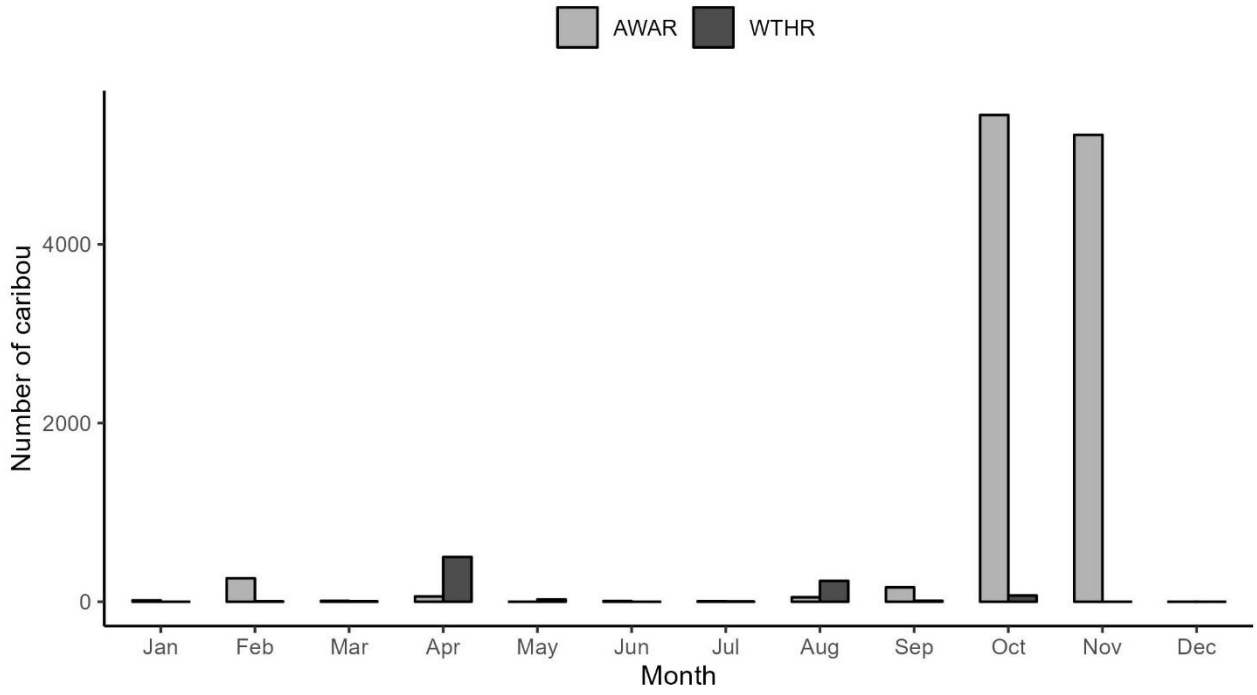


Figure 3-6: Number of Caribou Crossing Observations per Month on the All-Weather Access Road (AWAR) and Whale Tail Haul Road (WTHR) during 2022

Tolerant Caribou Observations

Observations of tolerant caribou along the AWAR and WTHR contribute to assessing risk and the success of mitigation measures. The TEMP Version 7 defines Project tolerant caribou as:

> *"An animal or group of animals (i) observed within a mitigation distance buffer for greater than 72 hours during the winter or 48 hours during other season; and (ii) not visibility disturbed by the Project"*

On eight occasions, observed caribou were identified as Project tolerant as defined in TEMP Version 7 (Agnico Eagle 2019) (Table 3-16). One caribou was identified as Project tolerant at Meadowbank on 11 July, and 13 caribou were identified as Project tolerant at Whale Tail with the same group identified as Project tolerant on April 19 and 20 after multiple days of observation (Table 3-16). On the AWAR, 23 caribou were identified as Project tolerant, including one group identified on 11 January and one group identified on 19 April. On the WTHR, 20 caribou were identified as Project tolerant, with groups identified on 11 February, 10 May, and 20 August (Table 3-16). Note, identification of project tolerant caribou did not impact the decision tree process or relax mitigation measures in place.

Table 3-16: Observations of Tolerant Caribou in 2022

Location	Date	Survey Type	KM Marker	Distance	Number of caribou	Tolerance
AWAR	2022-01-11	Road	70	900	17	Yes – Same location, about the same size of herd since few days.
	2022-04-19	Incidental	33	250	6	Yes – Same place as last observation.
Meadowbank	2022-07-11	Mine & Pit	NA	1	1	Yes – Same caribou that has been on site for a while.
Whale Tail Mine	2022-04-19	Incidental	NA	NA	13	Yes – Same individuals are hanging around the area since a couple of days now. Same numbers and place, no stress about mine activities.
	2022-04-20	Incidental	NA	NA	13	Yes – Same group that we saw for almost 4 days now. Same numbers and general location. They are migrating east.
WTHR	2022-02-11	Road	170	100	10	Yes – Same group size and location as previous survey.
	2022-05-10	Road	119	350	5	Yes – Seen them the other day.
	2022-08-20	Road	147	350	5	Yes – Seen them the other day around this area so could the same group.

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road, NA = not applicable.

3.6.9 Road-related Wildlife Mortality

Wildlife mortalities associated with the AWAR and WTHR during 2022 are recorded in Table 3-17, and reports are included in Appendix C. There were no road-related caribou, grizzly bear, or wolf mortalities associated with the AWAR or WTHR in 2022. There was one wolverine mortality that took place on the AWAR on 2 August 2022 (Table 3-17). Road related mortalities from 2007 to 2022 are presented in Table 3-18. Mine site related mortalities are described in Section 4.5.8. There were substantially fewer road related mortalities reported in 2022 than in 2021 (Golder 2022).

Upon discovery of any roadkill remains that had not been reported to Environment staff, employees were reminded of road rules and the need to enforce these rules by Environment staff and/or road supervisors. All employees are regularly reminded at toolbox meetings that all Project-related incidents are to be reported and that wildlife have the right-of-way at all times. Mine staff are required to stop vehicles and wait for wildlife to crossroads. No feeding wildlife and waste management practices are also regularly reviewed with employees.

Table 3-17: Wildlife Mortalities Related to the All-Weather Access Road and Whale Tail Haul Road in 2022

Date	Species	Count	Project Related	Location	Comments
AWAR					
2022-02-03	Arctic Hare	1	Yes	KM 16	Struck by a vehicle on the road.
2022-04-22	Ptarmigan	1	Yes	KM 40	Struck by a vehicle on the road.
2022-08-02	Wolverine	1	Yes	KM 80	Struck by a vehicle on a bridge.
2022-11-11	Arctic Hare	1	Yes	KM 15	Struck by a vehicle on the road.
2022-11-11	Arctic Hare	1	Yes	KM 2	Struck by a vehicle on the road.
WTHR					
2022-06-26	Arctic ground squirrel	1	Yes	KM 132	Struck by a vehicle on the road.
2022-07-23	Arctic Hare	1	Yes	KM 135	Carcass found on the road.
2022-07-23	Arctic Hare	1	Yes	KM 143	Struck by a vehicle on the road.
2022-09-05	Arctic Hare	1	Yes	KM 121	Carcass found on the road.
2022-10-23	Arctic Hare	1	Yes	KM 158	Struck by a vehicle on the road.

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road, KM = Kilometer Marker

Table 3-18: Summary of Road-related Wildlife Mortality Records (2007 to 2022)

Year	Caribou	Grizzly Bear	Wolverine	Wolf	Fox	Small Mammals	Small Birds	Unidentified Small Animal
AWAR								
2007	31	0	0	0	0	3	3	0
2008	102	0	0	2	13	7	17	0
2009	13	0	0	0	1	6	2	0
2010	1	0	0	0	2	6	2	0
2011	23	0	0	1	0	5	4	0
2012	24	0	1	0	0	3	1	0
2013	5	0	0	0	1	1	1	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	1	4	2	1
2016	0	0	0	0	2	0	1	0
2017	0	0	0	0	5	3	3	0
2018	0	0	0	0	0	2	0	0
2019	0	0	0	0	0	3	0	0
2020	1	0	0	0	0	0	0	0
2021	0	0	0	0	5	9	1	0
2022	0	0	1	0	0	3	1	0
WTHR								
2018	0	0	0	0	0	2	0	0
2019	0	0	0	0	1	1	1	0
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	2	11	0	0
2022	0	0	0	0	0	5	0	0

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

3.7 Accuracy of Impact Predictions

The summary of the impact predictions identified in the TEMP Version 7 (Agnico Eagle 2019) are listed in Table 3-19. The 2022 AWAR and WTHR survey data were compared to the impact prediction thresholds to evaluate adherence to the impact predictions and the provision of adaptive management, as either a necessary or proactive measure. None of the thresholds were exceeded in 2022.

Table 3-19: Accuracy of Impact Predictions – Sensory Disturbance and Mortality along the All-Weather Access Road and Whale Tail Haul Road in 2022

Potential Effect	Threshold	Threshold Exceeded (2022)	Adaptive Management Implemented	Monitoring Methods
Sensory Disturbance	No threshold but Decisions Trees followed when caribou are seen near mine facilities	Not Applicable	Yes. Multiple road closures and notices, good engagement of Wildlife Log by site staff. Use of Decision Tree for Management and Monitoring.	AWAR and WTHR Surveys, Wildlife Log, Mortality Reporting. Satellite-collaring data
Project-related Mortality (ungulates)	Threshold level of mortality is two individuals per year.	NO	NO	AWAR and WTHR surveys Satellite-collaring data surveys
Project-related Mortality (predatory mammals)	Predatory mammals (i.e., grizzly bear, wolverine, wolf) will not be killed or injured by vehicle collisions. Threshold level of mortality is two individuals per year.	NO; one wolverine killed on AWAR in 2022.	NO	AWAR, and WTHR surveys
Project-related Mortality	Raptors or waterbirds will not be killed along Project roads. Threshold is one individual due to vehicle collision per year.	NO	NO	AWAR and WTHR surveys

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

3.8 Management Recommendations

The AWAR and WTHR survey data are important for documenting sensitive periods when the area near the road is utilized by various wildlife species and for evaluating the need, if any, to adaptively manage mitigation (e.g., temporary road closures and radio announcements). Mitigation actions linked to individual wildlife observations (Appendix A) should continue to be recorded. No other management mitigations are recommended at this time.

4.0 PITS AND MINE SITE GROUND SURVEYS

4.1 Overview

The Mine site ground survey monitoring program (i.e., for Meadowbank/Vault, and Whale Tail) has been designed to verify that impacts to wildlife in and around the Project LSA are not occurring. The program has a strong emphasis on monitoring mortality and disturbance of various wildlife groups utilizing habitats near the Project. In addition, the Mine site ground survey monitoring program is an integral component of the monitoring strategy for evaluating sensory disturbance indicators for caribou.

4.2 Objectives

The primary objectives of the Mine site ground surveys are to:

1) Use Decisions Trees when caribou are seen near Project facilities to determine the level of adaptive management (e.g., suspending activities) required.

2) Confirm that caribou will not be killed through other Project-related mortality such as falling in pits, tailings sludge, or other means. The cumulative Project threshold level of mortality is two individuals per year.

3) Verify that measures are in place such that grizzly bears, wolverines, or wolves will not need to be destroyed at the Project site. The threshold level of mortality for predatory mammals is two individuals per year.

4) Verify that disturbance to high value habitats (e.g., sedge meadows) and nesting migratory birds is avoided, and all activities within 100 m of a migratory bird nest site be monitored, if deemed necessary.

4.3 Duration

The Mine site ground surveys are to be conducted regularly by Agnico Eagle environmental personnel over the operation and closure phases of the Project to verify that changes to habitats around the Project do not cause effects to wildlife and their use of habitat.

4.4 Methods

In 2022, environmental personnel conducted regular Mine site inspections focusing on waste management, spills, hazardous waste management, and wildlife monitoring. Formal Mine site inspections were carried out at least weekly as part of broader environmental on-site management. During these inspections, if non-conformities were identified they are rapidly addressed by the responsible department.

Weekly inspections included:

- Regular monitoring of all wildlife species near the facilities. Large mammal presence within the Project is documented during daily and weekly (formal) inspections. Any issues related to safety or proximity effects are identified and the appropriate mitigation is implemented. If risks to animal health are perceived, efforts are made to avoid the wildlife and provide them the right-of-way. In 2022, Mine-site ground survey inspections were conducted at minimum once per week.
- Regular monitoring of all large mammals in the Project LSA.
- Regular monitoring of breeding birds (especially in the spring), raptors, and nests located in the Project LSA.
- Inspections of waste management areas, bins, and hazardous material storage.

Environment Department inspections and wildlife ground surveys focus on migratory birds, ungulates, Arctic fox, wolf, grizzly bear, and wolverine. Through these observations and those of other Agnico Eagle employees (i.e., incidental observations), and incidence reports provided to the Environment Department, technicians follow up as needed to ensure the protection of wildlife near the Project. Monthly summary reports and wildlife observation data are submitted to the GN and KivIA, and quarterly reports are submitted to the KivIA.

4.4.1 Incidental Mine Site Wildlife Observations

All Mine site personnel, including construction and support staff, are required to document and report wildlife observed within the LSA of the Project as well as ancillary areas (e.g., AWAR and WTHR). The protocol involves notifying staff in the Environment Department, which is intended to ensure that potential problem animals are identified. Pertinent data, and daily and weekly Mine site inspection reports are consolidated and entered into an electronic database (EquiS). Monthly summary reports and wildlife observation data are submitted to the GN and KivIA. Quarterly reports are submitted to the KivIA.

4.5 2022 Results

4.5.1 Pit and Mine Site Ground Surveys

The number of surveys completed at Meadowbank Mine and Whale Tail mine sites each in 2022 is provided in Table 4-1. Mine and Pit surveys were distinguished from incidentals starting in October 2021 and were recorded separately from incidentals for all of 2022. Weekly mine inspections at Meadowbank and Whale Tail include a wildlife observation component and are also included in this count.

In 2022, Meadowbank had a total of 58 formal Mine and Pit surveys conducted between 1 January and 24 December. The average frequency of surveys was approximately one survey every 6.2 days during this period, with the largest number of surveys occurring in July and May with eight and seven respectively. Whale Tail had a total of 71 formal Mine and Pit surveys conducted between 1 January and 31 December. The average frequency of surveys was approximately one survey every 5.1 days during this period, with the largest number of surveys occurring in April.

Table 4-1: Number of Formal Pit and Mine Site Ground Surveys by Month

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Meadowbank	5	4	6	4	7	5	8	5	2	4	5	3	58
Whale Tail	6	4	5	10	6	6	7	4	4	5	6	8	71

4.5.2 Wildlife Observations from Pit and Mine Surveys

Wildlife observations from formal Pit and Mine surveys conducted between January and December of 2022 are shown in Table 4-2 and wildlife observations from incidental surveys at the Meadowbank and Whale Tail sites are provided in Table 4-3. Observations were used by Environment personnel to monitor wildlife activity within the Project and to identify potential problematic or sensitive animals requiring deterrence.

Six mammal species were reported during formal Pit and Mine surveys at Meadowbank in 2022, including Arctic fox, Arctic hare, caribou, muskox, red fox (*Vulpes vulpes*), and wolverine (Table 4-2). Caribou sightings were highest from March to July, peaking in observations during May, and muskox sightings were highest in July. Wolverines were only reported once in March and once in November. Four species of birds were reported during

formal Pit and Mine surveys at Meadowbank, including Canada goose, sandhill cranes, an unidentified ptarmigan, and unidentified gulls. The Canada goose was the most frequently observed bird species and was reported mostly in June and August.

Four mammal species were reported during formal Pit and Mine surveys Whale Tail Mine in 2022, including Arctic fox, Arctic hare, caribou, and muskox (Table 4-2). The highest caribou sightings took place in August and September, followed by May and April. Muskox sightings were only recorded in July while the Arctic fox was recorded during almost every month except for June, July, and October. Arctic hare had two observations at Whale Tail Mine, once in June and once in July. Six species of birds, as well as unidentified species of geese, ducks, and ptarmigan, were observed during formal surveys at Whale Tail in 2022 (Table 4-2). Species observed include bald eagle, Canada goose, raven, crow, greater white-fronted goose (*Answer albifrons*), and peregrine falcon.

Table 4-2: Wildlife Observations from Formal Pit and Mine Site Ground Surveys by Month 2022

Species Group	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Meadowbank														
Mammal	Arctic fox	1	1	2	0	1	0	0	0	0	0	4	2	**11**
	Arctic hare	1	0	0	3	10	0	2	0	0	0	1	0	**17**
	Caribou	0	0	12	5	38	9	10	6	0	0	0	0	**80**
	Muskox	0	0	0	0	0	2	23	1	3	0	5	0	**34**
	Red fox	0	1	1	0	0	0	0	0	0	0	0	0	**2**
	Wolverine	0	0	1	0	0	0	0	0	0	0	1	0	**2**
Bird	Canada goose	0	0	0	0	2	34	0	44	0	0	0	0	**80**
	Ptarmigan sp.	0	0	0	0	0	1	0	0	0	0	0	0	**1**
	Sandhill crane	0	0	0	0	0	0	0	2	0	0	0	0	**2**
	Gull sp.	0	0	0	0	13	0	0	0	0	0	0	0	**13**
Whale Tail														
Mammal	Arctic fox	2	4	8	2	6	0	0	1	1	0	9	8	**41**
	Arctic hare	0	0	0	0	0	1	1	0	0	0	0	0	**2**
	Caribou	10	0	0	31	38	0	4	73	49	0	2	8	**215**
	Muskox	0	0	0	0	0	0	16	0	0	0	0	0	**16**
Bird	Bald eagle	0	0	0	0	0	0	0	1	0	0	0	0	**1**
	Canada goose	0	0	0	0	0	2	0	6	0	0	0	0	**8**
	Common raven	0	0	0	0	1	1	0	0	0	0	0	0	**2**
	Crow	0	0	0	0	0	0	1	0	0	0	0	0	**1**
	Duck sp.	0	0	0	0	0	0	0	6	0	0	0	0	**6**
	Goose sp.	0	0	0	0	0	60	0	0	0	0	0	0	**60**
	Greater white-fronted goose	0	0	0	0	1	0	0	0	0	0	0	0	**1**
	Peregrine falcon	0	0	0	0	0	0	0	0	1	0	0	0	**1**
	Ptarmigan sp.	0	0	0	0	0	0	0	0	0	2	0	0	**2**

Six mammal species were reported as incidental sightings at Meadowbank in 2022 including Arctic fox, caribou, wolves, muskox, red fox, and wolverine (Table 4-3). Incidental caribou sightings were highest in May and trailed

off into July. Muskox and grey wolf sightings were highest June to July and July to August respectively. Wolverines were sighted more frequently during the winter, with the highest number of incidental wolverine sightings occurring during January to March at Meadowbank. Arctic fox were sighted once in January and the red fox were sighted once in both January and March at Meadowbank in 2022. There were no bird species recorded incidentally at Meadowbank in 2022 (Table 4-3).

Five mammal species were reported as incidental sightings at Whale Tail in 2022 including Arctic fox, Artic hare, caribou, wolves, and wolverine (Table 4-3). The highest caribou sightings took place in June, August, and April, though caribou were observed each month from February to August. Grey wolf were only observed in March and wolverine were only detected in November. Arctic hare were only detected in March and November. Arctic fox were observed at low frequencies throughout the year. Canada goose was the only bird species reported as an incidental sighting at Whale Tail in 2022 and was observed in August (Table 4-3).

Table 4-3: Incidental Wildlife Observations in 2022 by Month

Species Group	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Meadowbank														
Mammal	Arctic fox	1	0	0	0	0	0	0	0	0	0	0	0	**1**
	Caribou	0	1	0	0	32	8	6	0	0	0	0	0	**47**
	Muskox	0	0	0	0	0	6	5	0	0	0	0	0	**11**
	Red fox	1	0	1	0	0	0	0	0	0	0	0	0	**2**
	Grey wolf	1	2	0	3	0	0	5	11	0	0	0	0	**22**
	Wolverine	7	18	7	2	2	0	0	0	0	2	4	6	**48**
Whale Tail														
Mammal	Arctic fox	0	1	3	4	0	0	0	0	2	0	0	5	**15**
	Arctic hare	0	0	1	0	0	0	0	0	0	0	1	0	**2**
	Caribou	0	5	17	52	3	61	2	54	0	0	1	0	**195**
	Grey wolf	0	0	2	0	0	0	0	0	0	0	0	0	**2**
	Wolverine	0	0	0	0	0	0	0	0	0	0	1	0	**1**
Bird	Canada goose	0	0	0	0	0	0	0	4	0	0	0	0	**4**

4.5.3 Bird Nests

Exemption permits were obtained on 05 April 2022 and 10 May 2022 from the GN for removal of two common raven nest that posed risk to proper maintenance of the fuel tank and could possibly result in fire hazard. These nests also prevented proper maintenance and could result in fire hazard. Exemption permits are provided in Appendix D.

Results of raptor nest monitoring and waterbird nest monitoring are provided ins Sections 13 and 14, respectively.

4.5.4 Wildlife Deterrent Records

Wildlife deterrents are implemented when habituated or problematic wildlife pose a threat to the wildlife or Mine personnel through human-wildlife conflict. Necessary deterrent strategies are determined and implemented by the Environment Department based on the severity of risk and the nature of the interaction. Each deterrence event is reported using the EquiS database.

Wildlife deterrents were used and reported throughout 2022 at the Project. A total of 42 deterrence activities were reported from interactions with six species of mammals: Arctic fox, caribou, muskox, red fox, wolf, and wolverine (Table 4-4, Table 4-5). In some cases, deterrent actions were taken in response to the same animal over multiple days, as was the case with one wolverine observed near the tailings or the incinerator at Meadowbank in February 2022.

The total number of deterrence actions was higher in 2022 compared to 2021 (37 deterrence events recorded), and similar to previous years (43 deterrence activities in 2020, 31 in 2019, 32 in 2018, and 21 in 2017). Deterrence actions in the winter months were primarily related to wolverine and foxes, whereas in the spring and summer deterrence actions were related mostly to caribou and wolves. There were three muskox deterrence events which all occurred along the Meadowbank airstrip in June and July.

Most wolverine deterrence actions were taken at Meadowbank with only one action taken at Whale Tail. Caribou actions were taken at both Meadowbank and Whale Tail Mine. Deterrence actions were taken for muskox, wolves, and red fox only at Meadowbank, while the Arctic fox was deterred at Whale Tail Mine and the Whale Tail Haul Road. Of the 42 deterrence actions taken, 39 were classified as successful deterrence and 3 were classified as unsuccessful deterrence. In one instance involving a wolverine near the south cell at Meadowbank, a destruction permit was issued by the GN as a result of unsuccessful deterrence and the animal was dispatched on 04 April 2022 (Table 4-4, Table 4-5). Additional details on the mortality are provided in Section 4.5.7 and Appendix C.

Table 4-4: Details of Deterrence Activities for 2022

Date	Species	Number	Behaviour	Deterrence Reason/Context	Deterrence Method	Deterrence Action	Deterrence Reaction	Deterrence Outcome	Additional Comments
Meadowbank Mine									
2022-01-01	Wolverine	1	Walking	Too close of the camp.	6mm pistol launcher	When the environment crew arrived, the wolverine was walking slowly on the airstrip. The 6mm pistol was used as a deterrent. A banger and a whistler were used.	After the banger and whistler, the wolverine ran out of sight.	Successful deterrence	-
2022-01-19	Wolverine	1	Running	Dewatering called environment for a wolverine at the incinerator. It moved towards the fuel farm and then was seen going towards Goose pit.	Bangers	Environment fired a banger to scare him away from site.	-	Successful deterrence	-
2022-02-03	Wolverine	1	Standing	E&I called ENV for a wolverine behind the incinerator.	Pistol – Bangers	ENV shot 2 bangers and the wolverine ran south towards Third Portage Lake. It was dark, so hard to say where it went after. But went back 15 minutes later and the wolverine was not back.	Spoke with the incinerator operator and told him to make sure to call us if it comes back.	Successful deterrence	-
2022-02-04	Wolverine	1	Trotting/ running	When the environment team saw the wolverine close to the incinerator, they shot 2 bangers to lead him towards Third Portage Lake.	Pistol – Bangers. Bangers were used to scare the wolverine away from camp.	Then lost sight of it. After following tracks, env. Team found it close to winter parking and pushed him with the pickup truck towards Goose pit. Another banger was shot to try and push it away further.	After seeing tracks going East towards the Pit, environment team went back to the office.	Successful deterrence	-
2022-02-18	Wolverine	1	Feeding	While performing a wildlife survey, a wolverine was observed licking frozen grease at the location where sewage and kitchen grease are dumped. For safety reason, the wolverine was deterred.	Bangers and whistlers	Deterred the animal. Communications with the GN-DOE will be done during the monthly report.	Deterred the animal. Communications with the GN-DOE will be done during the monthly report.	Successful deterrence	The wolverine started running towards the landfill and disappeared in a field of boulders located south of the landfill.

Table 4-4: Details of Deterrence Activities for 2022

Date	Species	Number	Behaviour	Deterrence Reason/Context	Deterrence Method	Deterrence Action	Deterrence Reaction	Deterrence Outcome	Additional Comments
2022-02-21	Wolverine	1	Running	The wolverine was on site near installations.	Bangers.	Two bangers were shot near its position.	It ran towards FGL in the tundra and the environment team then lost sight of it. A wolverine was again seen at the incinerator at 10:00. It fled in the tundra once again.	Successful deterrence	
2022-02-21	Wolverine	1	Foraging	This wolverine has been seen on site multiple times near the tailings or the incinerator.	Banger rounds.	Three banger rounds had been used to deter the wolverine. The first one (red) was a whistler, the two others were bangers.	It went in the airstrip direction to escape in the tundra, so I drove near the airstrip to make sure he fled off site.	Successful deterrence	-
2022-03-16	Wolverine	1	Feeding	He was alert on the tundra side when I arrived, and he was on site.	Explosive bangs.	One round was shot in the air in a secure place near the wolverine.	-	Deterrents did not succeed	-
2022-03-29	Red fox	1	Feeding	fox feeding near the tailings area.	12-gauge bear banger.	1 shot over the animal.	Fox run away	Successful deterrence	-
2022-04-02	Wolverine	1	Feeding	Was feeding with sewage, on the mine site.	Horn.	Deterred with the Sherp, horning.	Deterred with horn, it was the only tool at hand.	Successful deterrence	Beside land farm and south cell, where they dump the sewage.
2022-04-04	Wolverine	1	Dead	Destruction permit was issued by the wildlife officer	Animal was dispatched: Shoot 2x 12-gauge shotgun slugs to the animal.	Wildlife mortality report was sent to wildlife officer.	Carcass was brought to wildlife officer	Deterrents did not succeed – Euthanized	South cell where sewage truck is dumping.
2022-04-25	Wolf	1	Standing	The wolf was at vault parking near operations.	Rattler, truck, truck horn. We followed him with the truck, and we were shaking the rattler to scare him away from the WTHR and Vault Parking.	We made sure that the wolf left the site, no communication has been made.	None	Successful deterrence	-
2022-05-21	Wolverine	1	Running	Was going into camp site.	Bangers	Shot two bangers towards the wolverine.	Ran away from south cell after shooting two bangers.	Successful deterrence	Wolverine was at the south cell land farm.

Table 4-4: Details of Deterrence Activities for 2022

Date	Species	Number	Behaviour	Deterrence Reason/Context	Deterrence Method	Deterrence Action	Deterrence Reaction	Deterrence Outcome	Additional Comments
2022-06-12	Caribou	4	Foraging	Plane landing.	Clapping, honking, whistlers	-	-	Successful deterrence	Four caribous were reported on the airstrip just before a plane departure. An environment employee went to deter them by clapping hands, but caribous were not cooperating. Afterwards, the employee used the pick-up horn to make them move. This time, they went off the runway but stayed on the edge between the airstrip and Q23. They were still too close to the runway, so a second environment employee came to with deterrent gear. Two whistlers were fired, and caribous started walking crossing the runway and move towards the freshwater barge.
2022-06-14	Caribou	4	Alert	Plane landing.	Honking the horn	Honking the horn repeatedly	Walked away from air strip.	Successful deterrence	-

Table 4-4: Details of Deterrence Activities for 2022

Date	Species	Number	Behaviour	Deterrence Reason/Context	Deterrence Method	Deterrence Action	Deterrence Reaction	Deterrence Outcome	Additional Comments
2022-06-22	Muskox	2	Feeding	Plane on approach: serious safety concern.	Bear banger	Two bangers and one whistler shots.	Move at a safer place south of the AWAR, return to feeding behaviour 1 minute and deterring action.	Successful deterrence	10 m from airstrip, between AWAR and airstrip.
2022-07-01	Caribou	4	Alert	Plane landing.	Whistler banger	Moved only 2 m so shot a few bangers.		Successful deterrence	Communication will be end of the month
2022-07-03	Wolf	1	Walking	Got calls for it from fountain tire guys that seen it outside their building.	Banger	Bangers.	Started running away.	Successful deterrence	Got a call from fountain tire. But seen it at the airstrip and chased it to the way and went in the tundra towards np2.
2022-07-06	Wolf	1	Walking	Got a call from dewatering.	Bangers	Bangers.	Started running after the first shot of banger.	Successful deterrence	-
2022-07-09	Caribou	2	Feeding	Pit A is not a good place due to the presence of tailings water, screamed at them to make them go up the ramp. Ended up at the back of FGL shop.	Scream, honks, bangers.	Scream, honks, bangers.	They ran.	Successful deterrence	Down the ramp of pit A
2022-07-11	Muskox	1	Alert	Airplane landing.	Honking horn.	Honking the horn.	Ran to the water and away from the air strip.	Successful deterrence	-
2022-07-21	Caribou	1	Lying Down	The environment team wanted the caribou to leave the Tailings area, since it was lying down in it.	Used the pistol with bangers, whistlers.	Used the pistol to push it away since we could not go on the TSF.	Used the pistol to push it away since we could not go on the TSF.	Successful deterrence	Somebody reported a caribou on the tailings south cell. Environment team went to push it away from the TSF.

Table 4-4: Details of Deterrence Activities for 2022

Date	Species	Number	Behaviour	Deterrence Reason/Context	Deterrence Method	Deterrence Action	Deterrence Reaction	Deterrence Outcome	Additional Comments
2022-07-23	Wolf	1	Trotting/ running	Wolf was first spotted by the road going to Central dike sampling point.	Honking with the truck	We deterred the wolf by honking and following him by truck. He headed towards the landfill and then NP1.	We deterred the wolf by honking and following him by truck. He headed towards the landfill and then NP1.	Successful deterrence	Wolf was first spotted by the road going to Central dike sampling point.
2022-07-28	Muskox	2	Feeding	Plane on approach: serious safety concern.	Bear bangers	Used bear bangers to make them go away from the airstrip and into the tundra where they can get away safely of the mine site.	Told the airport tower controller that muskox were gone and that it was safe for the plane to land.	Successful deterrence	Two Muskox between the airstrip and the AWAR.
2022-07-30	Wolf	1	Walking	Wolf spotted near the camp and walked towards camp.	Bangers	Bangers.	The wolf started running towards tailing. We chase him with the pick-up truck until we see him at the north cell tailings.	Successful deterrence	-
2022-08-01	Wolf	10	Feeding	Five adults and five pups were feeding in a puddle at the bottom of the ramp near the land farm at south cell.	Pick-up horn	We made the pack go away by honking with our pick-up truck.	The wolf pack headed away towards the north cell tailing until we lost sight of them. We called E&I to come and bury what they were trying to feed on.	Successful deterrence	South cell, bottom of the ramp near the land farm.
2022-10-02	Wolverine	1	Alert	Safety of workers on site.	Banger	We used 4 bangers to deter the wolverine and it ran out of site.	Ran out of site after shooting 4 bangers at the wolverine.	Successful deterrence	-
2022-10-12	Wolverine	1	Walking	Honking with the vehicle, wolverine reacted and ran away immediately away from main site.	Vehicle	Communicated with supervisor.	Running away.	Successful deterrence	-
2022-12-09	Wolverine	1	Walking	Got a call about it.	Flares	N/A	Started running away from site.	Successful deterrence	SS coverall.
2022-12-13	Wolverine	1	Foraging	Got a call.	Banger flares	Deterrence.	Running.	Successful deterrence	Near the C-Cans and went behind the building after shooting bangers.

Table 4-4: Details of Deterrence Activities for 2022

Date	Species	Number	Behaviour	Deterrence Reason/Context	Deterrence Method	Deterrence Action	Deterrence Reaction	Deterrence Outcome	Additional Comments
2022-12-14	Wolverine	1	Walking	Calls.	Banger	N/A	Running through C-Cans.	Successful deterrence	C-Cans row.
2022-12-20	Wolverine	2	Hiding	Getting calls.	Bangers	Yes	Running away like usual.	Successful deterrence	
Whale Tail Mine									
2022-03-21	Arctic fox	1	Resting	The fox was curled up sleeping in the travelled section of road (inside of the berm). The concern was that the fox could be struck by an approaching vehicle if the operator didn't notice it there.	Pickup truck (horn)	Used a pickup truck horn in close proximity as a deterrent to get the fox off the road, this had no effect and it continued to sleep on a traveled portion of road.	No reaction.	Deterrents did not succeed.	The fox was sleeping but aware of our presence in observing him, when we moved around it would open an eye and watch our movements. Just as we were preparing to place orange delineators around his chosen resting location another fox showed up, and within about 30 seconds of the second fox's presence the first fox got up and scurried off. No visible injuries on the first fox, no limp or gait observed either.
2022-03-31	Wolf	2	Walking	-	-	-	-	Successful deterrence	-
2022-04-04	Arctic fox	2	Feeding	Had to go get the coordinates of the dead caribou and take some pictures.	Pistol	Shot two bangers with the pistol.	They ran in the opposite direction, West of the road towards Nemo Lake.	Successful deterrence	IVR new ring road, they were eating the carcass of the dead caribou reported on 2022-04-03.

Table 4-4: Details of Deterrence Activities for 2022

Date	Species	Number	Behaviour	Deterrence Reason/Context	Deterrence Method	Deterrence Action	Deterrence Reaction	Deterrence Outcome	Additional Comments
2022-04-08	Arctic fox	2	Feeding	Foxes were in a dangerous location, and not easily visible to heavy equipment operators.	Pistol	Shot one banger.	They ran away towards Nemo Lake.	Successful deterrence	IVR new ring road on the west side.
2022-08-06	Caribou	1	Foraging	Caribou was too close to mine operation for their safety. Trucks and handclapping were used to push it to the final position (info in survey).	Truck, shouting, clapping	Push the caribou out of the radius. Told dispatch/blast supervisor when the animal was out.	A bit stress and tired but looks fine (eating and drinking).	Successful deterrence	-
2022-08-08	Caribou	1	Feeding	Caribou was too close to mine operation for their safety.	Pickup truck	I followed the road adjacent to the caribou, using short blasts of the horn prompting it to move away from the blast area.	Moved south and resumed feeding near the waters edge.	Successful deterrence	-
2022-08-09	Caribou	5	Standing	Caribou was too close to mine operations for their safety.	Horn of truck	We push the caribou out of the radius before the blast.	It went to eat in the tundra.	Successful deterrence	-
2022-11-08	Arctic fox	3	Feeding	Deterrents were used to scare off scavengers to remove carcass.	Truck horn	Deterrents were used to scare off scavengers to remove Arctic hare carcass.	Ran away behind snowbanks.	Successful deterrence	On Road 7 near entrance to IVR 2.
2022-11-22	Wolverine	1	Walking	Wolverine was walking around camp. Observed it for a bit and it was coming back closer to camp.	Pistol, bangers	Shot two bangers to scare it away.	Ran in the opposite direction after the first banger. After, he was coming back close to camp shot another banger and then he went east till we could not see him anymore.	Successful deterrence	Behind wing 26.

Table 4-4: Details of Deterrence Activities for 2022

Date	Species	Number	Behaviour	Deterrence Reason/Context	Deterrence Method	Deterrence Action	Deterrence Reaction	Deterrence Outcome	Additional Comments
Whale Tail Haul Road									
2022-10-22	Arctic fox	1	Feeding	The fox wouldn't leave the road regardless of approaching vehicles.	Banged two shovels together loudly while approaching the area of interest on the road surface.	Once the fox moved away, I used the shovel to chip and scrape the unknown substance into a garbage bag so as to reduce the attractant so that the fox will stay away from this travelled area.	The fox moved off to the side of the road.	Successful deterrence	The fox was on the road gnawing on a frozen substance on the road surface. Once I left the area, I observed the fox return to the road to sniff and scratch at that same spot.

GN-DoE=Government of Nunavut Department of Environment

Table 4-5: Summary of Deterrence Events in 2022

Location	Species	Number of Deterrence Events		
		Successful	Unsuccessful	Total
Meadowbank	Caribou	5		**5**
	Muskox	3		**3**
	Red fox	1		**1**
	Wolf	6		**6**
	Wolverine	15	2	**17**
Whale Tail Mine	Arctic fox	3	1	**4**
	Caribou	3		**3**
	Wolf	1		**1**
	Wolverine	1		**1**
Whale Tail Haul Road	Arctic Fox	1		**1**
Total		**39**	**3**	**42**

4.5.5 Waterbird Monitoring

Waterbird monitoring is completed to minimize accidental waterbird confinement around the Meadowbank and Whale Tail sites, entrapment in the tailings, and mortality. Regular inspections were completed throughout the migratory period and during weekly or daily inspections, as deemed necessary by Environment personnel. Additionally, a noise cannon was deployed in the South Cell tailings storage facility on 24 July 2022 to deter waterbirds from landing in the tailings pond. Further discussion of 2022 waterbird monitoring is provided is Section 14.0.

4.5.6 Raptor Monitoring

Raptor monitoring was conducted as part of routine Mine site inspections of the pit and other areas to ensure adequate bird protection and management. In addition to observations as part of the raptor nest monitoring (Section 13), there were 4 bald eagle detections (June, July, August), one osprey detection (May), 13 peregrine falcon detections (May, June, July, September), 4 rough-legged hawk detections (May, September), and 1 snowy owl detection (September) along the AWAR and WTHR (Table 3-7, Table 3-8). Additionally, 1 unidentified hawk was observed along the AWAR (Table 3-7).

4.5.7 Predatory Mammal Deterrence and Protection

Improved practices for waste segregation and incineration, the use of enclosed food waste facilities, and skirting around buildings have improved Arctic fox protection and decreased fox-human interactions (Table 4-6).

Table 4-6: Summary of Deterred Predatory Mammals at the Meadowbank Mine and Whale Tail Sites from 2015 to 2022

Species	2015	2016	2017	2018	2019	2020	2021	2022
Arctic fox	6	6	2	0	4	1	0	5
Red fox	1	0	0	0	0	0	0	1
Wolf	1	4	9	14	9	5	2	7
Wolverine	5	3	10	17	16	17	6	18
Total	**23**	**37**	**21**	**31**	**31**	**43**	**8**	**30**

Wolverines were regularly observed around the Project particularly during the winter months in 2022 (Table 4-4). Deterrence actions for wolverines, which followed the Wildlife Protection and Response Plan (Appendix C in 2019 TEMP), were required on 17 occasions at the Meadowbank site and 1 occasion at the Whale Tail site (Table 4-5). For the wolverine deterrence actions at Meadowbank Mine, 15 were successful and 2 were unsuccessful. The unsuccessful deterrence events were for the same wolverine, and a destruction permit was issued by the wildlife officer. The wolverine was dispatched on 4 April 2022 (Appendix C). The single deterrence action for wolverine at Whale Tail Mine was successful. Well-defined food-handling practices and employee awareness programs have minimized wolverine fatalities or wolverine-human interactions, and the number of deterrence efforts were similar in 2022 to previous years (Table 4-6).

Wolves were also regularly observed around the Meadowbank site primarily in the summer months (Table 4-4). Deterrence actions were required on six occasions at Meadowbank, with one in April, four in July, and one in August (Table 4-4). One deterrence action was required at Whale Tail in March. All wolf deterrence events were successful (Table 4-5). Notices are sent to Meadowbank employees regarding the presence of wildlife, waste management procedures, and requesting all sea cans and doorways be closed when a non-conformity occurs.

Arctic fox were observed at Whale Tail in 2022 (Table 4-4) and deterrence actions were required on four occasions, with one of which noted as not successful. A red fox was observed at Meadowbank and was successfully deterred (Table 4-4).

4.5.8 Wildlife Mortality – Meadowbank and Whale Tail Sites

One wildlife project-related mortality, a wolverine, was observed at Meadowbank in 2022 (Table 4-7). This mortality was related to deterrence (Section 4.5.4). At the Whale Tail Mine, there were three Arctic fox and two Arctic hare project-related mortalities (Table 4-7). Road-related mortalities are tabulated and discussed in Section 3.6.9. Mortality reports are included in Appendix C.

Table 4-7: Wildlife Mortalities at Meadowbank Mine and Whale Tail in 2022

Date	Species	Count	Project Related	Location	Comments
Meadowbank					
2022-04-04	Wolverine	1	Yes	South Cell Tailings Area	A wolverine was frequently observed and was unaltered by deterrents. On March 21, 2022, GN DOE issued a wildlife destruction authorization to ensure the safety of personnel on site.
Whale Tail Mine					
2022-03-01	Arctic Fox	1	Yes	AMQ Metal Screening Pad	Fox was trapped under a pile of snow and a cement wall that was being constructed for the metal removal system.
2022-03-15	Arctic Fox	1	Yes	Northwest of AMQ Warehouse	Struck by a vehicle on the road.
2022-03-18	Arctic Hare	1	Yes	IVR Ring Road	Carcass found on the road.
2022-11-08	Arctic Hare	1	Yes	On Road 7 near entrance to IVR 2	Struck by a vehicle and scavenged by three foxes.
2022-12-13	Arctic fox	1	Yes	Intersection of Phase 3 Ramp and Whale Tail Ring Road	Dead fox spotted on the intersection of Phase 3 Ramp and Whale Tail Ring Road. Carcass was retrieved to avoid attracting predators to the area. GN-DOE was informed of the fox mortality, and GN-DOE authorized via email that the carcass could be incinerated on site.

GN-DoE=Government of Nunavut Department of Environment

Table 4-8: Summary of Project-Related Wildlife Mortality Records for Caribou and Predatory Mammals (2007 to 2022)

Year	Caribou	Grizzly Bear	Wolverine	Wolf
2007	0	0	0	0
2008	0	0	0	2
2009	0	0	0	4
2010	0	0	0	1
2011	0	0	1	4
2012	0	0	0	1
2013	0	0	1	0
2014	0	0	0	1
2015	0	0	0	1[(a)]
2016	0	0	0	0
2017	0	0	1	2
2018	0	0	1	2[(b)]
2019	0	0	1	0
2020	0	0	2	0
2021	0	0	1	0
2022	0	0	1	0

a) Naturally injured wolf that needed to be euthanized.

b) Wolf died at Mine site of head injuries; did not need to be dispatched.

4.5.8.1 Caribou

No caribou mortalities related to Project activities were reported at the Project in 2022.

4.5.8.2 Predatory Mammals

All incident reports, observations, deterrence activities, and environment team responses to predatory mammal sightings are included in Appendix C.

One wolverine mortality associated with the Mine site was reported in 2022. A phone call between Agnico Eagle environment department and GN-DOE was completed on 18 March 2022 regarding the monitoring and deterring efforts related to the wolverine observations. Use of deterrents and location of wolverine observations were issued to GN-DOE on 19 March 2022. Frequent reports/observations of the wolverine continued between 19 March and 4 April 2022. On 21 March 2022, GN-DOE issued a wildlife destruction authorization to ensure the safety of personnel on site. On 4 April environment technicians received a call from Meadowbank security at 12:30pm about a wolverine moving north across the airstrip towards the South Cell tailing area. At 12:50pm the environmental technician went to patrol the area around the South Cell and Waste rock storage facility. Two 12-gauge slugs were used to dispatch the wolverine. The carcass was removed and brought to the GN office in Baker lake on 5 April. Details of the incident can be found in Appendix C.

4.5.8.3 Other Wildlife

There were three project related Arctic fox mortalities associated with the Whale Tail Mine in 2022. On 1 March 2022, while removing snow at the construction site for the Metal Screening Pad at the Whale Tail site, workers noticed a fox carcass in the snow. The operator called his supervisor who then contacted the Environmental personnel to come and assess the carcass. Upon investigating the location of the carcass, it

appeared as though the fox had been trapped under a pile of snow and a cement wall that was being constructed for the metal removal system. On 15 March 2022, an Agnico Eagle employee found a dead Arctic fox that on the northwest side of the Whale Tail Warehouse in the middle of the road. The employee called his supervisor who then contacted the Environmental personnel to come and assess the carcass. Upon investigating, it appeared that the fox was struck by a vehicle. On 13 December 2022, a dead fox was identified on the intersection of the Phase 3 Ramp and the Whale Tail Ring Road. The auxiliary supervisor delivered the carcass to environment, and the GN-DOE was called and advised of the fox mortality. GN-DOE authorized for the carcass to be incinerated on site at Meadowbank.

There were two Arctic hare related mortalities associated with the Whale Tail site in 2022. On 23 October 2022, an Arctic hare carcass was identified on the WTHR by an environmental technician. The carcass appeared to have been struck by a vehicle. The carcass could not be removed because it was frozen to the road. On 8 November 2022, three foxes were observed fighting over an Arctic hare carcass on the road near the IVR 2 Pit entrance. Environmental technicians used deterrents to move the scavengers (Table 4-4), and then removed the carcass from the roadway to prevent risks to other wildlife. The environmental technician monitored the area for approximately 30 minutes to ensure the scavengers did not return. Details of the incidents can be found in Appendix C.

4.5.9 Helicopter Activity

Helicopters are utilized at the Project for various reasons including transport, exploration, surveying, monitoring, and reconnaissance. Pilots are required to review an air traffic management procedure that includes flight restrictions:

- Long-range flights are a minimum of 650 m above ground level, except for take off and landing.
- Short-range flights are a minimum of 300 m above ground level, except for take off and landings.
- Notification of caribou, muskox or other wildlife sightings within 1 km of the helicopter pad.
- Caribou groups of 50 or more animals, and muskoxen of 10 or more animals must be avoided by a minimum of 1,000 m vertically and 1,500 m horizontally. Flocks of migratory birds must be avoided by 1,100 m vertically and 1,500 m horizontally. Flying over known raptor nests will be avoided.
- Harassing wildlife (flying below 300 m) is expressly forbidden unless animals pose an immediate danger to humans.

Track logs and altitudes are recorded using the Honeywell Skyconnect Tracker II, which runs on the Iridium satellite network. This product provides two-way satellite voice communication, ground to asset texting, and asset to ground location tracking service. Spatial location, altitude, and speed of helicopters are collected throughout flights. Up to five months of previous tracking data are stored online by Honeywell.

Flight length and altitude calculations were determined by trip number using helicopter track data in ArcGIS (Table 4-9; Figure 4-1, Figure 4-2, and Figure 4-3) Portions of flights extending outside the RSA were only removed from calculation of flight length. Data were summarized based on unique trip number in track data, which may represent multiple arrivals and departures. Entries in track data identified as arrival or departure not included in altitude calculations, in effort to limit the periods where helicopters were ascending or descending to cruising altitude. The average altitude throughout the entire trip (i.e., excluding departure and arrival), and average maximum altitude across all trips were calculated for 2022. The average maximum altitude was calculated by

averaging the maximum altitude of each trip. Maximum altitude was included to avoid bias of ascent and descent altitudes in calculation of averages but is not expected to be representative of altitude throughout the entire trip. Flight duration was summarized based on flight log data (Appendix E).

The number of flights, and flight hours were highest in the summer In 2022 (Table 4-9). Average maximum altitudes were above 300 m in each season (Table 4-9). Flights with maximum altitudes less than 300 m excluding departure and arrival in 2022 are displayed in Figure 4-1, Figure 4-2, and Figure 4-3. In spring and fall, flights with altitudes less than 300 m appear concentrated around the Meadowbank and Vault sites (Figure 4-1; Figure 4-3). In summer, flights with altitudes less than 300 m occur in an area south of the Whale Tail site, between Baker Lake and Meadowbank, and in an area east of Meadowbank (Figure 4-2). Some of these flights are related to a helicopter on site that completed dust suppression from 6 to 20 August. These flights were included in summary of flight length and altitude.

Flights and their associated purpose are provided in Appendix E. Some flights for environmental monitoring require lower altitudes, including flights to visually inspect water quality of the water bodies around bridges and roads, inspection of various mine infrastructure for runoffs, lake water sampling, and raptor surveys. Flights occurred in 2022 related to search and rescue operations in Baker Lake, where low elevation flights are expected. Meteorological conditions and visibility may also limit flight altitudes. For shorter flights, ascending to 300 m cannot always be justified. The helicopters ascend gradually and cannot always ascend directly to an elevation above 300 m and begin horizontal movement immediately.

Many low elevation flights are related to slinging operations, and short-distance flights (Figure 4-2). Flights that involve slinging, and some passenger loads required flights under 300 m. This includes slinging of the diamond drill core, drilling equipment, additives, drilling rods, fuel tanks, and the wooden floor used as a base to assemble the fly drill. Moving the drill and drill parts from one site to another (often less than 1 km from each other) often occurs at low altitudes. Helicopter maintenance, and small moves to accommodate different aircrafts at the fueling station at airport often include low altitude flights. The number of hours related to flights where these flight types occurred are presented as flights with expected low altitudes (Table 4-9).

Pilots are made aware to avoid caribou and muskox by 1,000 m vertically and 1,500 m horizontally, flocks of migratory birds by 1,100 m vertically and 1,500 m horizontally, and to avoid known raptor nests. Locations of these flights in relation to caribou and other wildlife was not assessed in 2022. Point locations of caribou and other wildlife from road surveys, pit and mine site surveys, and viewshed surveys may be too coarse to assess in relation to helicopter flight tracks. Helicopter flight tracks would ideally be assessed in relation to caribou satellite collar data, to assess avoidance of caribou by the required setback distances. However, caribou satellite collar locations would not necessarily represent groups of caribou of 50 individuals or larger.

Helicopter use varies across years based on operations, including establishment of remote camps and the amount of exploration. Different data sources and availability prevent accurate comparison of helicopter traffic between years. Variation in altitude and length of some trips suggests that some unique trip numbers represented more than one departure and arrival. Where possible, unique trip numbers should represent a single arrival and departure. When data are available, future Wildlife Monitoring Summary Reports could present helicopter flights in relation to caribou satellite collar locations to demonstrate avoidance of caribou by the required 1,000 m vertical and 1,500 m horizontal distance.

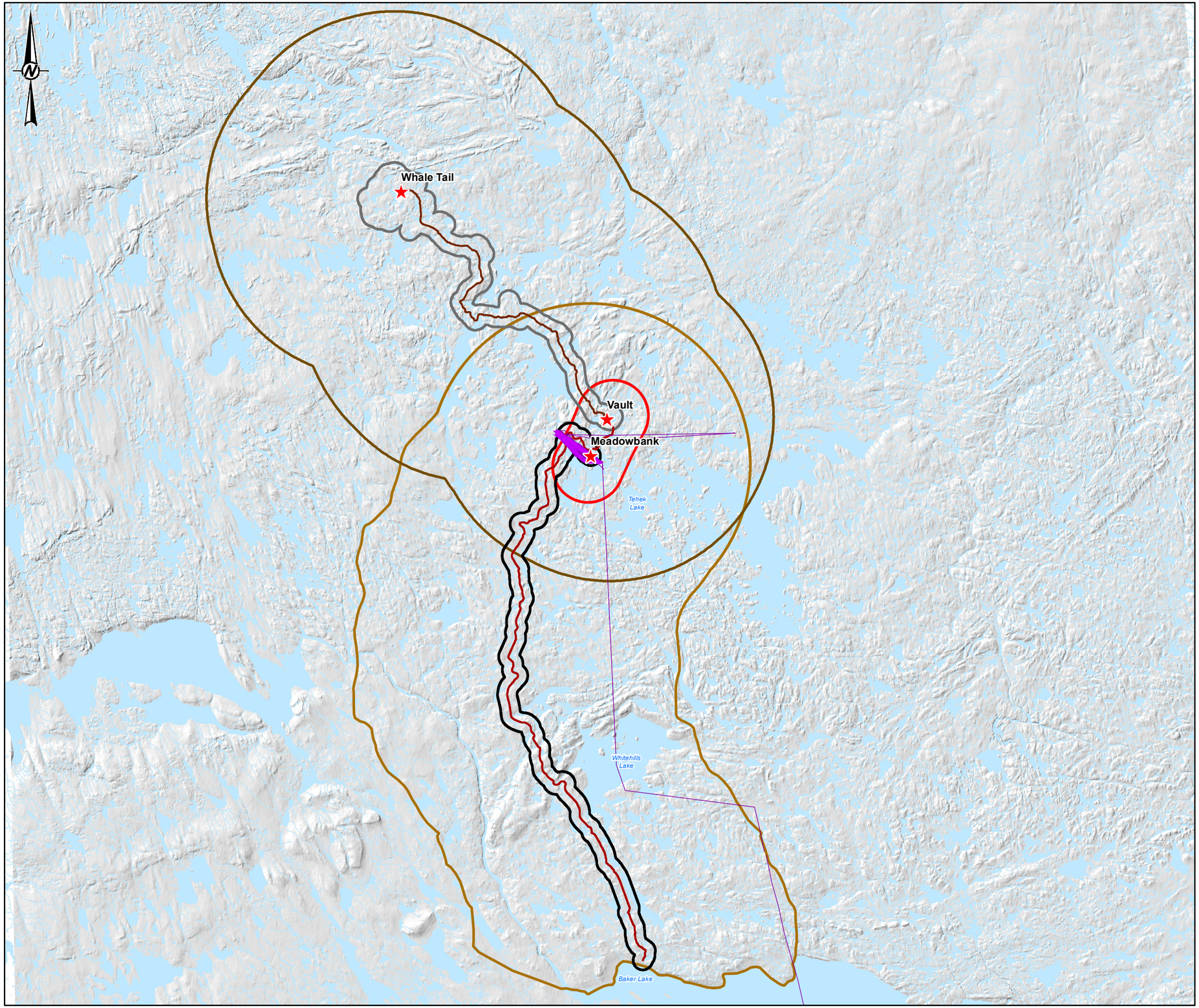
Table 4-9: Summary of Helicopter Flights in 2022.

Season	Flight Days	Number of Flights	Total Distance within RSA (km)	Average Distance (km) (mean ± SD)	Total Duration (hours)	Duration of Flights with Expected Low Altitudes[a]	Average Altitude (m) (mean ± SD)[b]	Average Maximum Altitude (m) (mean ± SD)[b]
Spring	30	31	3,514.03	17.31 ± 22.72	82.50	52.80	214.32 ± 36.91	326.74 ± 50.25
Summer	118	209	53,110.81	32.70 ± 46.54	760.12	391.50	237.77 ± 78.37	352.33 ± 130.32
Fall	22	24	4,114.33	27.43 ± 43.74	84.30	54.50	213.85 ± 76.28	317.01 ± 131.11

a) Represents flights where slinging or other activities with expected low altitudes were performed.

b) Values exclude departure and arrival; values in metres above sea level.

km = kilometres; m = metres; SD = standard deviation.



LEGEND

MINE-RELATED HELICOPTER ACTIVITY

SEASON

- SPRING 2022 (MAXIMUM ALTITUDE <300 m)
- SPRING 2022
- ALL-WEATHER ACCESS ROAD (AWAR)
- WHALE TAIL HAUL ROAD (WTHR)
- AWAR LOCAL STUDY AREA (LSA)
- WTHR LOCAL STUDY AREA (LSA)
- WTHR REGIONAL STUDY AREA (RSA)
- MEADOWBANK LOCAL STUDY AREA (LSA)
- MEADOWBANK REGIONAL STUDY AREA (RSA)
- WATERCOURSE
- WATERBODY

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REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

MINE-RELATED HELICOPTER ACTIVITY ALONG THE ALL-WEATHER ACCESS ROAD AND WHALE TAIL HAUL ROAD, SPRING 2022

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	SW
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
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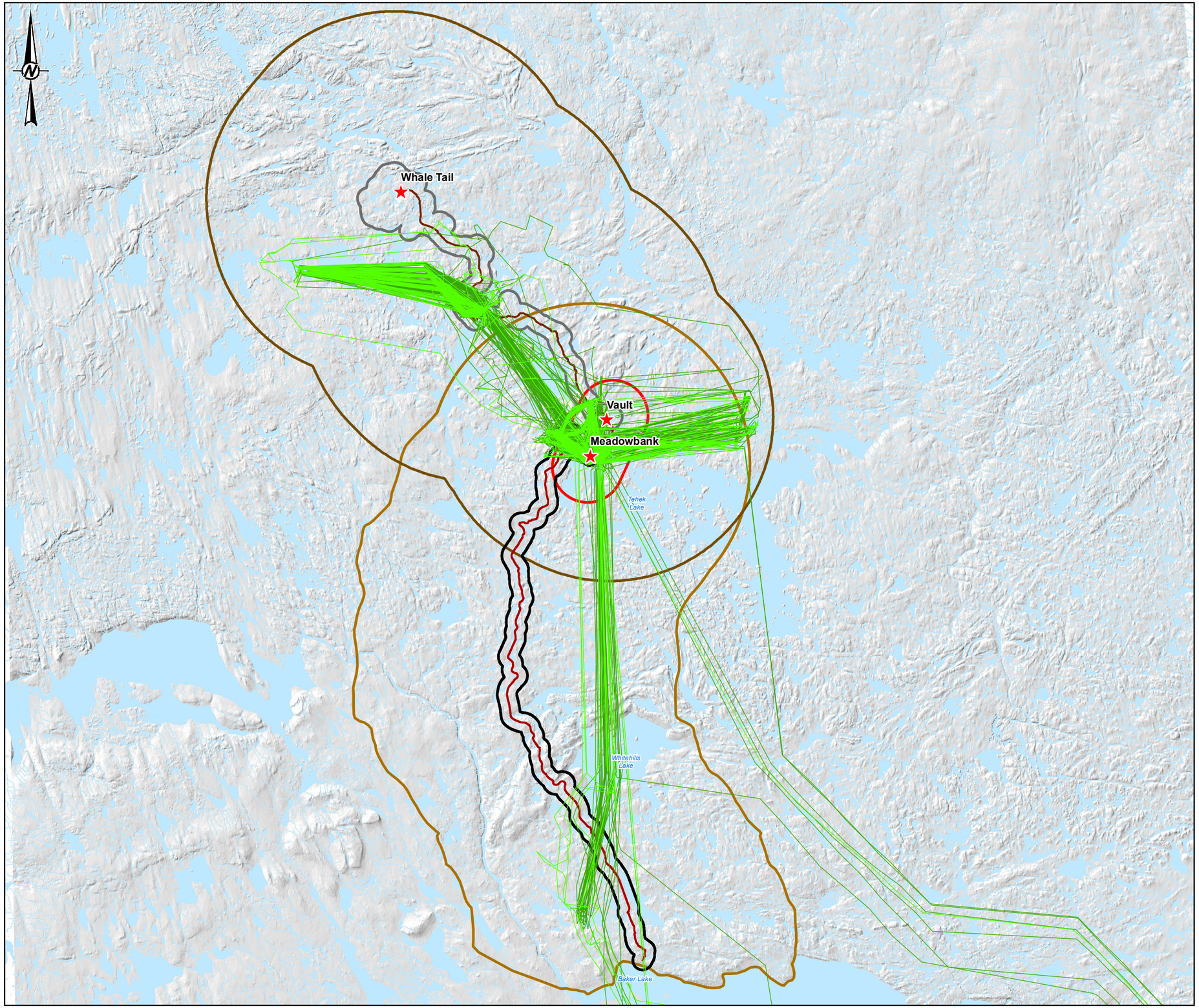

LEGEND

MINE-RELATED HELICOPTER ACTIVITY

SEASON

- SUMMER 2022 (MAXIMUM ALTITUDE <300 m)
- SUMMER 2022
- ALL-WEATHER ACCESS ROAD (AWAR)
- WHALE TAIL HAUL ROAD (WTHR)
- AWAR LOCAL STUDY AREA (LSA)
- WTHR LOCAL STUDY AREA (LSA)
- WTHR REGIONAL STUDY AREA (RSA)
- MEADOWBANK LOCAL STUDY AREA (LSA)
- MEADOWBANK REGIONAL STUDY AREA (RSA)
- WATERCOURSE
- WATERBODY

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1:600,000 KILOMETRES

REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA.
COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

MINE-RELATED HELICOPTER ACTIVITY ALONG THE ALL-WEATHER ACCESS ROAD AND WHALE TAIL HAUL ROAD, SUMMER 2022

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	SW
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
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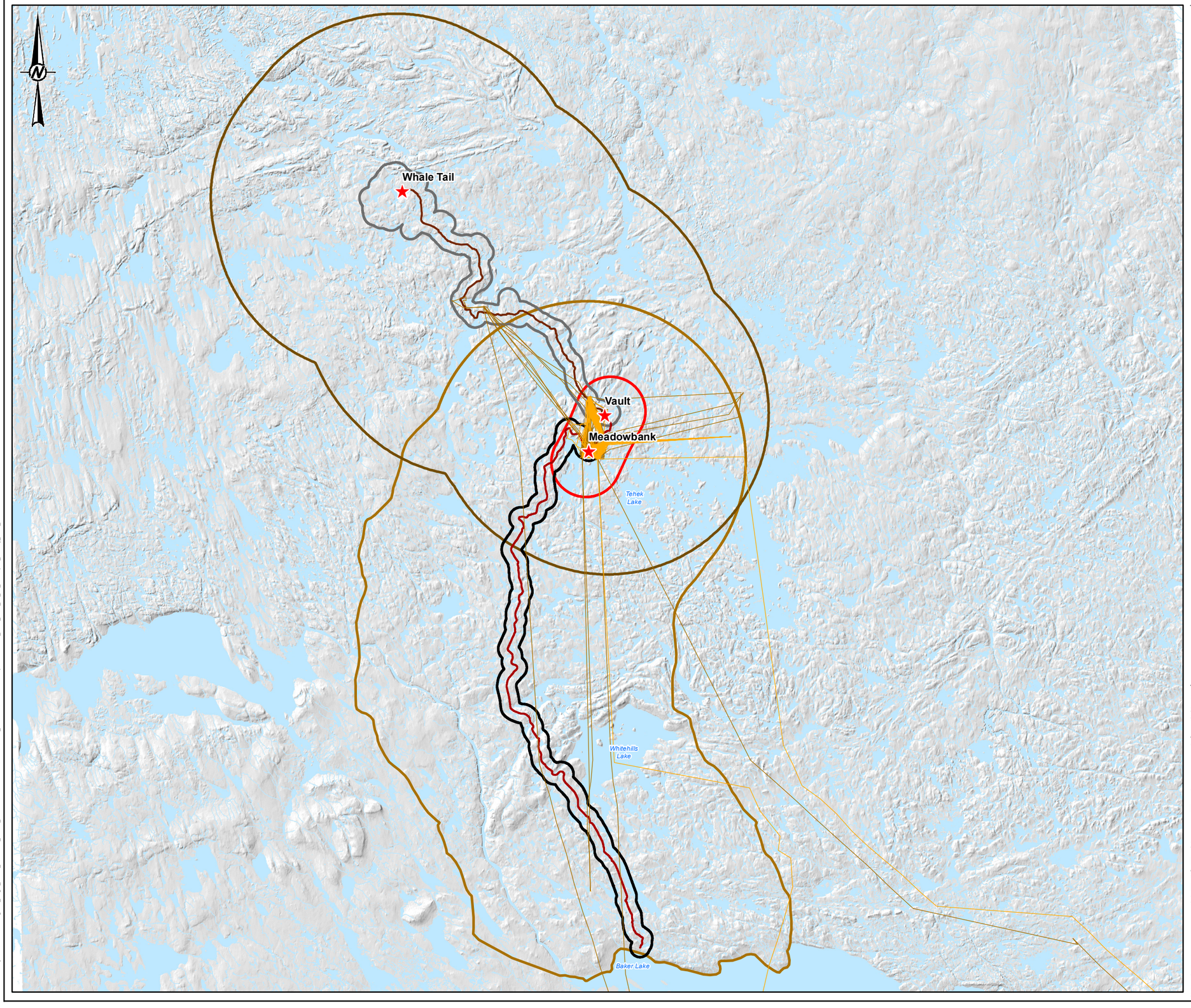

LEGEND

MINE-RELATED HELICOPTER ACTIVITY

SEASON

- FALL 2022 (MAXIMUM ALTITUDE <300 m)
- FALL 2022
- ALL-WEATHER ACCESS ROAD (AWAR)
- WHALE TAIL HAUL ROAD (WTHR)
- AWAR LOCAL STUDY AREA (LSA)
- WTHR LOCAL STUDY AREA (LSA)
- WTHR REGIONAL STUDY AREA (RSA)
- MEADOWBANK LOCAL STUDY AREA (LSA)
- MEADOWBANK REGIONAL STUDY AREA (RSA)
- WATERCOURSE
- WATERBODY

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REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

MINE-RELATED HELICOPTER ACTIVITY ALONG THE ALL-WEATHER ACCESS ROAD AND WHALE TAIL HAUL ROAD, FALL 2022

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	SW
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
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4.6 Accuracy of Impact Predictions

A summary of the impact predictions identified in the TEMP Version 7 (Agnico Eagle 2019) that are evaluated, in part, by the Mine site ground surveys is presented in Table 4-10. Specifically, the 2022 Mine site ground survey monitoring data were compared to the impact prediction thresholds to evaluate adherence to the impact predictions and the provision of adaptive management, as either a necessary or proactive measure. None of the thresholds were exceeded in 2022.

Table 4-10: Accuracy of Impact Predictions – Mine Site Wildlife Disturbances

Potential Effect	Threshold	Threshold Exceeded? (2022)	Adaptive Management Implemented	Monitoring Methods
Sensory Disturbance	No threshold but Decisions Trees followed when caribou are seen near mine facilities	Not Applicable	YES Use of Decision Tree for Management and Monitoring.	Satellite-collaring data Road surveys Daily and weekly pit and Mine-site ground surveys Incidental wildlife reporting
Disturbance to Nesting Raptors	Raptor nest failures will not be caused by Project-related activities. Threshold is one nest failure per year.	NO	YES Mine-related activity restricted within quarries with nesting activity.	Daily and weekly pit and Mine-site ground surveys Incidental wildlife reporting Dedicated raptor nest surveys Road surveys
Disturbance of Nesting, Roosting or Moulting Waterfowl	Mine facilities and activities will not affect the breeding success of waterbirds occurring in the area or disturb large concentrations of roosting or moulting waterbirds. Threshold level is one nest failure per year.	NO	NO	Daily and weekly pit and Mine-site ground surveys Waterbird nest surveys Incidental wildlife reporting
Project-related Mortality	Destruction of two problem grizzly bear, wolverine, or wolf per year.	NO One wolverine mortality in 2022.	YES All crews were reminded on wildlife procedures, right-of-way and reporting incident reporting requirements	Daily and weekly pit and Mine-site ground surveys Wildlife deterrents and mortality reporting
Project-related Mortality	Two caribou or muskoxen mortality per year because of Project-related activities (e.g., falling into pits, tailing, sludge or other means)	NO	NO	Daily and weekly pit and Mine-site ground surveys Incidental wildlife reporting Wildlife mortality reporting
Project-related Mortality	Raptors and waterbirds will not be killed at the Mine site. Threshold is one individual per year.	NO	NO	Daily and weekly pit and Mine-site ground surveys

4.7 Management Recommendations

The 2022 Mine site ground surveys were an effective source of monitoring to address the impact predictions for managing ungulates, predatory mammals, nesting raptors, and Project-related mortalities. The following are specific management recommendations for the Mine site ground survey monitoring program:

- Complete wildlife incident reports, according to the TEMP Version 7, including deterrence events (Agnico Eagle 2019). All wildlife deterrence events are currently submitted to the eQuiS database.
- Continue to conduct formal weekly pit and Mine surveys to document wildlife activity and to verify that effects to wildlife are not occurring from Project-related activities.
- Continue raptor nest monitoring within the Meadowbank and Whale Tail LSAs, and along the AWAR and WTHR.
- Continue to document the use of deterrents to prevent habituation of wildlife near the Project or to relocate problematic wildlife.
- Continue to apply the Wildlife Protection and Response Plan (Appendix C, 2019 TEMP Version 7), which includes waste provisions, training, incident reporting, and protocols for problem wildlife. Efforts should be taken to ensure all perishable garbage is directed to the incinerator.
- Continue training and education to ensure that incidental wildlife reporting is completed by all Mine site personnel so that Environment personnel can remain informed of pertinent wildlife-related activity near the Mine site.
- Monitor tailings ponds daily during the waterbird migration period, beginning in mid-May. Increase the frequency of deterrent use if required.
- Gather detailed information (e.g., sex, age, photos) on deceased animals and include in incident reports, when possible.

5.0 WILDLIFE HABITAT MONITORING

5.1 Overview

The wildlife habitat mapping monitoring program was developed to describe the overall area of different Ecological Land Classification (ELC) units lost due to Mine-related activities (i.e., during construction, operation, decommissioning, and post-closure phases) at three primary locations: Meadowbank Main and Vault sites (which together encompass the Mine site), the AWAR, and the Whale Tail Mine and WTHR.

The initial strategy in the impact assessments for Meadowbank and Whale Tail was to compare predicted habitat losses due to Mine development to actual losses (i.e., from the environmental assessments); however, regular infrastructure extensions and expansions, changes to the Project, and subsequent regulatory approvals, made this approach difficult to implement. The current approach is to compare habitat losses from development to permitted areas, which encompass all proposed development. Habitat mapping monitoring is completed every three years post-construction, or if changes are greater than 25% of the overall Mine site footprint from the previous evaluation. The last comprehensive analysis was completed in 2021, therefore the next comprehensive analysis is scheduled for the 2024 reporting year, unless changes to footprint exceed 25%.

5.2 Objective

The primary initial objective of the habitat mapping monitoring program was to confirm that habitat losses identified in the TEMP (Agnico Eagle 2019) and the Whale Tail Pit FEIS Addendum (Golder 2018) for the Mine sites, haul roads, and AWAR, plus any subsequent approved extensions, have not exceeded threshold limits. This approach was difficult to execute due to regular Mine plan changes and subsequent approvals; therefore, beginning in 2018, habitat losses are compared to permitted areas, which encompass Mine development areas. A summary of each monitoring parameter, predicted losses, permitted areas, and thresholds for the Meadowbank Mine and Whale Tail Mine components is included in Table 5-1 and Table 5-2, respectively. Habitat suitability ratings for VECs are provided in Dougan & Associates (2015).

Table 5-1 Habitat Mapping Monitoring Parameters, Predicted Footprint Losses, Permitted Areas, and Thresholds for the Meadowbank Mine, All-Weather Access Road

Monitoring Parameter	Mine Site Predicted Loss	Mine Site Permitted Area	AWAR Predicted Loss	Threshold
Wildlife Habitat	1,130 ha	1,532 ha	180 ha[(a)]	>5% Predicted
Ungulate – High Suitability Habitat	372 ha (growing) 280 ha (winter)	531 ha (growing) 407 ha (winter)	4 ha (growing) 30 ha (winter)	>10% Predicted
Small Mammals – High Suitability Habitat	Given the minimal effects associated with the Meadowbank Project, habitat loss effects on Small Mammals were screened out during the FEIS (Golder 2016)			
Waterbirds – High Suitability Habitat	274 ha	417 ha	3 ha	>10% Predicted
Breeding Birds – High Suitability Habitat	590 ha	736 ha	29 ha	>10% Predicted

a) FEIS = Final Environmental Impact Statement. Permitted area along the AWAR is 455 ha.

Table 5-2: Habitat Mapping Monitoring Parameters, Predicted Footprint Losses, Permitted Areas, and Thresholds for the Whale Tail Mine and Haul Road

Monitoring Parameter	Whale Tail Predicted Loss	Whale Tail Permitted Area	Threshold
Wildlife Habitat	775 ha	1,505 ha	>5% Predicted
Ungulate – High Suitability Habitat	21 ha (growing) 561 ha (winter)	56 ha (growing) 1,057 ha (winter)	>10% Predicted
Small Mammals – High Suitability Habitat	Given the minimal effects associated with the Meadowbank Project, habitat loss effects on small mammals were screened out during the FEIS (Golder 2016)		
Waterbirds – High Suitability Habitat	Given the minimal effects associated with the Meadowbank Project, habitat loss effects on waterbirds were screened out during the FEIS (Golder 2016)		
Breeding Birds – High Suitability Habitat	Given the minimal effects associated with the Meadowbank Project, habitat loss effects on breeding birds were screened out during the FEIS (Golder 2016)		

FEIS = Final Environmental Impact Statement.

5.3 Duration

The total area of habitat disturbance associated with Mine site and ancillary facility construction was mapped following significant construction completion (2010) and was to be mapped annually during the operation phase as detailed in the TEMP (Agnico Eagle 2019). At the end of 2010, a detailed ELC habitat loss analysis found that habitat losses to date were substantially lower than predicted and that no habitat loss thresholds for VECs were exceeded. Given this outcome, another detailed ELC habitat loss analysis was not provided until the 2012 report, which had similar conclusions as those in 2010. The 2014 habitat analysis determined that habitat losses were still below predicted losses but that some of the thresholds were being reached. A partial analysis was conducted in 2017 while a full and through analysis using a revised approach was completed in 2018 and 2021.

The current habitat mapping monitoring program is intended to be completed every three years post-construction or if changes are greater than 25% of the overall Mine site footprint from the previous year evaluation. This frequency may be reduced during the operation phase if the amount of new disturbance and reclamation areas is relatively unchanged. Following decommissioning, vegetation mapping will be conducted in the first two years post-closure and every three years thereafter until Year 11 post-closure to verify that thresholds have been met.

5.4 Methods

Monitoring of habitat loss will occur at three primary locations: Meadowbank Mine (includes Vault Pit and Haul Road), AWAR (including quarry sites), and Whale Tail Mine and Haul Road (includes borrow/quarries sites and access roads). The footprint was updated based on 2022 survey data. Calculated losses were then subtracted from the permitted lease areas to ensure actual disturbances are within the lease area boundaries. For the Meadowbank Mine and AWAR locations, thresholds are disturbance of 5% above permitted areas of 1,532 and 455 ha, respectively. For the Whale Tail and Haul Road location, threshold is disturbance of 5% above a permitted area of 1,505 ha.

Changes to footprint occurred at the Whale Tail Mine in 2022. Current spatial files were overlayed on the 2021 footprint, to determine the percentage change in footprint area.

5.5 Historical Results

5.5.1 Meadowbank Mine Site

In 2014, construction of the Main site construction was almost complete, including most of the infrastructure for the Vault Pit area, although much of the pit and waste rock storage area had not yet been disturbed. ELC results for the Mine site footprint, based on as-built drawings from 2014, were compared to predicted ELC unit losses from the 2005 FEIS, plus approved extensions. Measured habitat loss for the Mine site in 2014 was calculated to be 775.7 ha, which was 91.1 ha (10.5%) less than the predicted total habitat loss of 866.8 ha for the Mine site. Differences between predicted and actual habitat losses were greatest in heath tundra, birch and riparian shrub, and lichen ELC units, all of which are high suitability habitat for ungulates during the winter season. Although no thresholds (>5% to 10% above predicted losses) for the loss of high suitability habitat were exceeded for any VECs, threshold levels for the Mine site were almost reached in 2014. Consequently, commitments were made to remove the material stored in the NPAG extension area (which was approved by Nunavut Water Board [NWB]) and use it for capping of the North Cell Tailings Storage Facility during the closure/reclamation phase of the Mine.

In 2017, the Mine development footprint had changed substantially since the 2014 analysis. The Vault Pit was fully operational and had expanded into the Phaser Lake area. Although the Phaser Lake extension was completed with approval from the NIRB and the NWB, the size of the extension area was not available for habitat calculations in the 2017 report. Measured habitat loss for the Mine site in 2017 was calculated to be 1,021 ha, which was 154 ha (17.8%) more than the predicted total habitat loss of 867 ha for the Mine site. The difference between predicted and actual habitat losses was primarily attributable to the final extent of the Vault waste dump, the Phaser Lake extension of the Vault Pit area (i.e., these were not included in the 867 ha calculation), and the as-built layout of the Non-potentially Acid Generating (NPAG) expansion of the Portage Waste Rock Facility. Differences between predicted and actual habitat losses were greatest for the sedge, and birch and riparian shrub ELC units, both of which are high suitability habitat for ungulates during the winter season. Greater than 10% differences between predicted and actual habitat losses were also observed in heath tundra, lichen, lichen-rock, and rock and boulder ELC units. Additionally, losses of high suitability habitat exceeded established thresholds for ungulates (growing and winter season), small mammals, and other breeding birds.

For the 2018 habitat analysis, the approach was revised to compare habitat losses to total area within Agnico Eagle's permitted areas, which also encompasses future approved work. For all ELC units combined, overall measured habitat losses (i.e., 1,129 ha) were 26% less than the habitat available within permitted areas (i.e., 1,532 ha) of the Meadowlark Mine site; therefore, thresholds were not surpassed. High suitability habitat losses for ungulates, small mammals, waterbirds, and other breeding birds were all below available high suitability habitats within permitted areas, also not surpassing any thresholds.

In 2021, overall measured habitat losses (i.e., 1,130 ha) were 26% less than the habitat available within permitted areas (i.e., 1,532 ha) of the Meadowlark Mine site; therefore, thresholds were not surpassed. High suitability habitat losses for ungulates, small mammals, waterbirds, and other breeding birds were all below available high suitability habitats within permitted areas, also not surpassing any thresholds.

5.5.2 AWAR

The ELC results for the AWAR had not changed since the 2010 analysis, and habitat loss analyses were not required. The 2010 ELC results for the AWAR were compared to ELC unit losses predicted in the 2005 EIS report. Construction of the AWAR required 38.4% less area (173 ha) than predicted in the 2005 FEIS (281 ha) and for each ELC unit, actual habitat losses were less than predicted. ELC habitat loss values for the AWAR

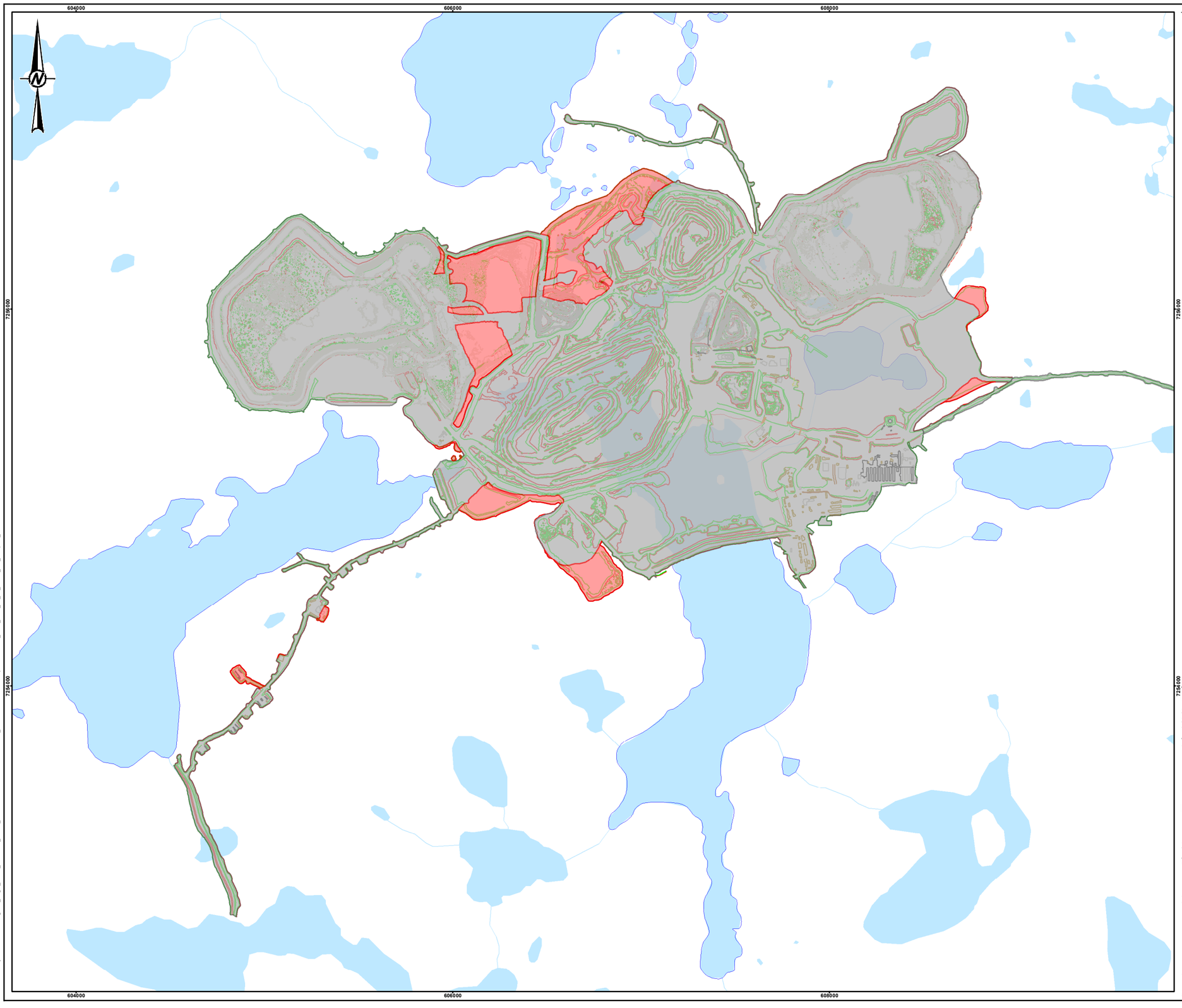
in 2010 were compared to predicted high suitability habitat losses for ungulates (growing and winter season), waterbirds, other breeding birds, and small mammals. In all cases, the measured high suitability habitat losses were significantly less than predicted losses and no thresholds (i.e., >5 to 10% above predicted losses) were exceeded.

5.5.3 Whale Tail Mine and Haul Road

The Whale Tail Mine was assessed in 2020 (Golder 2021). The area of the proposed footprint from 2018 was assessed as 5.04 km^2, and the area of the 2020 footprint of the Whale Tail Mine was assessed as 5.20 km^2. The Whale Tail Lake, borrow areas, and WTHR present in the proposed 2018 footprint were excluded from comparison with the 2020 footprint. Change in footprint for the Whale Tail Mine (3.2%) in 2020 was assessed as less than 25% since 2018. In 2021, overall measured habitat losses (i.e., 775 ha) were 48% less than the habitat available within permitted areas (i.e., 1,504 ha) of the Whale Tail Mine and Haul Road; therefore, thresholds were not surpassed.

5.6 Results

A 109.2 ha, or 8.4% change in footprint at the Whale Tail site occurred between the assessment in 2021 and 2022 (Figure 5-1). The change in footprint since the previous assessment less than 25%. Therefore, the next comprehensive analysis is scheduled for 2024.



LEGEND

- FOOTPRINT (2022)
- FOOTPRINT (2021)
- WATERCOURSE
- WATERBODY

0 400 800

1:20,000 METRES

REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED (AMQ STATUS MAP - 20230110.DXF).
2. WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

WHALE TAIL PIT AND HAUL ROAD FOOTPRINT (2022)

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	SW
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
21502960	4000/4040	0	5-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

PATH: Y:\Journaby\CAD GIS\Client\Agnico_Eagle_Mines_Ltd\Whale_Tail\9.0_PROJECTS\21502960\4000\4040\102_ PRODUCTION\MXD\Report\21502960_4000_4040_05_01_Whale_Tail_Footprint_2022.mxd PRINTED ON: 2023-03-27 AT: 10:58:53 AM

5.7 Accuracy of Impact Predictions

The 2022 habitat loss data were compared to permitted areas (i.e., rather than EIA predicted areas and extensions) to evaluate adherence to the impact predictions and the provision of adaptive management, as either a necessary or proactive measure. Actual habitat loss as result of mine site, AWAR, and WTHR construction and to date is less than habitat available within permitted areas (Table 5-3).

Table 5-3: Accuracy of Impact Predictions–- Habitat Loss

Measurable Parameter	Threshold (Compared to Permitted Areas	Threshold Exceeded (2022)	Adaptive Management Implemented	Status
Habitat Loss	Terrestrial Habitat Meadowbank = 1,532 ha AWAR = 455 ha Whale Tail = 1,505 ha Threshold is >5% habitat loss of permitted area	Not Assessed	None required	Ground Surveys Mapping and GIS analyses – ELC habitat mapping
	Ungulates Meadowbank Growing = 33 ha Winter = 650 ha Whale Tail Growing = 56 ha Winter = 1,057 ha	Not Assessed	None Required	
	Small Mammals Waterbirds Breeding Birds	Given the minimal effects associated with the Meadowbank project, habitat loss effects were screened out during the EA (Golder 2016)		
	Following mine closure and reclamation activities (except for tailings, waste rock facilities and exposed pit slopes) will see revegetation rates of >20% (year 2 post-closure), >40% (year 5), >60% (year 8) and >80% (year 11)	Not yet applicable		

AWAR = All Weather Access Road, EA = Environmental Assessment, ELC = Ecological Land Classification, GIS = Geographic Information System.

5.8 Management Recommendations

Measured change in footprint for the Meadowbank Mine and Vault sites, the AWAR, the Whale Tail Mine and WTHR was assessed as less than 25% of predicted values. Therefore, the next comprehensive habitat analysis will be completed in 2024, unless changes to the footprint from 2023 exceed 25%.

6.0 CARIBOU SATELLITE-COLLARING PROGRAM

6.1 Overview

Agnico Eagle intends to continue collaboration with the GN DOE caribou satellite-collaring program that includes data collected within the Meadowbank Complex RSA. The GN biologists discuss collar deployments with hunters and Elders and get approval prior to proceeding. Daily collar location maps are provided by GN DOE during the sensitive seasons to inform locations of caribou in relation to the Meadowbank Complex.

6.2 Objectives

The satellite-collaring program was developed to provide information on the distribution of caribou occurring within the Meadowbank RSA and contribute data to ongoing satellite-collaring programs for the Ahiak, Qamanirjuaq, and other herds that are used by the GN for herd management. The satellite-collaring program, along with GN DOE regional data, is an important monitoring and management tool that provides a regional perspective on caribou activity near Mine operations. Another key objective of the program is to provide timely information for the caribou management and monitoring strategy at the Meadowbank and Whale Tail sites (i.e., Decision Tree approach; see 2019 TEMP [Agnico Eagle 2019]).

6.3 Duration

The satellite-collaring program was initially designed to continue for five consecutive years in accordance with the original TEMP (Cumberland 2006), but collar deployments have continued beyond this period as part of a long-term caribou monitoring strategy for the region. Caribou in the Baker Lake area were first collared in May 2008, and the program has continued for more than a decade. Monitoring of collars continued in 2022 and is expected to continue through 2023.

6.4 Methods

Caribou collaring methods and deployment are administered by the GN. Caribou are carefully netted by the contracted satellite-collaring crew via helicopter and fitted with either an Advanced Research and Global Observation Satellite (ARGOS) GPS Type IV or Iridium satellite-collar. Collar data are regularly[1] retrieved electronically via satellite and distributed to GN DOE and Nunavut Environmental personnel by CLS America, the data-management company.

Deployed collar data were included in a population distribution analysis completed for the GN (Nagy et al. 2011). The clustering and movements of each collared caribou are examined and assigned to the sub-population (i.e., Ahiak, Beverly, Lorillard, Qamanirjuaq, and Wager Bay herds) that best fits the animal's movement characteristics.

Collar data collected between 2005 and 2019 was analyzed in 2021 to assess inter-annual trends in migration timing, comparison between telemetry and ground survey observations in 2018 and 2019, and the effect of WTHR construction on spring and fall migration patterns. Full methodology of 2005 to 2019 collar analysis is included in Appendix F of Golder (2022).

[1] Data are often retrieved on a daily basis but may vary depending on signal strength and weather conditions.

6.5 Historical Results

Collaring was originally scheduled to commence in 2007 but was postponed for one year due to logistical constraints. Seven deployments, with a total of 115 collars, have been completed in the area around Baker Lake since Agnico Eagle became involved in the collaring program. historical collar data have all been assigned to one of the five major sub-populations (Nagy et al. 2011). The following numbers of collars were successfully deployed since 2008:

- Nine collars (Agnico Eagle) in May 2008
- Twenty-one collars (shared by Agnico Eagle and AREVA) in November 2009
- Thirteen collars (Agnico Eagle) in April 2011
- Fifteen collars (shared by Agnico Eagle and AREVA) in April 2013
- Ten collars (Agnico Eagle) in April 2015
- Thirteen collars (Agnico Eagle) in May 2016 and
- Thirty-four collars (Agnico Eagle) in April 2018
- Twenty-five collars (GN) in April 2022.

6.6 Caribou Migration Patterns

Interaction with a north-south reference line on the west and east side of the road was used to identify spring and fall migration. Based on analysis of collar data from 2005 to 2019, the estimated average date of spring migration pooled across all years was Julian day 121, or 1 May, and 96% of all spring migrations occurred between 11 April and 20 May. Spring migration timing distribution differed significantly across all years. However, pairwise comparisons between years found that 83% of years were statistically similar, and only 17% of years differed significantly. When years with low sample sizes were removed, large changes to migration timing, duration, and pooled absolute differences were not observed. However, the number of year-to-year comparisons of distributions that were statistically similar was reduced.

In 2018, the date at which approximately 50% of caribou were estimated to have migrated across the spring reference line, based on ground observations, was Julian day 108 (18 April), which was 13 days earlier than the date estimated by telemetry data (i.e., Julian day 120 or 1 May). The estimated date of spring migration was later in 2019 (i.e., Julian day 114 or 24 April vs. Julian day 108 or 18 April) based on ground observations. Telemetry data for 2019 indicated that the estimated date of spring migration was also 24 April.

Because fall migration appeared to be multimodal (i.e., caribou interacted with the fall reference line in multiple waves), the fall season was split into an early and late period, and inter-annual variation in fall migration was considered for each period separately. Based on 14 caribou, the mean early fall migration date for 2018 was Julian day 256 (13 September), and 96% of early fall migrations, occurred between 30 August and 27 September in 2018. The mean late fall migration date was Julian day 312 (8 November), and 96% of late fall migrations, occurred between 11 October and 7 December. Late fall migration distributions differed significantly across years. Pairwise comparison of years indicated that 33% of years were statistically similar and 67% of years were statistically different.

In 2018, the estimated date at which approximately 50% of total caribou were recorded from ground observations was Julian day 286 (13 October), which was 22 days later than the date estimated by 50% of telemetry data (i.e., Julian day 264 or 21 September) and inclusive of both early and late fall periods. Comparisons between ground and telemetry observations could not be made for 2019, due to collar data being unavailable at the time of analysis.

Spring migration distributions did not vary pre- and post-WTHR construction, nor did late fall migration distributions. Early fall pre-and post-WTHR construction distributions were not compared because the within year trend for 1999, 2000 and 2001 are characterized by a single collared animal and would limit the temporal comparison to a single pre-construction (2016) and post-construction 2018 year.

Full results of the 2005 to 2019 collar data analysis are provided in Appendix F of Golder (2022).

6.7 2022 Results

Agnico Eagle intends to continue collaboration with the GN DOE caribou satellite-collaring program, however, a data sharing agreement has not existed since 2019. Without a data sharing agreement, Agnico Eagle has not had access to collar data to complete the 2020, 2021, and 2022 analyses. Agnico Eagle and the GN DOE have been working on a revised data sharing agreement that is mutually beneficial to both parties and hope to have this resolved soon.

6.8 Accuracy of Impact Predictions

The accuracy of impact predictions could not be completed for the 2022 monitoring year. Collar data were not available to complete the analysis at the time of reporting.

6.9 Management Recommendations

Future collar data analysis should be discussed with the TAG. Recommendations based on analysis of 2005 to 2019 collar data include further exploratory analysis aimed at explaining annual differences in the timing of spring and fall migration may be completed with environmental covariates such as snow conditions (Mallory et al. 2020) or weather (Gurarie et al. 2019). If differences can be explained by readily available information such as weather, then it may be possible to forecast when mitigation should be applied annually. Further analyses can be carried forward with additional comparisons to ground observations during both seasons as collar data becomes available.

7.0 VIEWSHED SURVEYS

7.1 Overview

Viewshed surveys were implemented in 2020 to survey standardized and readily accessible survey locations along the WTHR that would maximize detection of approaching caribou because topography around the WTHR is variable. The viewshed surveys serve as an early warning system for caribou approaching the WTHR to support mitigation measures during migration. The existing height-of-land (HOL) surveys were completed from 2017 through to February 2020 and then replaced by the viewshed surveys for the remainder of 2020. In 2019, Agnico Eagle advanced the idea of using viewshed survey points instead of HOL locations because of safety and logistical concerns. A viewshed survey analysis (a viewshed analysis) and report were prepared by Golder (2020c) to establish 12 viewshed survey locations along the WTHR that maximized the total habitat around the WTHR that could be surveyed. Agnico Eagle began using the viewshed survey locations in February 2020. In 2021, viewshed survey locations were adjusted based on areas with high caribou use and points of high elevation within areas with high caribou use, and an additional survey location was added. Thirteen viewshed locations were surveyed on 58 occasions in 2022.

7.2 Objectives

The viewshed surveys provide an ‘early warning’ system of the presence of caribou in proximity to the WTHR. The viewshed surveys provide a series of standardized locations to repeatedly and safely survey throughout the year to produce estimates of caribou moving through the Project.

7.3 Methods

From 2017 to 2019, five height-of-land (HOL) locations were surveyed along the WTHR. The locations were within 500 m of the WTHR and provided an unobstructed view of the surrounding terrain. In 2020, the HOL surveys were replaced by viewshed surveys and twelve viewshed survey locations were established along the WTHR in a desktop review to maximize the area around the WTHR that could be surveyed (Golder 2020a). Survey locations were established to cover the length of the WTHR. In 2022, 13 viewshed locations were surveyed as shown in Figure 7-1. While conducting the viewshed surveys, observers spent 10 minutes surveying for wildlife using a combination of naked eye, binoculars, and spotting scopes to maximize sighting distance. If a caribou group is observed, the observer estimates the number of individuals, direction from observer, distance from road, behaviour, direction of travel, and habitat. These results are then used to determine if a Group Size Threshold has been reached and if mitigation action is required.

7.4 Historical Results

A total of 12 species were observed during HOL surveys in 2019; six species were only observed during the summer caribou season (Table 7-1). The highest number of caribou was observed during the spring caribou season, followed by the fall and then summer seasons (Table 7-1). No caribou were observed during the winter caribou season.

In 2020, 163 viewshed surveys were completed across 19 dates: five in spring, eight in summer, one in fall, and five in winter. Three mammal species were observed during viewshed surveys, including 252 caribou, one Arctic hare, and eight muskox (Table 7-2). Two bird species were observed including one common raven and one sandhill crane. Only ten out of 163 surveys (6%) had caribou sightings. Of the ten sightings, eight occurred during the spring and two during the summer. Caribou were typically sighted to the north or west, and the average

sighting distance was 630 m from the road. In all cases where caribou were observed, the recorded visibility was up to 1 km, indicating these surveys are most effective in good visibility conditions.

In 2021, 310 viewshed surveys were completed across 27 dates: nine in summer, 14 in fall, and four in winter. Five mammal species were observed during the viewshed surveys, including caribou, muskox, Arctic hares, Arctic foxes, and Arctic ground squirrel (Table 7-3). Five species of birds were observed including Canada geese, common ravens, ptarmigan (willow ptarmigan or rock ptarmigan), sandhill cranes, and snow geese. Only 37 surveys (12%) had caribou sightings with 27 positive surveys occurring in the summer and ten in the fall, and a total of 190 caribou reported. Only two survey locations, Viewshed 1 and Viewshed 11, had no surveys with caribou detections. Group sizes ranged from 1-24 individuals and, caribou were sighted more frequently to the east at an average sighting distance of 1,049 m from the road. In all cases where caribou were observed and visibility was recorded, the visibility was at least 1 km, indicating these surveys are most effective in good visibility conditions.

Table 7-1: Total Number of Wildlife Observed during Height of Land Surveys along the Whale Tail Haul Road in 2019

Species	Caribou Seasons			
	Spring 01 Apr to 25 May	Summer 26 May to 21 Sep	Fall 22 Sep to 15 Dec	Winter 16 Dec to 31 Mar
Mammals				
Arctic hare	2	3	3	0
Caribou	842	177	529	0
Muskox	17	16	0	32
Wolf	0	0	1	0
Wolverine	0	0	1	1
Birds				
Canada goose	0	6	0	0
Geese sp.	0	167	0	0
Gull sp.	0	2	0	0
Owl sp.	0	2	0	0
Ptarmigan	0	19	15	0
Snow bunting	0	10	0	0
Snow goose	0	346	0	0

Table 7-2: Total Number of Wildlife Observed during Viewshed Surveys along the Whale Tail Haul Road in 2020

Species	Caribou Seasons			
	Spring 01 Apr to 25 May	Summer 26 May to 21 Sep	Fall 22 Sep to 15 Dec	Winter 16 Dec to 31 Mar
Mammals				
Arctic hare	1	0	0	0
Caribou	247	5	0	0
Muskox	1	7	0	0
Birds				
Common raven	0	1	0	0
Sandhill crane	0	1	0	0

Table 7-3: Total Number of Wildlife Observed during Viewshed Surveys along the Whale Tail Haul Road in 2021

Species	Caribou Seasons			
	Spring (01 Apr to 25 May)	Summer (26 May to 21 Sep)	Fall (22 Sep to 15 Dec)	Winter (16 Dec to 31 Mar)
Mammals				
Arctic fox	-	1	2	0
Arctic ground squirrel	-	1	0	0
Arctic hare	-	2	0	0
Caribou	-	149	41	0
Muskox	-	20	35	2
Birds				
Canada goose	-	13	0	0
Common raven	-	0	1	1
Ptarmigan	-	0	5	0
Sandhill crane	-	2	0	0
Snow goose	-	38	0	0

7.5 2022 Results

Viewshed surveys were conducted on 58 dates in 2022, though not all locations were surveyed each day (Figure 7-1). Each location was surveyed a minimum of 56 times each throughout the year, with a maximum of 57 survey visits. A total of 739 surveys were conducted between 5 January and 28 December, with the highest survey effort occurring in the summer (28%, Table 7-4).

Table 7-4: Viewshed Survey Effort by Season, 2022

Season	Survey Days	Surveys Completed (% of total effort)
Spring	14	182 (25%)
Summer	16	207 (28%)
Fall	12	155 (21%)
Winter	16	195 (26%)
Total	**58**	**739 (100%)**

Of the 739 viewshed surveys completed in 2022, only 41 surveys (6%) had caribou sightings, and a total of 461 caribou were reported (Table 7-5). All survey locations had surveys with caribou detections, except for Viewshed 5 (Table 7-5). Three survey locations had only one survey with caribou sightings (Viewshed 2, 3, and 7), three survey locations had two surveys with caribou sightings (Viewshed 4, 6, and 8), and one survey location had three surveys with caribou sightings (Viewshed 11). Viewshed 9 had four surveys with sightings, Viewsheds 1 and 13 each had five surveys with sightings, Viewshed 10 had six surveys with sightings, and Viewshed 12 had the most surveys with sightings at nine. Of the 41 surveys with caribou sightings, 20 occurred during the summer, 12 occurred during the spring, five occurred during the fall, and four occurred during winter (Table 7-5).

Group sizes ranged from 1-100 individuals (Table 7-6). Caribou were sighted more frequently to the west and the average sighting distance was 685.5 m from the road. In all cases where caribou were observed and visibility was recorded, the visibility was at least 1 km, indicating these surveys are most effective in good visibility conditions.

Other mammals recorded during viewshed surveys include Arctic fox, Arctic hare, muskox, and grey wolf. Bird species recorded include American crow, Canada goose, common raven, greater white-fronted goose, ptarmigan sp., rough-legged hawk, and snow goose (Table 7-7).

Table 7-5: Viewshed Surveys Completed and Number of Caribou Observed per Season in 2022

Date	Viewshed Survey Location												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Spring Caribou Season (01 Apr – 25 May)													
2022-04-06	0	0	0	0	0	0	0	0	0	**14**	0	0	0
2022-04-09	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-04-12	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-04-18	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-04-20	0	0	0	0	0	0	0	**100**	**100**	**4**	0	0	**66**
2022-04-25	0	0	0	0	0	0	0	**3**	0	0	0	**33**	0
2022-04-29	0	0	**6**	0	0	0	0	0	0	0	0	0	0
2022-05-04	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-05-05	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-05-09	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-05-11	0	0	0	0	0	0	0	0	**6**	0	0	0	0
2022-05-17	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-05-22	**6**	0	0	0	0	0	0	0	0	0	0	0	0
2022-05-25	**2**	0	0	**5**	0	0	0	0	0	0	0	0	0
Summer Caribou Season (26 May – 21 Sep)													
2022-06-09	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-06-22	0	0	0	0	0	**4**	0	0	0	0	0	0	0
2022-06-30	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-07-06	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-07-15	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-07-19	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-07-28	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-07-31	**1**	0	0	0	0	0	0	0	0	0	-	0	0
2022-08-08	0	0	0	0	0	0	0	0	0	0	0	**1**	0
2022-08-11	0	0	0	0	0	0	0	0	0	0	**1**	0	0
2022-08-19	0	0	0	0	0	**2**	**5**	0	0	**1**	0	**5**	**14**
2022-08-24	0	0	0	0	0	0	0	0	0	**1**	0	**1**	**2**
2022-08-31	0	0	0	0	0	0	0	0	**1**	**1**	**3**	**4**	**1**
2022-09-05	0	0	0	0	0	0	0	0	0	**11**	0	**8**	0
2022-09-07	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-09-14	0	0	0	0	0	0	0	0	0	0	0	0	**3**
Fall Caribou Season (22 Sep – 15 Dec)													
2022-09-22	**9**	**1**	0	0	0	0	0	0	0	0	0	**1**	0
2022-09-24	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-09-28	0	0	0	**2**	0	0	0	0	0	0	0	0	0
2022-10-04	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-10-08	**16**	0	0	0	0	0	0	0	0	0	0	0	0
2022-10-22	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-10-28	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-10-30	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-11-08	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-11-16	0	0	0	0	0	0	0	0	0	0	0	0	-

Table 7-5: Viewshed Surveys Completed and Number of Caribou Observed per Season in 2022

Date	Viewshed Survey Location												
	1	2	3	4	5	6	7	8	9	10	11	12	13
2022-11-24	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-12-03	0	0	0	0	0	0	0	0	0	0	0	0	0
Winter Caribou Season (16 Dec – 31 Mar)													
2022-01-05	0	0	0	0	0	0	0	0	0	0	-	-	-
2022-01-07	-	-	-	-	-	-	-	-	-	-	0	0	0
2022-01-12	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-01-18	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-02-02	0	0	0	0	0	0	0	0	0	0	**6**	0	0
2022-02-09	0	0	0	0	0	0	0	0	0	0	0	**5**	0
2022-02-19	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-02-23	0	0	0	0	0	0	0	0	**4**	0	0	0	0
2022-03-01	0	0	0	0	0	0	0	0	0	0	0	**2**	0
2022-03-12	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-03-19	0	0	0	0	0	0	0	0	0	0	0	0	0
2022-03-27	0	0	0	0	0	0	0	0	0	0	0	0	0

Dashed line indicates survey location was not surveyed. Zero indicates the area was surveyed and there were no caribou detected.

Table 7-6: Survey Condition Details for Viewshed Surveys with Caribou Sightings, 2022

Survey Location	Date	Temperature (°C)	Wind Speed (km/hr)	Visibility*	Cardinal Direction	Number	Habitat	Behaviour	Distance from Road (m)
Spring Caribou Season (01 Apr – 25 May)									
Viewshed 10	2022-04-06	-8	30	> 1 km	West	14	Heath Tundra, Rock & Boulder	Foraging	900
Viewshed 8	2022-04-20	-20	12	> 1 km	West	100	Heath Tundra	Foraging	3000
Viewshed 9	2022-04-20	-20	12	> 1 km	West	100	Heath Tundra	Feeding	2000
Viewshed 10	2022-04-20	-20	12	> 1 km	East	4	Heath Tundra	Resting	2500
Viewshed 13	2022-04-20	-20	12	> 1 km	West	66	Heath Tundra	Foraging	2000
Viewshed 8	2022-04-25	-14	20	> 1 km	East	3	Heath Tundra	Foraging	733
Viewshed 12	2022-04-25	-14	20	> 1 km	West	33	Heath Tundra	Foraging	1200
Viewshed 3	2022-04-29	-17	30	> 1 km	West	6	Ice	Walking	1000
Viewshed 9	2022-05-11	-1	17	1 km	West	6	Heath Tundra, Lichen-Rock, Rock & Boulder	Feeding	100
Viewshed 1	2022-05-22	-9	21	> 1 km	East	6	Heath Tundra	Feeding	100
Viewshed 4	2022-05-25	-4	20	> 1 km	West	5	Ice	Walking	400
Viewshed 1	2022-05-25	-4	20	> 1 km	West	2	Hilltop	Feeding	400

Table 7-6: Survey Condition Details for Viewshed Surveys with Caribou Sightings, 2022

Survey Location	Date	Temperature (°C)	Wind Speed (km/hr)	Visibility*	Cardinal Direction	Number	Habitat	Behaviour	Distance from Road (m)
Summer Caribou Season (26 May To 21 Sep)									
Viewshed 6	2022-06-22	14	20	1 km	West	4	Heath Tundra	Walking	80
Viewshed 1	2022-07-31	5	30	> 1 km	East	1	Heath Tundra, Hilltop, Rock & Boulder	Walking	100
Viewshed 12	2022-08-08	10	10	> 1 km	West	1	Lichen-Rock	Feeding	350
Viewshed 11	2022-08-11	12	40	> 1 km	West	1	Hilltop, Rock & Boulder	Walking	400
Viewshed 6	2022-08-19	11	30	1 km	West	2	Heath Tundra	Feeding	50
Viewshed 7	2022-08-19	11	30	1 km	East	5	Heath Tundra	Walking	500
Viewshed 10	2022-08-19	11	30	1 km	East	1	Heath Tundra, Water	Trotting/running	200
Viewshed 12	2022-08-19	11	30	1 km	West	5	Heath Tundra	Walking	200
Viewshed 13	2022-08-19	11	30	1 km	West	14	Heath Tundra	Feeding	400
Viewshed 10	2022-08-24	6	40	> 1 km	East	1	Heath Tundra	Feeding	300
Viewshed 12	2022-08-24	6	40	> 1 km	West	1	Heath Tundra	Feeding	200
Viewshed 13	2022-08-24	6	40	> 1 km	West	2	Heath Tundra	Feeding	5
Viewshed 13	2022-08-31	12	12	> 1 km	East	1	Birch & Riparian Shrub	Foraging	200
Viewshed 12	2022-08-31	12	12	> 1 km	East	2	Lichen-Rock	Feeding	300
Viewshed 12	2022-08-31	12	12	> 1 km	West	2	Lichen-Rock	Feeding	300
Viewshed 11	2022-08-31	12	12	> 1 km	East	1	Lichen-Rock	Feeding	200
Viewshed 11	2022-08-31	12	12	> 1 km	West	2	Birch & Riparian Shrub, Lichen-Rock	Feeding	250
Viewshed 10	2022-08-31	12	12	> 1 km	West	1	Heath Tundra	Feeding	800
Viewshed 9	2022-08-31	12	12	> 1 km	West	1	Birch & Riparian Shrub	Feeding	1000
Viewshed 12	2022-09-05	9	20	> 1 km	East	5	Heath Tundra, Hilltop	Feeding	150
Viewshed 12	2022-09-05	9	20	> 1 km	West	3	Heath Tundra, Hilltop	Feeding	2500
Viewshed 10	2022-09-05	9	20	> 1 km	East	2	Heath Tundra, Hilltop	Feeding	1500
Viewshed 10	2022-09-05	9	20	> 1 km	West	9	Heath Tundra, Hilltop	Feeding	450
Viewshed 13	2022-09-14	5	15	> 1 km	East	2	Heath Tundra	Foraging	30
Viewshed 13	2022-09-14	5	15	> 1 km	West	1	Heath Tundra	Foraging	100
Fall Caribou Season (22 Sep – 15 Dec)									
Viewshed 1	2022-09-22	10	14	> 1 km	West	7	Lichen	Foraging	500
Viewshed 1	2022-09-22	10	14	> 1 km	West	2	Heath Tundra	Foraging	20
Viewshed 2	2022-09-22	10	14	> 1 km	West	1	Lichen-Rock	Foraging	2000
Viewshed 12	2022-09-22	10	14	> 1 km	West	1	Heath Tundra, Lichen-Rock	Foraging	1000
Viewshed 4	2022-09-28	8	32	> 1 km	West	2	Lichen-Rock	Foraging	1000
Viewshed 1	2022-10-08	-2	20	1 km	East	16	Heath Tundra	Walking	300

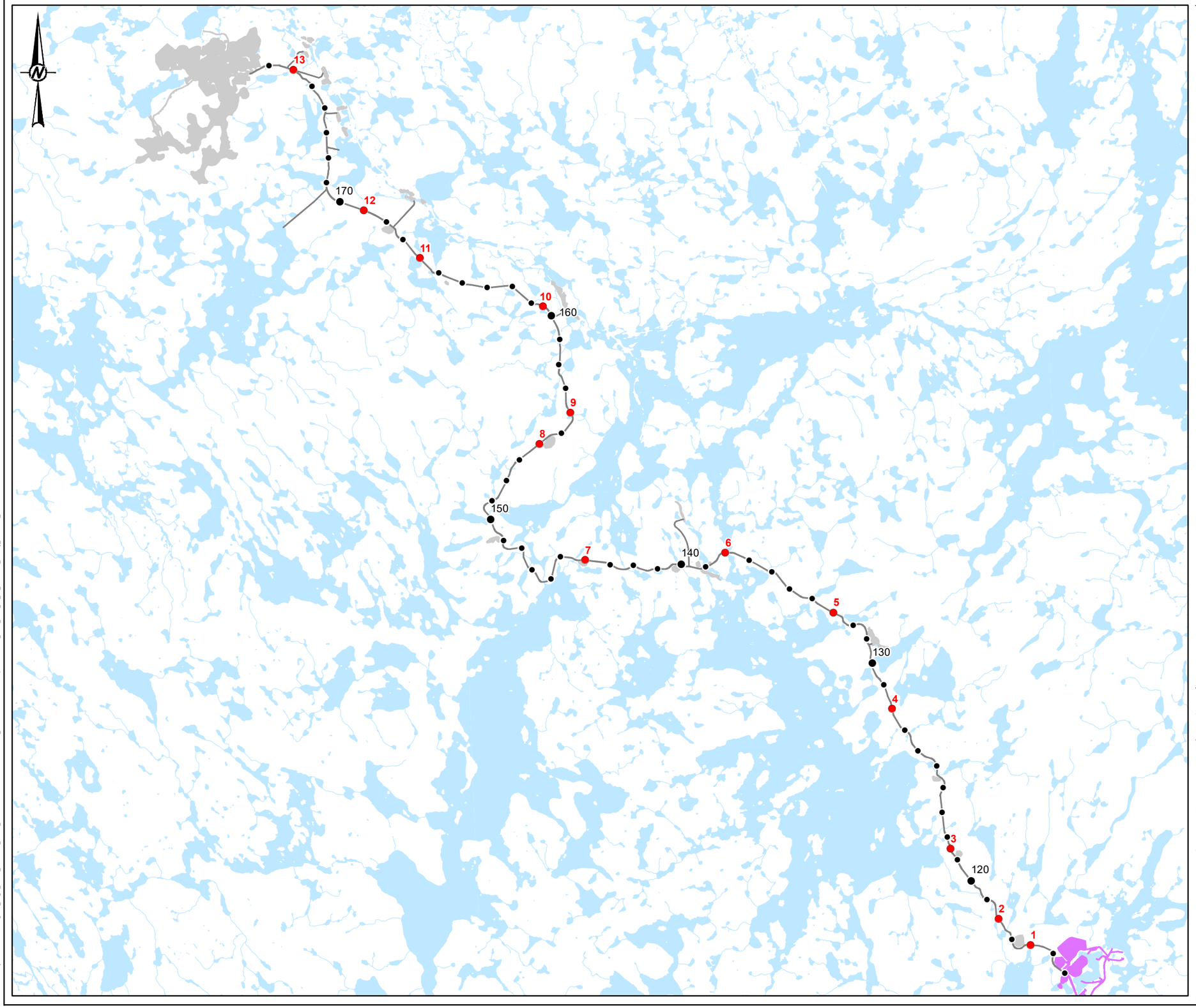
Table 7-6: Survey Condition Details for Viewshed Surveys with Caribou Sightings, 2022

Survey Location	Date	Temperature (°C)	Wind Speed (km/hr)	Visibility*	Cardinal Direction	Number	Habitat	Behaviour	Distance from Road (m)
Winter Caribou Season (16 Dec – 31 Mar)									
Viewshed 11	2022-02-02	-36	26	1 km	West	6	Hilltop	Feeding	150
Viewshed 12	2022-02-09	-36	31	> 1 km	East	5	Heath Tundra	Foraging	1000
Viewshed 9	2022-02-23	-35	16	1 km	West	4	Heath Tundra	Foraging	1200
Viewshed 12	2022-03-01	-33	40	1 km	West	2	Heath Tundra	Feeding	150

*Methods for noting visibility changed during September 2021 including an additional option for “>1 km” being added to tablets used for data collection. Visibility of 1km prior to September 2021 may have been selected for visibility that was 1 km or visibility that was greater than 1 km.

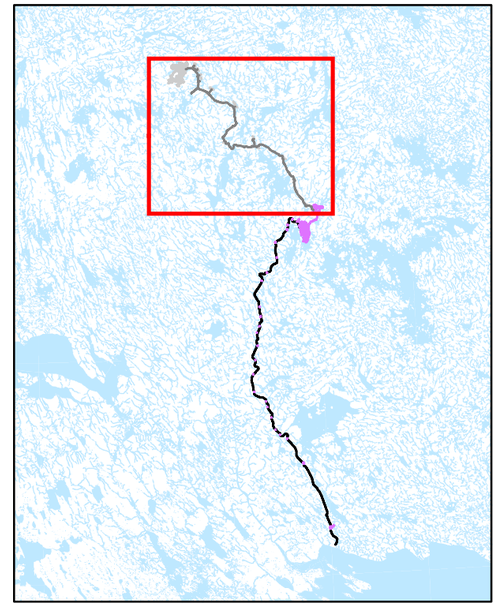
Table 7-7: Total Number of Wildlife Observed during Viewshed Surveys along the Whale Tail Haul Road in 2022

Species	Caribou Seasons			
	Spring (01 Apr to 25 May)	Summer (26 May to 21 Sep)	Fall (22 Sep to 15 Dec)	Winter (16 Dec to 31 Mar)
Mammals				
Arctic fox	0	2	0	0
Arctic hare	0	1	0	0
Caribou	345	70	29	17
Muskox	73	62	110	12
Wolf	0	1	0	0
Birds				
American crow	0	1	3	2
Canada goose	32	7	0	0
Common raven	3	0	0	0
Greater white-fronted goose	36	0	0	0
Ptarmigan	1	1	0	0
Rough-legged-Hawk	2	0	0	0
Snow goose	0	233	0	0



LEGEND

- VIEWSHED SURVEY LOCATION
- KILOMETRE MARKER
- WHALE TAIL MINE SITE
- HAUL ROAD
- MEADOWBANK MINE SITE
- WATERBODY
- WATERCOURSE



0 3 6

1:150,000 KILOMETRES

REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. ROAD, WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

LOCATION OF VIEWSHED SURVEYS ALONG WHALE TAIL HAUL ROAD, 2022

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	JF
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
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7.6 Management Recommendations

The viewshed surveys were implemented to improve logistics and health and safety conditions for observers, as well as long-distance monitoring of caribou. Fifty-eight days of viewshed surveys were conducted in 2022, while the majority of monitoring along the WTHR was conducted using the standard road surveys (Section 3.0). Comparison of the effectiveness of viewshed surveys and road surveys at detecting caribou approaching the WTHR is presented in Section 17.0.

8.0 REMOTE CAMERA PROGRAM

8.1 Overview

The initial remote camera study design (October 2018 to November 2019) was intended to collect general trends on caribou crossing events and traffic or road activities on the WTHR, to inform fine scale traffic mitigation. An updated study design was implemented in November 2019, to examine the permeability of the WTHR to caribou movement as those interactions relate to the physical parameters of the road. The 2019 to 2021 remote camera data were previously analyzed for the 2020 and 2021 Wildlife Monitoring Summary Reports (Golder 2021, 2022). Results from the 2022 remote camera program are summarized below.

8.2 Objectives

The primary objective of the remote camera program is to monitor caribou behavioural interactions with the WTHR, and adapt management practices (i.e., traffic mitigation) as required. The current remote camera program allows for comparisons to determine if caribou crossing locations along the WTHR are related to the physical parameters of the road (i.e., backfill height, slope and material grain size) and traffic rates.

8.3 Duration

The use of remote cameras will continue throughout the year, but camera results will be analyzed and discussed at TAG meetings to ensure that the monitoring objectives are being achieved.

8.4 Methods

8.4.1 Camera Deployment and Settings

Locations of remote cameras have varied across program years (Golder 2021, 2022). The same locations were used in 2022 as in 2021. The locations of the paired remote cameras along the WTHR were selected based on high-frequency caribou crossing locations, and stratified across road height categories (i.e., <1.5 m, 1.5 to 3 m, and >3 m; Table 8-1). Road heights were determined in the field. Backfill material and slope at camera locations were determined from construction surveys (WSP 2019). Backfill slope along the WTHR is typically 2:1. In areas where backfill height exceeds 3 m, slope was recontoured to 4:1 for safety purposes, and to facilitate wildlife crossings (WSP 2019).

The program uses Reconyx HyperFire 2 Professional Covert IR Camera OD Green cameras. In the pilot program, at each location, the first camera in the pair was typically placed facing the WTHR, and the second camera was placed facing away from the WTHR. In November 2019, camera locations were updated so that at each location, the first camera in the pair was placed facing parallel to the WTHR (i.e., recording observations of caribou crossing the road) in one direction (e.g., north). The second camera in the pair was placed facing parallel to the road in the opposite direction of the first camera (e.g., south). Cameras were placed in close proximity to the road (within 5 m, approximately 1 m above ground level), to provide a field of view that would capture road traffic and caribou interactions with the road. The majority of camera positions were adjusted for 2021 to encompass both sides of the road to better document caribou crossing events and vehicle traffic. Camera timing was set to the continuous motion-triggered setting, with additional timed interval photographs occurring in thirty minute or one-hour intervals. Maintenance checks were performed weekly throughout the year to remove dust, snow, or ice accumulated on cameras, and back up photographs as required.

Table 8-1 Remote Camera Locations along the Whale Tail Haul Road, 2022

Camera Pair	Camera Label	KM Location Reference	Road Height (m)	Backfill Material	Backfill Slope (Horizontal:Vertical)
1	AECC01/AECC02	118	>3	Rock	4:1
2	AECC03/AECC04	132	>3	Esker	4:1
3	AECC05/AECC06	136	1.5 to 3	Rock	2:1
4	AECC07/AECC08	172	1.5 to 3	Rock	2:1
5	AECC09/AECC10	157	1.5 to 3	Esker	2:1
6	AECC11/AECC12	152	<1.5	Mix	2:1
7	AECC13/AECC14	138	>3	Rock	2:1
8	AECC15/AECC16	161	<1.5	Esker	2:1
9	AECC17/AECC18	170	<1.5	Rock	2:1
10	AECC19/AECC20	146	>3	Rock	4:1

> = greater than; < = less than; km = kilometre; m = metre; UTM = Universal Transect Mercator

8.4.2 Photograph Review

Previous years of the remote camera program focused on manual review of time lapse photographs, rather than motion-triggered photographs (Golder 2022). Due to the open nature of the habitat along the WTHR, caribou infrequently walk directly in front of cameras, and so, infrequently activate motion-triggered photographs. Photographs in 2022 were pre-sorted using artificial intelligence (Section 8.4.2.1). The artificial intelligence was run over both motion and time-lapse photographs from the entire year.

Photographs identified as wildlife by the artificial intelligence were manually reviewed by a human observer and identified to species. Individuals of wildlife species were not considered separate detections during manual review, until either an hour had passed or until there was a distinguishable difference between separate individuals triggering the camera. Instances of caribou crossing the road were recorded where applicable.

8.4.2.1 Artificial Intelligence Classification

An automated approach was used to classify the 2,727,572 photos collected in 2022 as “near wildlife” (i.e., wildlife close enough to cameras that they could be easily identified by humans) and “far wildlife” (i.e., wildlife far away from cameras that can only be detected by differences in pixels between subsequent photographs, Agnico Eagle 2023b).

An image classification machine learning model was used to classify “near wildlife”. Photographs from the 2021 camera program were used as a training dataset for the model. The dataset was augmented to obtain a suitable number of training images. An object detection model was trained to recognize trucks, and photographs containing trucks were filtered out and not passed through the main image classification model. Therefore, photographs containing both trucks and near wildlife are not selected by the classification model. For each camera, approximately 500 to 2000 photographs were selected by the classification model. Many of these photographs were false positives (i.e., classified as containing wildlife, but do not actually contain wildlife), and were manually filtered for wildlife photographs. Four cameras with high numbers of false positives were re-trained, with false positives photographs re-classified as not containing wildlife.

An image comparison tool was used to classify “far wildlife”. The algorithm analyzes what changes in two consecutive photographs near the horizon. The truck object detection model was used to eliminate the area on photographs occupied by trucks, otherwise, each truck near the horizon would be identified as wildlife. The image comparison tool could be applied for 14 of 20 cameras. The six remaining cameras did not have a clear view of the horizon, or had high rates of false positives. The photographs selected by the tool were manually reviewed to confirm presence of wildlife. If the presence of wildlife was uncertain, they were classified as containing wildlife.

8.4.3 Data Analysis

Sampling effort or number of days each camera was considered active was determined at each camera pair based on unique days with photographs. An overall caribou detection rate was calculated, based on the number of individuals observed, divided by the camera station sampling effort in days by season. A caribou crossing rate was also calculated, based on the number of individuals observed crossing the road, divided by the camera station sampling effort in days by season. To prevent double counting caribou at camera pairs, the maximum caribou and caribou crossing rate at each camera pair is presented by season.

Only events where caribou were photographed on the road, or individuals of a group were observed on either side of the road were considered crossing events. Caribou counts may be subject to error due to distance of caribou groups from cameras. Caribou groups had to be detected on both sides of the road to count as crossing events, and some crossing events beyond the range of the camera are likely missed due to the interval between time-lapse photographs or the short distance of the motion sensor (~30 m limit).

Following discussion at the November/December 2022 TAG meeting, assessment of caribou crossing rates in relation to previous vehicle may be better assessed using caribou satellite collar data, and vehicle traffic collected using remote camera data (Angico Eagle 2023a). Therefore, time between caribou crossing events, and previous vehicle time is not presented.

8.5 Results

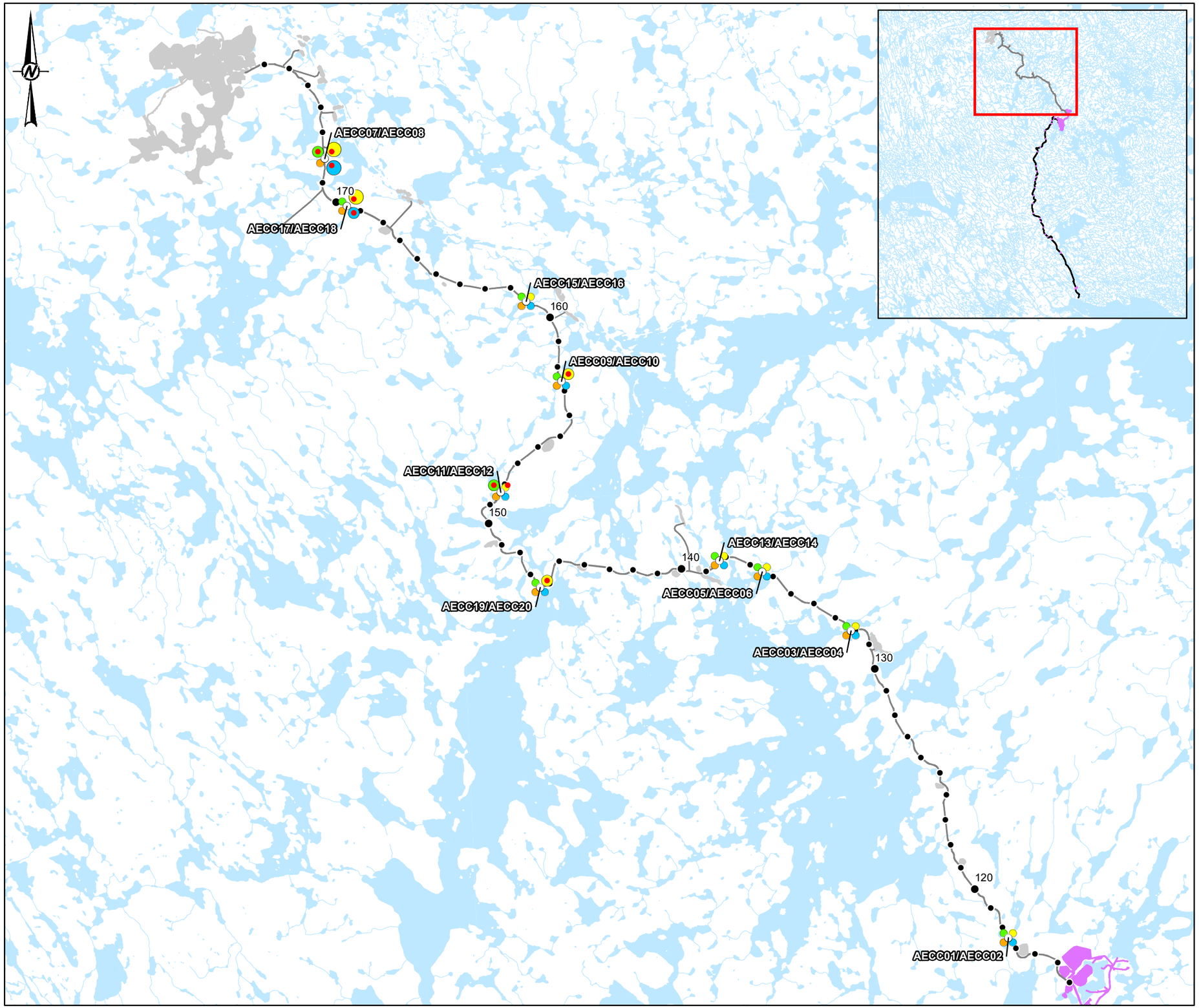
A total of 1,453 photographs were selected by the automated approach, and reviewed by a human observer. There were 281 total observations, 187 observations were “near wildlife” detections and 93 “far wildlife” detections. Six species were detected in 2022: Arctic fox, Arctic hare, caribou, common raven, gray wolf, and muskox. All six species were detected on both “near wildlife” and “far wildlife” detections.

Caribou were detected between 2 February 2022 and 3 September 2022. The highest detection rate occurred at camera pair 4 (KM 172) in the summer, and the highest crossing rate was observed at camera pair 6 (KM 152) in the spring (Figure 8-1; Table 8-2). No caribou were detected on remote cameras in the fall (Table 8-2). There were 27 crossing events in 2022 (Table 8-3). Approximately equal numbers of crossing events were observed while the road was open (n = 13) or when a restriction was in places (n = 14; Table 8-3).

Table 8-2 Caribou Detection Rates from Remote Cameras, 2022

Camera Pair	Spring (Caribou/Active Days)		Summer (Caribou/Active Days)		Fall (Caribou/Active Days)		Winter (Caribou/Active Days)	
	Caribou Rate	Crossing Rate	Caribou Rate	Crossing Rate	Caribou Rate	Crossing Rate	Caribou Rate	Crossing Rate
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.04	0.02	0.18	0.08	0.00	0.00	0.11	0.04
5	0.00	0.00	0.03	0.03	0.00	0.00	0.00	0.00
6	0.08	0.08	0.02	0.02	0.00	0.00	0.00	0.00
7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00
9	0.00	0.00	0.13	0.06	0.00	0.00	0.04	0.03
10	0.00	0.00	0.04	0.03	0.00	0.00	0.00	0.00

Too few crossing events were detected to statistically compare crossing rates between different road heights, backfill materials, and backfill slopes. However, crossing events occurred on cameras of all road heights, both backfill slope categories and backfill slopes.



LEGEND

- REMOTE CAMERA LOCATION
- CARIBOU CROSSING

CARIBOU RATE SPRING (CARIBOU/ACTIVE CAMERA DAYS)

- 0.00 - 0.02
- 0.02 - 0.10
- 0.10 - 0.18

CARIBOU RATE SUMMER (CARIBOU/ACTIVE CAMERA DAYS)

- 0.00 - 0.02
- 0.02 - 0.10
- 0.10 - 0.18

CARIBOU RATE FALL (CARIBOU/ACTIVE CAMERA DAYS)

- 0.00 - 0.02
- 0.02 - 0.10
- 0.10 - 0.18

CARIBOU RATE WINTER (CARIBOU/ACTIVE CAMERA DAYS)

- 0.00 - 0.02
- 0.02 - 0.10
- 0.10 - 0.18

- KILOMETRE MARKER
- WHALE TAIL MINE SITE
- HAUL ROAD
- MEADOWBANK MINE SITE
- WATERBODY
- WATERCOURSE

0 3 6

1:150,000 KILOMETRES

REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. ROAD, WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED: MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

CARIBOU DETECTION AND CROSSING RATES FROM REMOTE CAMERA DATA (2022)

CONSULTANT

wsp

YYYY-MM-DD	2023-03-28
DESIGNED	SW
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
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Table 8-3 Caribou Crossing Events on Remote Cameras, 2022

Camera Pair	Crossing Time	Number of Individuals	Road Closure Status
7	2022-03-04 7:33	2	Open
8	2022-03-04 8:40	2	Open
8	2022-04-21 4:25	1	Open
7	2022-05-21 23:11	1	Open
9	2022-06-03 9:52	1	Speed Restriction (Muskox)
9	2022-07-03 12:49	2	Open
10	2022-07-23 3:14	1	Speed Restriction (Muskox)
10	2022-07-24 7:33	1	Open
8	2022-08-08 9:51	1	Speed Restriction (Caribou)
8	2022-08-13 15:05	1	Speed Restriction (Caribou)
8	2022-08-14 6:00	1	Speed Restriction (Caribou)
10	2022-08-17 9:22	1	Speed Restriction (Caribou)
8	2022-08-17 11:21	1	Speed Restriction (Caribou)
10	2022-08-18 9:45	1	Open
10	2022-08-19 12:59	1	Open
8	2022-08-24 12:15	1	Speed Restriction (Caribou)
9	2022-08-27 18:36	1	Open
8	2022-08-28 5:50	1	Open
9	2022-08-30 6:13	1	Speed Restriction (Caribou)
9	2022-08-30 6:18	3	Speed Restriction (Caribou)
8	2022-08-30 6:38	3	Speed Restriction (Caribou)
10	2022-09-02 17:14	1	Speed Restriction (Caribou)
6	2022-09-03 7:06	1	Open
9	2022-09-18 12:49	1	Open
9	2022-09-20 17:49	2	Open
6	2022-10-04 9:50	4	Closed (Caribou)
6	2022-10-09 20:36	1	Closed (Caribou)

8.6 Management Recommendations

The use of artificial intelligence expedited processing of remote camera photographs and was able to process a large number of photographs (2,727,572), which would not be feasible by manual processing. Although some wildlife detections are expected to be missed through this approach, more wildlife may be detected overall through analysis of a greater number of photographs. It is assumed that more photographs with far-away wildlife are present that were not detected by the automated approach. Object detection techniques could be applied to improve the accuracy of the process. Further research and improvement in quality control methods would benefit the process of wildlife detection (Agnico Eagle 2023b).

Results from 2022 are not comparable to previous program years, due to differences in the analysis approach used. Overall, relatively few crossing events were detected on remote cameras, and conclusions on how road

characteristics influence caribou crossing behaviour cannot be drawn at this time. As discussed at the November/December 2022 TAG meeting, assessment of caribou crossing rates in relation to previous vehicle may be better assessed using caribou satellite collar data and vehicle traffic collected using remote camera data (Angico Eagle 2023a). Ground observations of caribou, including crossing events, could also be used. The automated approach may be useful for determining traffic rates from remote cameras, especially if cameras are repositioned to focus on capture of vehicle traffic.

The future of the remote camera program should be discussed with the TAG. The remote camera program is unlikely to contribute to adaptive management but could provide insight into time between vehicle traffic and caribou crossing events. Deploying more cameras across the WTHR, and potentially the AWAR could increase the number of caribou crossing event detections. However, this would require significantly more effort to deploy and maintain cameras and to review camera photos.

9.0 BLAST MONITORING

9.1 Overview

The purpose of the blast monitoring program is to measure vibration and overpressure from explosive blasts at the Whale Tail Mine and to understand how blasting vibration relates to caribou behaviour. The program aims to establish site-specific relationships between vibration and overpressure levels and blasting parameters (e.g., charge mass, charge depth), environmental conditions (e.g., seasonal variation), and propagation distances. The program includes monitoring of caribou sensory disturbance related to blasting.

Blasting is delayed when caribou or other wildlife are observed within the blast danger zone (typically 600 m from the blast centre). According to the TEMP, blasting is also delayed when caribou GST is observed within 4 km during the sensitive season, or within 5 km during the calving period, or when muskox GST is observed within 1 km (Agnico Eagle 2019). Following discussion with the TAG, the distance was relaxed to 3 km for caribou during the sensitive season, and 5 km during the calving period, to better understand effects to caribou from blasting. The Environment Department performs monitoring prior to each blast to ensure no caribou groups exceeding GST are present within these setback distances

9.2 Objectives

The purpose of the blast monitoring program is to determine if blasts conducted at the Whale Tail Mine exceed vibration annoyance or damage thresholds, understand blasting vibration and overpressure attenuation and to characterize the behavioural response of caribou to blasting.

9.3 Duration

Blast measurement data collected in 2020 and 2021 were used to determine site-specific relationships between overpressure and vibration and blasting parameters. Caribou behaviour monitoring will continue until a sufficient sample size of caribou behaviour at different distances from blasting is collected and assessed in relation to blasting parameters.

9.4 Methods

9.4.1 Vibration and Overpressure Model

The blast monitoring program focuses on the following parameters to estimate impacts of blasting on caribou:

- Peak Particle Velocity (PPV), which characterizes ground vibration (i.e., physical shaking of the ground as a result of an explosive blast). PPV values were measured in millimetres per second (mm/s).
- Peak Pressure Level (PPL), which characterizes airblast overpressure (i.e., movement of air as a result of an explosive blast). PPL values were measured in linear decibels (dBL).

There are few if any guidelines intended to address sensory disturbance to wildlife from explosive blasting. In the absence of wildlife-specific threshold or limits, guidelines for damage and human annoyance due to blasting were used as a starting point for assessment of potential impacts to caribou. The caribou hearing threshold for low frequency noise is higher than humans, meaning that humans may be able to a detect blasting related PPL at greater distances than caribou (Agnico Eagle 2019). According to IQ, caribou may be able to detect blasting vibrations at greater distances than humans.

Most guideline limits on PPV and PPL from blasting are intended to protect against minor cosmetic damage to buildings and other structures. For example, the Environment and Climate Change Canada (ECCC) *Environmental Code of Practice for Metal Mines* (Environment Canada 2009) recommends that PPV be limited to 12.5 mm/s and PPL be limited to 128 dBL at nearby receptors. Another document commonly referenced in blasting assessments is the Australian and New Zealand Environment Council (ANZEC) *Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration* (ANZEC 1990). To protect against human annoyance, the ANZEC document recommends that PPV be limited to 5 mm/s and PPL be limited to 115 dBL at nearby receptors.

Models to describe the site-specific relationship between vibration and overpressure from explosive blasting were developed using blast monitoring data collected in 2020 and 2021. Explanation on calculation of the site-specific relationships between overpressure and vibration and blasting parameters are presented in Golder 2022. These models can be used to estimate propagation distance of PPL and PPV based on blast charge and depth (i.e., shallow vs. deep) by season. Blast charge mass and depth from blasts in 2021 and 2022 were input into the models to estimate PPV and PPL experienced by caribou groups which have behaviour monitoring data.

9.4.2 Caribou Behaviour Monitoring

The same general approach to caribou behaviour monitoring for blast monitoring was used as for other caribou behaviour monitoring for Meadowbank (Section 17.2). Surveys were opportunistic in nature and required groups of caribou to be present during blast events. The overall method for blasting monitoring was to identify caribou groups in proximity to blasting locations prior to blast events and recording behaviours of individuals every three minutes for 30 minutes before blasting, and a 30-minute period beginning at the blast. The behaviour categories were feeding, lying down, standing, alert, walking, and trotting or running. In the case that a different form of disturbance event occurred during the survey, such as a vehicle driving on the road, the time and type of disturbance was recorded. Videos were recorded during blast events to document changes in caribou behaviour.

Due to challenges locating caribou groups that could be monitored near blasts for long enough periods, not all surveys had data collected before, during, and after blasts. Behaviour surveys were time corrected to align before, during, and after blasts with blast timing. For example, if a blast was performed three minutes into a 30-minute survey, the three-minute interval would be corrected to zero minutes (i.e., during blast), and subsequent minutes would be reclassified as after the blast. Therefore, full thirty-minute monitoring periods were not available on all survey days where behaviour monitoring was performed. Proportions of the caribou groups performing different behaviours were summarized by the three-minute periods before, during, and after blasts. Three-minute intervals alone may not represent the entire caribou response to blasting; however, this interval was chosen to increase sample size of comparisons and standardize comparisons across days.

For days where blasting events could be tied to caribou behaviour monitoring surveys, the average proportion of caribou performing response behaviours (defined as alert, walking and trotting or running) following blasts were correlated with modelled PPL and PPV levels. Due to challenges with aligning behaviour surveys with blasts, average proportion of response behaviours in an interval of six minutes following blasts were used in Spearman correlations with PPL and PPV. If two blasts were performed on the same day, the combined blast charge of both blasts and minimum distance from caribou group monitored was used in calculation of modelled PPL and PPV. Locations of caribou groups that could be linked to blast events in 2022 are shown in Figure 9-1.

9.5 Results

9.5.1 Historical Results

9.5.1.1 Blast Monitoring

Blasting measurements were collected using four Instantel Minimate units in August, September, and December 2019 (Golder 2020a). Only two of the four Minimate units were outfitted with linear microphones per available equipment, therefore PPL could only be measured at two locations (R1 and R2). All measured PPV values were below the 12.5 mm/s damage threshold (Environment Canada 2009) and well-below the 5 mm/s annoyance threshold (ANZEC 1990). All but one of the measured PPL values were below the 128 dBL damage threshold (Environment Canada 2009). Seven of the 12 blasts measured during the first year of the program resulted in PPL values above the 115 dBL annoyance threshold (ANZEC 1990) at the measurement location approximately 500 m from the edge of the Whale Tail Mine. This suggests that airblast overpressure may result in annoyance impacts at receptors in close proximity to the blast site. Recommendations from the 2019 program included procurement of linear microphones to allow collection of PPL at all four locations, use of external power sources that would allow for deployments to log data from multiple blasts, and enclosing units in rugged outdoor cases that would protect them from the elements. Future PPL measurements at more distant locations were recommended to characterize the maximum distance to which PPL-related annoyance impacts may extend.

The 2020 blast monitoring program was limited due to COVID-19 (Golder 2021). Eleven blast events were monitored at two locations by Agnico Eagle in December 2020. Caribou were observed sporadically during pre-blast monitoring in spring and fall 2020. There was one instance where blasting was canceled (4 April 2020) due to observation of 25 caribou approximately 2 km from the Whale Tail Mine.

Two blasts in 2020 exceeded the PPV annoyance threshold of 5 mm/s (ANZEC 1990), and one blast exceed the 12.5 mm/s damage threshold (Environment Canada 2009) at the measurement location closest to the Whale Tail Mine. This suggests that ground vibration from blasting may result in annoyance impacts at receptors close to the blast site. Results from 2020 contrast results from 2019, where no blasts exceeded annoyance or damage thresholds.

All blasts measured resulted in PPL values below the 128 dBL damage threshold (Environment Canada 2009). However, the 115 dBL annoyance threshold (ANZEC 1990) was exceeded for 5 of the 11 blasts at the measurement location 193 m from the Whale Tail Mine, and 2 of the 11 blasts for the measurement location 569 m from the Whale Tail Mine. This suggests that airblast overpressure from blasting may result in annoyance impacts at receptors in close proximity to the blast site as the monitoring locations (193 m and 569 m from pit edge) are closer to the bast site than the 4 km caribou distance threshold. Results from 2020 are similar to 2019 results, with the exception of a single blast exceeding damage thresholds in 2019 (Golder 2020a).

Vibration measurements were collected for 139 blasts between 20 December 2020 and 6 August 2021 within the scope of the blast monitoring program, resulting in a total of 247 individual PPV measurements and 174 individual PPL measurements suitable for analysis. Note the number of individual measurements is less than the 556 data points that might be expected given four monitoring units measuring vibration from 139 blasts (i.e., 4 x 139 = 556). This primarily is because the monitoring units were configured to collect measurements when PPV or PPL exceeded a trigger level, and the trigger level had to be set high enough to avoid a large number of “false positives” (i.e., measurements collected in response non-blasting events/activities). Consequently, the more-distant monitors (i.e., BM3 and BM4) did not log measurements in response to some blasts because the PPV or PPL at these locations was too low to trigger the monitoring unit.

9.5.1.2 Caribou Behaviour Monitoring

Pre-blast surveys for caribou were performed on 165 days between 3 January to 16 December 2021.Of the 165 surveys, 132 surveys yielded no species. Caribou were observed on 36 surveys, and Muskox were observed during one survey. No blasts had to be cancelled due to caribou GST exceedance in proximity to the Meadowbank Complex. One blast was cancelled, on 11 September 2021, due to six caribou present within 600 m of the blast.

Caribou behaviour monitoring occurred during 14 blast days between 6 May 2021 and 22 October 2021. Three monitoring sessions were performed in spring, nine in summer, and two in fall. Precise locations of caribou could be linked to blast locations on six days. Recorded locations of the remaining monitoring events were too imprecise for analysis. All modelled values were below the annoyance thresholds of PPV of 5 mm/s. All modelled values for PPL were below the annoyance threshold of 115 dBL, however the upper 95% confidence interval overlapped the annoyance threshold for all blasts.

9.5.1.3 Vibration and Overpressure Model

The model for PPV using the largest blast charge measured in 2021 found that PPV curve fell below the ECCC threshold approximately 350 m from the blast site and fell below the ANZECC threshold approximately 900 m from the blast site. This suggests that human receptors located more than 900 m from the Whale Tail Mine are unlikely to be annoyed by ground vibration from even the largest blasts. The model for PPL using the largest blast charge measured in 2021 found that the PPL curve fell below the ECCC threshold approximately 125 m from the blast site and fell below the ANZECC threshold approximately 1,900 m from the blast site. This suggests that human receptors located more than 1,900 m from the Whale Tail Mine are unlikely to be annoyed by airblast overpressure from even the largest blasts.

9.5.2 Caribou Behaviour Monitoring

Pre-blast surveys for caribou were performed on 191 days between 23 January to 31 December 2022 (Appendix A). Caribou were observed on 45 days, Muskox on two days, and Canada geese and Arctic fox were observed on one day. One blast was cancelled, on 29 April 2022, due to caribou presence within 600 m of the blast. Another blast was cancelled 23 August 2022, though the reason for cancellation was not noted. Caribou behaviour monitoring sessions occurred on 14 days in 2022 (Table 9-1). Additional information on blast surveys conducted in 2021 are provided in Golder (2022).

Table 9-1: Number of Pre-blast Caribou Surveys Performed in 2022.

Month	Number of Days with Pre-Blast Surveys	Caribou Behaviour Monitoring Sessions
January	4	1
February	13	0
March	8	0
April	14	7
May	16	3
June	16	1
July	13	0
August	21	1
September	15	1
October	22	0

Table 9-1: Number of Pre-blast Caribou Surveys Performed in 2022.

Month	Number of Days with Pre-Blast Surveys	Caribou Behaviour Monitoring Sessions
November	27	0
December	22	0
Total	**191**	**14**

Between 2021 and 2022, there where 13 behaviour monitoring sessions where behaviour before, during, and after the blast was monitored in 3-minute intervals (Figure 9-3). There were 18 surveys where behaviour monitoring was conducted for at least six minutes following blasting, and location of caribou could be linked with blasting data to determine modelled PPL and PPV (Figure 9-2; Figure 9-3; Table 9-2).

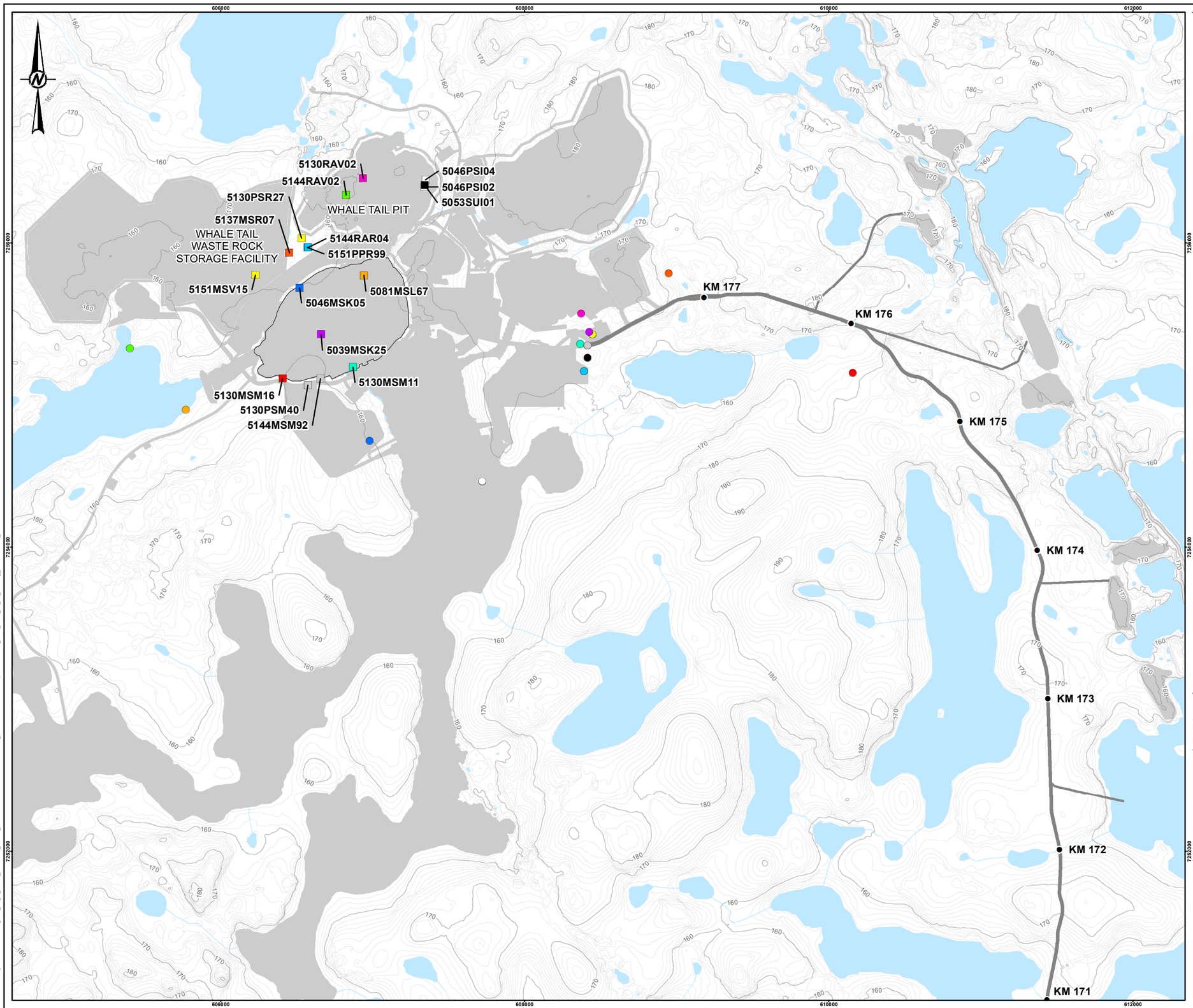
On 6 May 2021, when two blasts were performed at the same time, walking and alert behaviours increased following blasts. However, several vehicle disturbances were also recorded that appeared to elicit changes in caribou behaviour on this day. On 19 August 2021, alert behaviours were observed in the three-minute period immediately following the blast. An increase in alert and walking behaviours were observed following the blasts on 11 April, 15 April, 16 April, 24 April, and 30 April 2022 (Figure 9-2). On 15 April 2022, caribou walked towards to Mine following blasting. Walking behaviours also increased following the blast on 26 August 2022, however the increase was more delayed and mixed with an increase in lying behaviour. Caribou behaviour following the other blasts remained similar to their behaviour in the time prior to the blast, consisting primarily of lying, feeding and standing behaviours (Figure 9-2). Other forms of disturbance (e.g., vehicle traffic) occurred on five days where behaviour monitoring occurred (Figure 9-2). Vehicle traffic was recorded during behaviour monitoring on 11 April, 15 April, 7 May, and 26 August 2022. Helicopter flights were recorded on 14 June and 26 June 2022.

All modelled values were below the annoyance thresholds of PPV of 5 mm/s. All modelled values for PPL were below the annoyance threshold of 115 dBL except for 05 May 2022, however the upper 95% confidence interval overlapped the annoyance threshold for all blasts. Two blasts were conducted on five days used in the analysis (Table 9-2). Response behaviours were observed on half of days following blasting. However, the average proportion of the caribou group performing response behaviours in 6 minutes following each blast based on 18 behaviour monitoring sessions, and modelled PPV (Spearman’s rho = -0.06, p-value = 0.82) and PPL (Spearman’s rho = -0.15, p-value = 0.56) did not appear to be correlated (Table 9-2).

Caribou behaviour in the three minutes before, the three minutes during, and the three minutes following a blast is shown in Figure 9-3. On average, feeding and lying behaviours were the primary behaviours observed in each interval. An increase in alert behaviour was observed in the three-minute interval during a blast, which may correspond to the decrease in feeding behaviours during a blast. Walking behaviours showed an increasing trend following a blast, while lying and standing behaviours did not differ much between intervals.

Table 9-2: Caribou Behaviour Monitoring and Blast Data

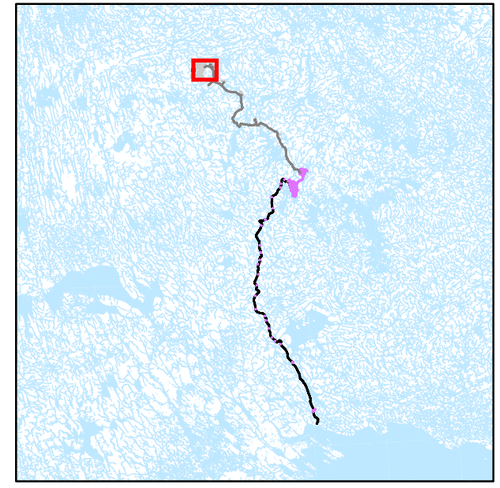
Blast Date	Blast Number	Quantity Explosive (kg)	Distance Between Caribou Group and Blast (m)	Proportion of Caribou Performing Response Behaviours	Predicted PPV (m/s) and 95% Confidence Interval	Predicted PPL (dBL) and 95% Confidence Interval
2021-05-06	5067SUK01, 5074MSK12	55887	2873	0.31	0.940 (0.51–- 1.72)	111.3 (97.9–- 124.7)
2021-05-28	5095MSL75	57553	1404	0.00	1.87 (1.12–- 3.12)	114.6 (102.3–- 126.8)
2021-06-04	5074MSK24	69245	1647	0.00	1.79 (1.07–- 3.01)	114.3 (101.9–- 126.6)
2021-08-19	5046PSK71	1164.6	1895	0.33	0.22 (0.10–- 0.49)	107.3 (92.5–- 122.2)
2021-08-22	5046PSK21, 5046PSK13	2336	832	0.00	0.68 (0.36–- 1.30)	112.2 (99.1–- 125.3)
2021-09-28	5046PSK31, 5060MSK22	4137	1579	0.00	0.21 (0.09–- 0.47)	106.1 (90.7–- 121.4)
2022-01-29	5144MSM92, 5130PSM40	41092	1769	0.00	1.31 (0.75–- 2.30)	113.2 (100.4–- 125.9)
2022-04-10	5130MSM16	90093	3750	0.00	0.91 (0.49–- 1.67)	110.7 (97.1–- 124.4)
2022-04-11	5137MSR07	37295	2500	0.64	0.86 (0.47–- 1.60)	111.2 (97.7–- 124.7)
2022-04-15	5081MSL67	74194	1466	0.33	2.11 (1.28–- 3.47)	115 (102.9–- 127.1)
2022-04-16	5130PSR27, 5151MSV15	11420	2014	0.76	0.60 (0.31–- 1.17)	110.4 (96.6–- 124.2)
2022-04-24	5144RAV02	19454	1745	0.52	0.92 (0.50–- 1.68)	112.0 (98.8–- 125.2)
2022-04-30	5130MSM11	178570	1503	0.08	3.02 (1.92–- 4.74)	116.0 (104.3–- 127.8)
2022-05-03	5151PPR99, 5144RAR04	12769	1993	0.01	0.67 (0.35–- 1.28)	110.8 (97.2–- 124.4)
2022-05-05	5046MSK05	42189	1107	0.00	2.03 (1.23–- 3.35)	115.2 (103.2–- 127.2)
2022-06-14	5039MSK25	17187	1762	0.00	0.86 (0.47–- 1.60)	111.8 (98.5–- 125)
2022-08-26	5130RAV02	28148	1688	0.11	1.16 (0.65–- 2.07)	112.8 (100.0–- 125.7)
2022-09-26	5053SUI01	4100	1559	0.00	0.49 (0.24–- 0.97)	110.1 (96.3–- 124)



LEGEND

BLASTING LOCATION	CARIBOU LOCATION (DURING BLAST)
1/29/2022	1/29/2022
4/10/2022	4/10/2022
4/11/2022	4/11/2022
4/15/2022	4/15/2022
4/16/2022	4/16/2022
4/24/2022	4/24/2022
4/30/2022	4/30/2022
5/3/2022	5/3/2022
5/5/2022	5/5/2022
6/14/2022	6/14/2022
8/26/2022	8/26/2022
9/23/2022	9/23/2022
9/26/2022	9/26/2022

- KILOMETRE MARKER
- CONTOUR (1 m)
- CONTOUR (10 m)
- WATERCOURSE
- WATERBODY
- WHALE TAIL MINE SITE
- HAUL ROAD



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REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. ROAD, WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA.
3. CONTOUR DATA OBTAINED FROM PHOTOSAT (2015).

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

BLASTING MEASUREMENT LOCATIONS

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	SW
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
21502960	4000/4040	0	9-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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PATH: Y:\burnaby\CAD-GIS\Client\Agnico_Eagle_Mines_Ltd\Whale_Tail\9_PROJECTS\21502960\4000\4040\02_PRODUCTION\MXD\Report\21502960_4000_4040_09_01_Blasting_Measurement_Locations.mxd PRINTED ON: 2023-03-27 AT: 11:02:01 AM

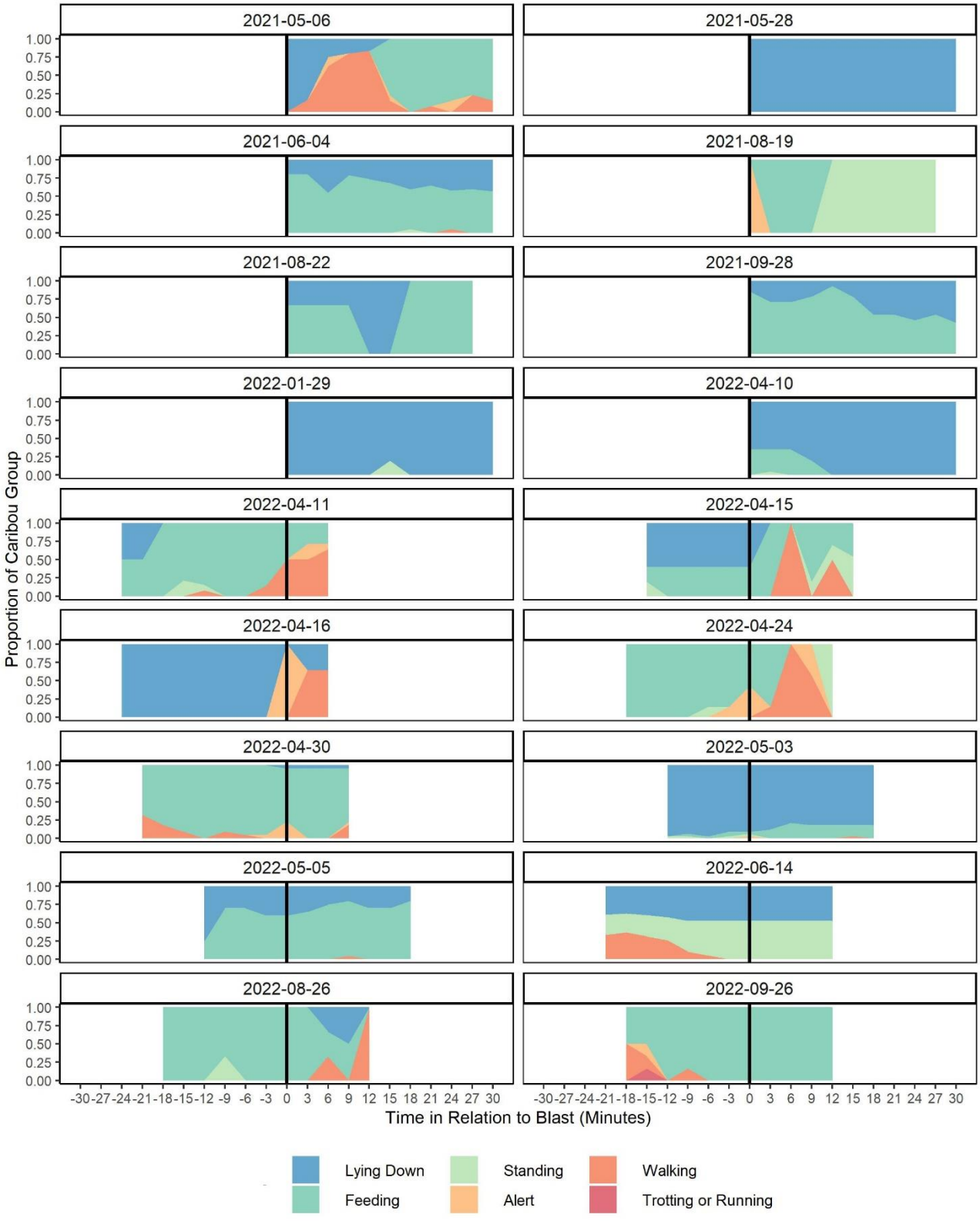


Figure 9-2: Caribou Behavioural Response Following Blasting Events

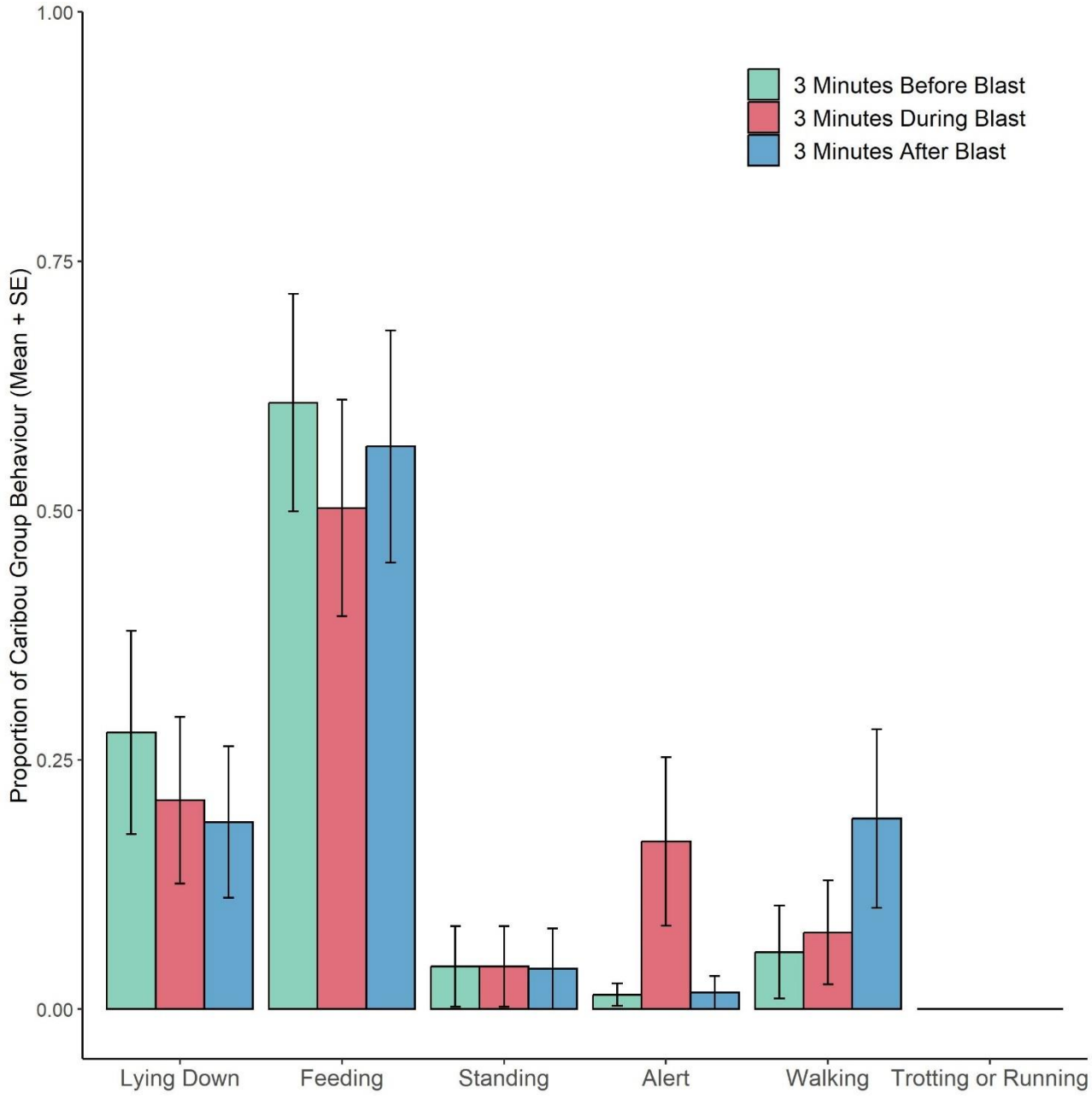


Figure 9-3: Caribou Behaviour Before, During, and After Blasting.

9.6 Management Recommendations

The metric used to quantify caribou response to blasting (i.e., average response behaviours six minutes following blasting) was determined based on data availability. Preliminary analysis found that this metric was not correlated with modelled PPV and PPL values, however the sample size was relatively small. Behaviour monitoring could aim to monitor caribou for a longer period of time following blasting to determine the time taken for response behaviours to return to pre-blast levels. Future analyses using more behaviour monitoring sessions could account for other factors such as caribou group size and presence of other disturbances (e.g., vehicle traffic).

During behaviour monitoring, the exact time of blast within thirty-minute surveys should continue to be recorded to allow time correction of surveys where necessary. Accurate locations of caribou groups (i.e., distance and bearing from observation location) should continue to be recorded on all behaviour monitoring surveys.

10.0 HUNTER HARVEST STUDY

10.1 Overview

As outlined in the original TEMP (Cumberland 2006) and the June 2019 version (Agnico Eagle 2019), and as a requirement of NIRB Project Certificate No. 004 Terms and Conditions 51 and 54, the Baker Lake Hunter Harvest Study (HHS) was initiated in March 2007 by Agnico Eagle. The HHS was conducted in association with the HTO to monitor and document the spatial distribution, seasonal patterns, and harvest rates of hunter kills and angler catches within the RSA.

After low participation during the first year of the study, methods were strategically adapted, participation increased steadily, and valuable information on harvest patterns in the Baker Lake area was collected. The HHS, through regular visits, contributed to developing a strong relationship with local harvesters, the HTO, GN. Data were provided annually in monitoring reports from 2007 to 2015 and in 2019 to 2021.

The HHS was suspended for three years (2016 to 2018) to develop new approaches and direction. Following consultation with the HTO, KivIA, GN, and other agencies in November 2016 (Winnipeg) and June 2017 (Ottawa), Agnico Eagle reinitiated the HHS in March 2019, which for the first time also encompassed the Whale Tail RSA as part of the Meadowbank Complex. The study approach was similar to previous years, but suggestions and guidance received during the consultation period were incorporated into the study. The study was conducted from 2020 to 2022 and continues into 2023.

The full 2022 HHS report is provided in Appendix F (Agnico Eagle 2023a).

10.2 Objectives

The primary objectives of the HHS are to monitor potential project-related effects on harvesting of wildlife by residents of Baker Lake. This objective is achieved by estimating the following key metrics:

1) The distribution of caribou, muskox, and wolverine harvest by residents of Baker Lake.

2) The total level (or an index of) caribou, muskox, and wolverine harvest by residents of Baker Lake.

Other objectives of the HHS, established in consultation with the TAG, or other participants include:

1) Supporting creel surveys by gathering information on Arctic char (*Salvelinus alpinus*), lake trout (*Salvelinus namaycush*), lake whitefish (*Coregonus clupeaformis*), and Arctic grayling (*Thymallus arcticus*) catch rates and Inuit-use patterns in the Baker Lake area.

2) Understanding regional distribution of hunting and fishing activity.

3) Investigating seasonal timing of hunting and fishing activity.

4) Determining whether increased harvest and catch rates are associated with the AWAR and WTHR.

As discussed during consultation with stakeholders, the HHS will further seek to: a) increase and maintain the hunter participant rate in the future of the program; b) improve resource protection; c) improve hunter awareness and education; d) increase the integration of IQ and Traditional Knowledge; e) increase availability of data to support a collective approach to understanding wildlife harvest; and f) assist Agnico Eagle in mitigative actions and the GN in management decisions.

10.3 Methods

The wildlife species that are the focus of the HHS are Caribou, Muskox and Wolverine; however, harvest data on other species, such as wolf, Arctic fox, geese and other birds are also collected. The few species in the study were deliberately chosen to make data entry and collection as simple as possible. To support creel surveys, data on fish harvest (i.e., Arctic char, lake trout, lake whitefish, and Arctic grayling) are also collected.

Inuit and non-Inuit residents, at least 16 years of age, are eligible to participate in the harvest survey. Harvest calendars are provided on a household basis, rather than an individual basis, to simplify data entry and collection, and reflect household hunting patterns. The harvest calendar is attractive and consists of local photographs of wildlife and Baker Lake residents (see Appendix A of Appendix F for 2022 calendar). Space is provided for each calendar day where harvest details can be documented. A map is provided at the end of the calendar that delineates a 4 km^2 UTM grid within the Baker Lake and Meadowbank Complex areas. Each grid has a unique code to facilitate recording of information. When calendars are issued, participants or participating households are encouraged to write harvest details (e.g., number of animals, sex, age, and location [i.e., grid code]) for the appropriate date on the calendar.

Participants were interviewed in person three times during the year (i.e., June 2022, October 2022, and February 2023) by the harvest study coordinator. During the January 2023 interviews, remaining data from 2022 were collected. The purpose of the interviews is to ensure all harvest data are recorded on the calendars and to collect incidental information to compliment calendar data, including notable Caribou movements, aggregations, and unique observations. Between interview periods, participants were often contacted by phone or social media to encourage recording of harvest data.

Features of the 2022 HHS included: 1) building long-term relationships between participants and researchers; 2) increasing engagement with participants on social media platforms such as Facebook and Instagram; and 3) increasing incentives for participating in the study (e.g., gas vouchers and prizes).

10.4 Results

The HHS included 59 participants by the end of 2022, which is higher than the 55 participants in 2021 and lower than the 64 participating in 2020. Higher numbers in 2022 are because of several new younger participants that are replacing older hunters that “don’t hunt anymore”. Of the 2022 participants, Caribou harvest data had been collected from 55 participants, which is considerably higher than the 39 hunters reporting Caribou harvests in 2021 and the highest number since the HHS began.

Based on the previous discussion of total numbers of hunters in the Hamlet of Baker Lake, there were 389 potential hunters within the Baker Lake community in 2008. The number is comparable to the comprehensive 5-year Nunavut Wildlife Harvest Study (NWMB 2005) in which 336 Baker Lake hunters were contacted and interviewed. Discussions with HTO members in 2019 suggest the total number of hunters is over 300. Given the historical and current number of hunters in Baker Lake, an estimate of 300 to 350 active hunters is used in this analysis. Based on these numbers, the 55 hunters reporting Caribou harvest in 2022 conservatively represent from 16% to 18% of total hunters in the community.

Hunting is highly concentrated in the vicinity of the Hamlet of Baker Lake and along the AWAR to approximately KM 85. Limited harvests were reported along the Thelon River system to Aberdeen Lake, and along the northeastern and southwestern shores of Baker Lake. Annual variation in harvest location and intensity is attributable to numerous factors. For instance, many hunters have stated during informal discussions that they

have a ‘favorite’ hunting area that they frequent each year. Some hunters have stated that they prefer hunting in ‘convenient’ locations, whereas other hunters prefer remote locations well away from frequented areas. A percentage of hunters also enjoyed partaking in long distance hunting trips over multiple days.

The 2022 HHS data indicated that 39% of reported harvest occurred within 5 km of the AWAR, and 70% occurred within the Meadowbank RSA. As was the case in other years, threshold levels of 20% set for monitoring the effects of the Meadowbank mine development (note – does not include the Whale Tail mine, which was approved under a separate permit with a different effect assessment) on the distribution of caribou harvest within the RSA were not exceeded.

In 2022, no Caribou were harvested within 5 km of the WTHR, which compares to no reported harvest during the NWMB harvest study, and three caribou harvested in 2021. Overall harvest numbers were too low to determine whether harvests have increased following construction of the WTHR. Within the Whale Tail RSA (note – overlaps with the Meadowbank RSA), a total of 34 harvests were reported in 2022, which is just above the average across the first 12 years of the study but lower than reported harvests in 2021 (48), 2019 (85), 2015 (53), and 2011 (103 caribou). Given the low numbers of reported harvests close to the WTHR and the prohibition of the public from the WTHR, it is unlikely that the presence of the road has resulted in increased harvest.

In 2022, a total of 766 caribou were reported as being harvested by 55 participants in the Baker Lake HHS, which includes harvests in the Meadowbank and Whale Tail study areas. The number of participants reporting harvest and the total number of caribou reported as being harvested are the highest since the HHS was initiated. Given that the 55 hunters represent an estimated 16% to 18% of the Baker Lake hunting community, the total estimated number of caribou harvested in 2022 in the Baker Lake community ranged from 4,256 to 4,788 animals, which is slightly higher than in 2021 (i.e., range of 3,946 to 4,664 animals). This estimate is very likely conservative (i.e., high) since the Baker Lake HHS targeted known hunters in the community with some known to be particularly successful.

Based on the NWMB (2005) and inclusive Baker Lake HHS results (2007 to 2015; 2019 to 2022), highest caribou harvests have occurred in September and October, with a second smaller peak in March and April. The similar pattern between the studies indicates that seasonal hunting preferences have not changed markedly in the last decade. Figures of and discussion of seasonal distribution of hunting are provided in Appendix F.

Eighteen muskox and 25 wolverine were harvested in 2022, which is higher than in 2021. A total of 92 wolves were reported as being harvested in 2022, which is considerably higher than the 26 reported in 2021. Arctic fox, red fox, grizzly bear, ermine, and American marten were also harvested. Several bird species were harvested in 2022 with the most common species being Canada goose. For the first time in the HHS, beluga (*Huso huso*), bearded seal (*Erignathus barbatus*), harp seal (*Pagophilus groenlandicus*), and ringed seal (*Pusa hispida*), were reported as being harvested by Baker Lake hunters but all were harvested well beyond the RSA (e.g., Christopher Island at the east end of Baker Lake).

The number of fishermen reporting successful fishing trips in 2022 was 30, which is higher than the average of 23 fisherman from 2007 to 2015 and 2019 to 2021 (12 years), and the highest number of fisherman reporting success since 2012. The highest numbers of fisherman reporting success in 2022 were in May and June period. Fishing trips, regardless of success rate, did not generally occur beyond the immediate areas of Baker Lake, Whitehills Lake, and along the lower AWAR. The average number of fish harvested per fisherman in each month was highest in November with lower averages in the summer months. In 2022, fishing periods with the most active fisherman was May and June. The periods with the most fish caught included the summer months

(especially May and June), which reflects the high number of Lake Trout caught by fisherman heading out on the land after ice melt, and November. This trend can be observed in the overall trends from 2007 to 2015 and 2019 to 2022. Lake trout (*Salvelinus namaycush*) and Arctic char (*Salvelinus alpinus*) were the most common species caught by fisherman and were reported at considerably higher numbers than in 2021.

10.5 Accuracy of Impact Predictions

A summary of the impact predictions identified in the TEMP Version 7 (Agnico Eagle 2019) that are evaluated by the HHS is presented in Table 10-1.

Table 10-1: Accuracy of Impact Predictions–- Baker Lake Hunter Harvest Study

Potential Effect	Threshold	Threshold Exceeded (2022)	Adaptive Management Implemented	Status
AWAR				
Hunting by Baker Lake Residents	The AWAR will not result in significant changes in the spatial distribution, seasonal pattern, or harvest levels of caribou by Baker Lake hunters. Changes will not exceed 20% of historical harvest activities within the RSA	NO (70% of harvest in RSA in 2022 compared to 67% baseline; average of 75% of harvest within RSA since 2007)	Future discussion with HTO and GN representatives required to identify management options	Hunter Harvest Study (including the Creel Survey)
WTHR				
Hunting by Baker Lake Residents	No change in harvest	NO (No harvests recorded within 5 km of the WTHR; harvests within the WTHR RSA were lower than some other years, including pre-construction)	None required. Access by hunters is restricted in the growing season and very limited hunting occurs in the winter.	Hunter Harvest Study Satellite-Collaring Program

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road, RSA = Regional Study Area, HTO = Hunters and Trappers Organization, GN = Government of Nunavut.

10.6 Management Recommendations

The Baker Lake HHS and Creel Survey should be continued on an annual basis to monitor the hunting and fishing patterns of Baker Lake residents, and the potential effects of the Meadowbank Complex Mine. Meetings with participants every four months (3 times/year) in 2023 are particularly important in maintaining contact, building relationships, expanding the study, and collecting good harvest data. Participation rates can be maintained by continuing to use social media platforms such as Facebook and Instagram, expanding connections on these platforms, ensuring that all participants are visited during the three scheduled field visits, and continuing with distribution of the well-received year-end prizes while in the community. In addition, an effort should be made to continue recruiting new, and particularly young, hunters for the HHS.

11.0 INTEGRATED CARIBOU MONITORING RESULTS

Various caribou monitoring programs have been developed (Sections 2.0 to 10.0) to understand and manage Mine-related effects on caribou. This section summarizes caribou monitoring data collected in 2022 and lists potential Mine-related effects.

11.1 Integrated Results

Table 11-1 summarizes results from each of the nine programs that monitored caribou activity and responses to Mine-related activity in 2022, while Table 11-2 summarizes potential Mine-related effects on caribou in 2022.

Table 11-1: Summary of Caribou Monitoring Activities and Management Responses in 2022

Monitoring Program	Summary of 2022 Monitoring Results	Summary of 2022 Management Responses
Caribou Management Decision Tree (Section 2.0)	Decision tree used when caribou were close to Project facilities as outlined in the TEMP Version 7.	Decision tree process uses data from the road, Mine site, viewshed surveys, and satellite collaring to determine the scale of caribou monitoring and management required.
Road Surveys (Section 3.0)	A total of 235 surveys completed on the AWAR, and 193 on the WTHR. High caribou numbers were observed along the AWAR in October and November. High numbers of caribou were observed along the WTHR in April.	The AWAR was fully closed (24-hour closure) on 45 days, closed for less than 24 hours on 71 days, and had speed restrictions applied for 84 days. In total the AWAR was closed for 1,808 hours. The WTHR was fully closed (24-hour closure) on 15 days, partially closed (less than 24-hour closure) on 63 days and had speed restrictions applied for 93 days. The WTHR was closed for 894 hours during 2022. The majority of mitigations resulted from observations made during road surveys. Approximately 184 caribou and muskox observations from road surveys were tied to mitigations (Appendix A).
Pits and Mine Site Ground Surveys (Section 4.0)	Mine site surveys conducted on a weekly basis at minimum, and incidental observations recorded. Caribou were observed throughout the year, with highest numbers reported in May at Meadowbank, and August/September at Whale Tail.	Deterrent actions were implemented to keep wildlife, including caribou safe from site hazards. Road crossing data thoroughly collected throughout the year to support mitigation decisions. There were no observations from Mine and Pit surveys that resulted in mitigation (Appendix A).
Wildlife Habitat Monitoring (Section 5.0)	A 109.2 ha, or 8.4% change in footprint at the Whale Tail site occurred between the assessment in 2021 and 2022. The change in footprint since the previous assessment less than 25%. Therefore, the next comprehensive analysis is scheduled for 2024.	Not Applicable.
Caribou Satellite-Collaring Program (Section 6.0)	Agnico Eagle intends to continue collaboration with the GN DoE caribou satellite-collaring program. Collar data were not available to complete analyses from 2022 to 2022.	Data were not accessible at the time of reporting. Daily satellite collar maps still received during sensitive seasons and used to assess need for increased monitoring.
Viewshed Surveys (Section 7.0)	Viewshed surveys were conducted on 58 days in 2022. Of the 58 surveys, 41 surveys (6%) had caribou sightings, and a total of 461 caribou were reported. Survey efforts were conducted between 5 January and 28 December, with the highest survey effort occurring in the summer.	Viewshed surveys informed road closure by acting as an early warning system for caribou approaching the WTHR. Seven speed restrictions were implemented based on viewshed surveys (Appendix A).
Remote Camera (Section 8.0)	Remote cameras were deployed at 10 Locations along the WTHR. Caribou were detected at six locations, and road crossings were identified at five locations	No management response based on remote camera program in 2022.

Table 11-1: Summary of Caribou Monitoring Activities and Management Responses in 2021

Monitoring Program	Summary of 2022 Monitoring Results	Summary of 2022 Management Responses
Blast Monitoring (Section 9.0)	Caribou monitoring conducted prior to blasts throughout 2022. Caribou behavioural response to blasting, based on 18 behaviour monitoring sessions was assessed in relation to modelled PPL and PPV. Response behaviours (i.e., alert, walking, trotting or running) were observed following half of blasts. However, preliminary analysis based on 18 surveys found overall that the proportion of caribou performing response behaviours in a six-minute interval following blasting was not correlated with modelled PPV and PPL values.	One blast postponed due to presence of caribou in the vicinity of the Whale Tail Mine.
Hunter Harvest Study (Section 10.0)	A total of 766 caribou were reported as being harvested by 55 participants in the Baker Lake HHS. The data indicated that 39% of reported harvest occurred within 5 km of the AWAR, and 70% occurred within the Meadowbank RSA. In 2022, three Caribou were harvested within 5 km of the WTHR.	The Hunter Harvest Study results support that harvest was less than threshold. Management actions are not required.

AWAR = All Weather Access Road, GN DoE = Government on Nunavut Department of Environment, GST = Group Size Threshold, HHS = Hunter Harvest Study, PPL = Peak Pressure Level, PPV = Peak Particle Velocity, RSA = Regional Study Area, WTHR = Whale Tail Haul Road.

Table 11-2: Summary of Mine-related Effects on Caribou in 2022

Monitoring Program	Potential Effect	Threshold	Threshold Exceeded (2022)	Adaptive Management Implemented
Caribou Management Decision Tree (Section 2.0)	Sensory Disturbance	No threshold but Decisions Trees followed when caribou are seen near mine facilities	Not Applicable	YES. Multiple road closures and notices. Use of Decision Tree for Management and Monitoring.
Road Surveys (Section 3.0)	Sensory Disturbance	No threshold. Decisions Trees followed when caribou are seen near mine facilities.	Not Applicable	YES. Multiple road closures and notices, good engagement of Wildlife Log by site staff. Use of Decision Trees for Management and Monitoring.
	Project-related Mortality	Caribou or muskoxen will not be killed or injured by vehicle collisions. Threshold level of mortality is two individuals per year.	NO	NO.
Pits and Mine Site Ground Surveys (Section 4.0)	Sensory Disturbance	No threshold. Decisions Trees followed when caribou are seen near mine facilities.	Not Applicable	YES. Deterrent actions were used to keep wildlife, including caribou safe from site hazards. Use of Decision Tree for Management and Monitoring.
Wildlife Habitat Monitoring (Section 5.0)	Habitat Loss	10% above total loss of high suitability habitat.	Not Applicable	Not Applicable.
Caribou Satellite-Collaring Program (Section 6.0)	Sensory Disturbance	No threshold. Decisions Trees followed when caribou are seen near mine facilities.	Not Applicable	YES. Multiple road closures and notices. Use of Decision Tree for management and monitoring.
Viewshed Surveys (Section 7.0)	Sensory Disturbance	No threshold. Decisions Trees followed when caribou are seen near mine facilities.	Not Applicable	YES. Multiple road closures and notices. Use of Decision Tree for Management and Monitoring.

Table 11-2: Summary of Mine-related Effects on Caribou in 2022

Monitoring Program	Potential Effect	Threshold	Threshold Exceeded (2022)	Adaptive Management Implemented
Remote Camera (Section 8.0)	Sensory Disturbance	No threshold.	Not Applicable	Not Applicable.
Blast Monitoring (Section 9.0)	Sensory Disturbance	NPC-119 criteria. Monitoring is continuous, but with increasing intensity as caribou approach the blasting site.	NO	YES. Blasting postponed on one occasion due to caribou presence. Use of Decision Tree for management and monitoring.
Hunter Harvest Study (Section 10.0)	Hunting by Baker Lake Residents	The AWAR will not result in significant changes in the spatial distribution, seasonal pattern, or harvest levels of caribou kills by Baker Lake hunters. Changes will not exceed 20% of historical harvest activities within the RSA.	NO	NO. Future discussion with HTO and GN representatives required to identify management options.
		No change in harvest along the WTHR.	NO	

AWAR = All Weather Access Road, GN = Government of Nunavut, NPC = Noise Pollution Control, RSA = Regional Study Area, WTHR = Whale Tail Haul Road.

12.0 PREDATORY MAMMAL DEN MONITORING

Predatory mammals, representing a valued ecosystem component (VEC), occur and are known to den in the vicinity of the Meadowbank and Whale Tail Mine facilities. Sensory disturbances near active dens such as blasting, vehicles and, most significantly, ground personnel, may negatively impact denning success by inducing stress responses in the adult mammals, which can result in den abandonment.

Predatory mammal den monitoring is applicable to four species: grey wolf (natal dens), grizzly bear (natal/overwintering dens), Arctic fox (natal dens), and wolverine (natal dens).

12.1 Objectives

The purpose of the predatory mammal den monitoring program is to identify and monitor active dens in close proximity to mining operations in order to protect any detected dens from disturbance.

12.2 Methods

Data will be collected on predatory mammal abundance and behaviour during ground surveys, vehicle surveys, and Viewshed surveys. Active den sites identified during baseline studies will also be monitored. If a wildlife technician suspects or confirms that an active den is present within the active footprint and vicinity of Project mines facilities or roads, a den management plan will be prepared. The plan will include consultation with the GN with respect to obligations under *The Wildlife Act*, SNU 2003, c. 26. Ground personnel and vehicle access will be restricted in the vicinity of the den as needed to minimize disturbances at the den. The den management plan outlines a monitoring schedule (dependent on seasonal timing) and will inform further mitigation strategies as required. See Figure 13 and Appendix G of the 2019 TEMP Version 7 (Agnico Eagle 2019) for den management and protection plan components.

12.3 Results

Monitoring of predatory mammal dens were conducted informally in 2022 through observations recorded during other monitoring programs. Potential effects due to Project-related activities were not identified to trigger monitoring of predatory mammal dens. No predatory mammal dens were observed or monitored in 2022.

12.4 Accuracy of Impact Predictions

A summary of the impact predictions identified in the TEMP Version 7 (Agnico Eagle 2019) is provided in Table 12-1; however, no impacts to denning predators were observed in 2022.

Table 12-1: Accuracy of Impact Predictions–- Disturbance to Denning Predatory Mammals for the Meadowbank and Whale Tail Projects

Potential Effect	Threshold	Threshold Exceeded	Adaptive Management Implemented	Monitoring Methods
Disturbance to Denning Predators	Predatory mammal den failures will not be caused by Mine-related activities. Threshold is one den failure per year.	NO	NO	Road Surveys, daily and weekly systematic pit and Mine site ground surveys, viewshed, incidentals and vehicle encounter.

12.5 Management Recommendations

When an active den site is identified in close proximity to Project facilities, a den management plan should be developed that outlines a monitoring schedule and appropriate mitigation strategies.

13.0 RAPTOR NEST MONITORING

13.1 Overview

The raptor nest monitoring program is designed to determine Project-related effects, and the success of mitigation strategies to prevent disturbance to nesting raptors. Within the Meadowbank LSA and AWAR LSA, peregrine falcons have previously nested in quarries along the AWAR, the Portage Pit, and Goose Pit. Monitoring of peregrine falcon nests in quarries along the AWAR has been conducted since 2009. The Portage, Goose, Vault, Whale Tail, and IVR Pits are inspected for peregrine falcon activity daily prior to and during the nesting season and managed under the Peregrine falcon Management and Protection Plan (Appendix E, Agnico Eagle 2019).

Monitoring in 2022 included surveys for nests associated with pits and quarries along the AWAR and WTHR. Raptor activity and potential nest locations were also noted on other surveys including road surveys, viewshed surveys, freshet monitoring, and on-site environmental monitoring. In addition, a research program was conducted by Arctic Raptors in 2022, to determine the relationship between nest success and Mine activity (Appendix G).

13.2 Objectives

The objectives of the raptor nest survey monitoring program are to monitor disturbance to nesting raptors, and Project-related mortality to raptors. Nest management plans are developed for nests in proximity to the Project. One mortality, and one nest failure are thresholds for the Project.

13.3 Duration

Raptor nest monitoring will continue throughout operation and closure stages of the Mine to evaluate if mitigation measures to prevent disturbance to nesting raptors are successful.

13.4 Methods

13.4.1 Nest Monitoring

Raptor nests within 1.5 km of the active footprint and Project facilities require monitoring from 1 May to 15 September. Daily monitoring is required for nests within the active footprint, or within 500 m of Project facilities (i.e., the area of concern; Agnico Eagle 2019), and weekly monitoring is required for nests outside the area of concern. Nest management plans are developed as required, in consultation with subject matter experts and the GN, which include establishment of no-disturbance buffers in accordance with BC Guidelines for Raptor Conservation or TAG recommendations. If raptor nesting activity is detected in the Portage, Goose, Whale Tail, and IVR Pits, or other site infrastructure, the Environment Department is notified, and these pits are then inspected daily for nesting activity from 25 May to 1 July. Management and mitigation approaches for peregrine falcon nests in proximity to pits and facilities are outlined in the ‘Peregrine falcon Management and Protection Plan on the Meadowbank Gold Project Site (Appendix E, Agnico Eagle 2019). Raptor activity is also noted on other surveys including pit and Mine site inspections, road surveys, and viewshed surveys.

Raptor nest monitoring in 2022 included monitoring of raptor nests in quarries along the AWAR and WTHR. Peregrine falcons have nested in quarries along the AWAR since 2009, and surveys of these quarries have been performed since 2010. Quarries along the WTHR were checked regularly for raptor nesting evidence between 5 May and 28 September in 2022 (Table 13-1). Quarries along the AWAR (Table 13-1) were visited on an approximately weekly basis between 7 May and 8 September in 2022. Raptor activity and potential nest locations were also noted on other surveys including road surveys, viewshed surveys, freshet monitoring, and on-site environmental monitoring. Surveys in pits or other areas were conducted when raptors were observed during

Mine site inspections or incidental observations. In addition to monitoring completed by Agnico Eagle technicians, Arctic Raptors completed ground-based surveys, and two helicopter surveys for nesting raptors in May and August 2022. Surveys were focused on nesting habitat along the AWAR and WTHR (Appendix G).

Nest sites are monitored using non-disruptive techniques, which include monitoring from vehicles within the quarry or from the road, to ensure that active nests are not approached by Mine personnel. Presence of aggressive adults, eggs, and chicks are used to identify active nests. To minimize direct disturbance to nesting birds and as per recommendations, intensive monitoring, which would require approaching nests by foot, is not conducted. Deterrents were applied to 22 in 2022 to discourage raptor nesting.

13.4.2 Nest Occupancy Analysis

Arctic Raptors analyzed data from raptor nest surveys performed in years 2015 – 2017, 2019, and 2021 – 2022 at 144 locations considered to be raptor nesting habitat. Occupancy modelling was used to determine nest occupancy across years for peregrine falcons (71 nest sites) and rough-legged hawks (30 nest sites). Insufficient data were available to complete models for gyrfalcon (*Falco rusticolus*; 10 nest sites). Annual occupancy probabilities were used to determine average rate of change in occupancy (lambda [λ]) for peregrine falcons and rough-legged hawks. A lambda value greater than one indicates population increase, and a lambda value less than one indicates population decrease. The number of young that hatched at each nest were used to estimate reproductive success. Full methods for the analysis are included in Appendix G (Arctic Raptors 2022).

13.5 Results

13.5.1 Nest Monitoring

Six peregrine falcon nests were documented in Quarries 2, 8, 18, 21, and 22 in 2022 (Table 13-1; Figure 13-1). A peregrine falcon was observed at Quarry 7, however the nest containing eggs in this quarry appeared to be occupied by a common raven. Nests have previously been identified in all these quarries (Table 13-1). No raptor nesting evidence was observed in quarries along the WTHR in 2022 (Quarries 10.5, 26, 30, 35, 50, and 52; Table 13-1). Peregrine falcon nesting activity (i.e., territorial behaviour) was identified on a communication tower on site, and in the Phaser Lake extension of the Vault Pit area during the NIRB site visit. However, these nests were not identified during subsequent raptor nest monitoring. No other raptor nests were identified during pit checks or incidentally during other surveys in 2022.

A summary of observations made at the peregrine falcon nests along the AWAR in 2022 is detailed in Table 13-2. Raptor nest management plans were not developed at the active nest sites, as Mine-related activity was already restricted within the quarries, with the only disturbance being traffic on the nearby AWAR. Intensive monitoring, which would include approaching nests by foot, was not conducted. Nest locations are not publicized to prevent inadvertent disturbance by curious Mine employees.

Table 13-1: Record of Peregrine falcon Nesting from 2009 and 2022

Location	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Comments (2022)
All-Weather Access Road															
Quarry 1	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Peregrine falcon pair circling around
Quarry 2	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	No	No	Yes	No	**Yes**	**Yes**	**Yes**	Two nestlings observed
Quarry 3	No	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	No	A lot of peregrine falcon whitewash specially on west walls, peregrine falcon pair observed
Quarry 4	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No raptors observed
Quarry 5	No	No	No	No	No	No	No	No	No	No	No	No	**Yes**	No	Peregrine falcon observed
Quarry 6	No	No	No	No	No	No	No	No	No	No	No	No	No	No	One peregrine falcon observed
Quarry 7	No	No	No	No	No	No	No	**Yes**	**Yes**	No	No	**Yes**	**Yes**	No	Common raven nest with one egg; potentially failed, one falcon observed
Quarry 8	No	No	No	No	No	No	No	No	**Yes**	No	No	No	No	**Yes**	Three falcon nestlings observed
Quarry 9	No	No	No	No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	No	One peregrine falcon observed
Quarry 10	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No falcons observed
Quarry 11	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No falcons observed
Quarry 12	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No falcons observed
Quarry 13	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No falcons observed

Table 13-1: Record of Peregrine falcon Nesting from 2009 and 2022

Location	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Comments (2022)
Quarry 14	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No falcons observed
Quarry 15	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No falcons observed
Quarry 16	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	One peregrine falcon observed
Quarry 17	No	No	No	No	No	No	No	No	**Yes**	No	No	No	No	No	No falcons observed
Quarry 18	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	Four peregrine falcon nestlings observed
Quarry 19	**Yes**	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	No	No	No falcons observed
Quarry 20	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No falcons observed
Quarry 21	No	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	No	**Yes**	Three peregrine falcon nestlings observed
Quarry 22	No	No	No	No	No	No	No	No	**Yes**	**Yes**	**Yes**	No	**Yes**	**Yes**	Three peregrine falcon nestlings observed
Whale Tail Haul Road															
Quarry 10.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No	No falcons observed
Quarry 26	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No	No falcons observed
Quarry 30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No	No falcons observed
Quarry 35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No	No falcons observed
Quarry 50	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No	No falcons observed
Quarry 52	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No	No falcons observed

Table 13-1: Record of Peregrine falcon Nesting from 2009 and 2022

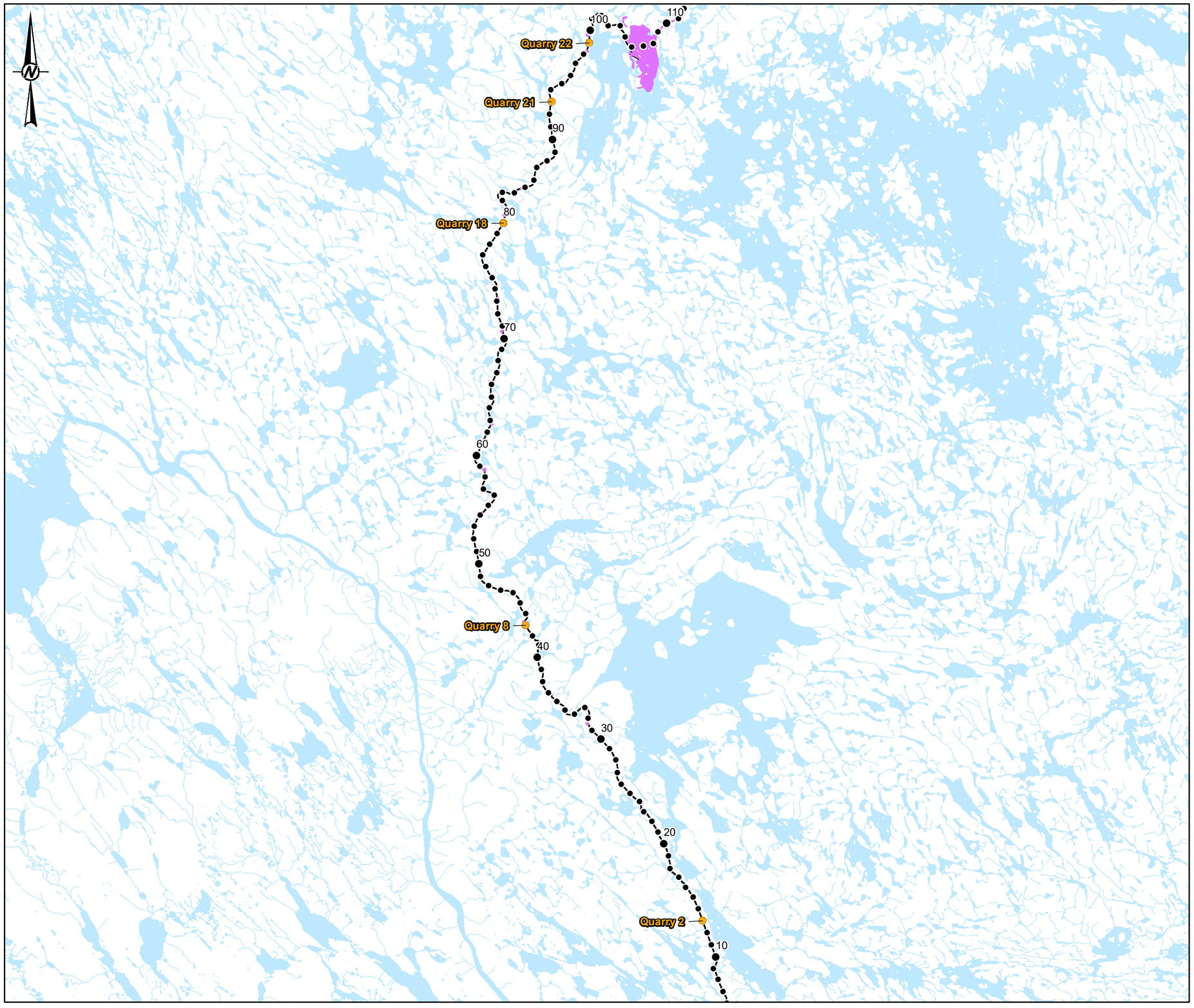
Location	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Comments (2022)
Meadowbank Mine															
Portage Pit	No	No	No	**Yes**	**Yes**	No	No	No	No	No	No	No	No	No	No falcons observed
Vault Pit	N/A	N/A	N/A	N/A	No	No	No	No	No	No	No	No	No	No	No falcons observed
Goose Pit	N/A	N/A	No	No	No	No	No	**Yes**	No	No	No	No	No	No	No falcons observed
Whale Tail Mine															
Whale Tail Pit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No	No	No falcons observed
IVR Pit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No	No	No falcons observed

N/A = Not Applicable

Table 13-2: Peregrine Falcon Nest Monitoring Data, 2022

Date	Quarry 2 (-96.049, 64.424)	Quarry 8 (-96.126, 64.504)	Quarry 18 (-96.307, 64.919)	Quarry 21 (-96.224, 65.003)	Quarry 22 (-96.155, 65.042)
24-May-22	No falcon observed	-	-	-	One peregrine falcon observed
29-May-22	Pair of peregrine falcon hunting	Pair of falcons observed	One falcon observed	Pair of peregrine falcons observed	Pair of peregrine falcons observed
03-Jun-22	Two peregrine falcons observed	-	One falcon observed	One peregrine falcon observed	Pair of peregrine falcons observed
08-Jun-22	Two peregrine falcons observed	Pair of falcons observed	Pair of falcons observed	Pair of peregrine falcons observed	Pair of peregrine falcons observed
05-Jul-22	Two peregrine falcons observed	No observations	No observations	Pair of peregrine falcons with one nestling	One peregrine falcon observed
12-Jul-22	One peregrine falcon observed	-	-	One peregrine falcon observed	One peregrine falcon observed
27-Jul-22	One peregrine falcon observed	Pair of falcons with three nestlings	Pair of peregrine falcons with four nestlings	Pair of peregrine falcons with three nestling	-
04-Aug-22	One peregrine falcon observed	Pair of falcons observed	Pair of peregrine falcons with four nestlings	Pair of peregrine falcons with one nestling	No observations
10-Aug-22	-	-	-	-	Pair of peregrine falcons observed
14-Aug-22	Pair of peregrine falcons with two nestlings	Pair of falcons with three nestlings	Pair of peregrine falcons with four nestlings	one peregrine falcon with two fledglings	One peregrine falcon and three nestlings
26-Aug-22	Four peregrine falcons observed	No observations	Five peregrine falcons observed	Three peregrine falcons observed	Pair of peregrine falcons observed
08-Sep-22	One peregrine falcon observed	No observations	Pair of peregrine falcons with four nestlings	No observations	No observations

“-“ indicates no monitoring event on given day.

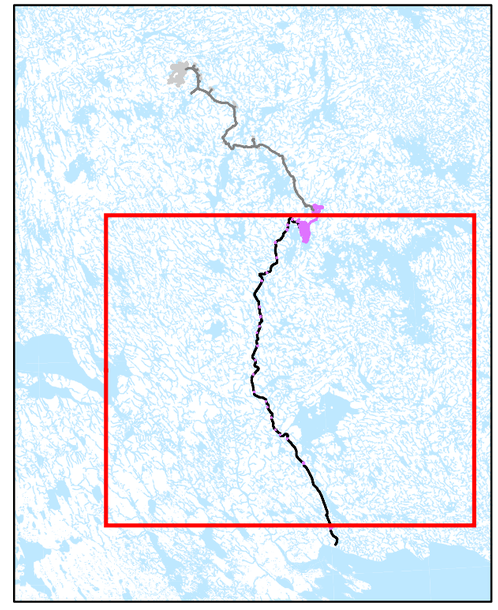


LEGEND

ACTIVE PEREGRINE FACON NEST LOCATION (2022)

STATUS

- SUCCESSFUL
- KILOMETRE MARKER
- WHALE TAIL MINE SITE
- HAUL ROAD
- MEADOWBANK MINE SITE
- ALL WEATHER ACCESS ROAD
- WATERBODY
- WATERCOURSE



0 6 12

1:300,000 KILOMETRES

REFERENCE(S)

1. INFRASTRUCTURE OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. ROAD, WATERCOURSE AND WATERBODY DATA OBTAINED FROM NATURAL RESOURCES CANADA.

COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 14N

CLIENT

AGNICO EAGLE MINES LIMITED:
MEADOWBANK DIVISION

PROJECT

MEADOWBANK AND WHALE TAIL PIT TEMP 2022

TITLE

PEREGRINE FALCON NEST LOCATIONS (2022)

CONSULTANT

wsp

YYYY-MM-DD	2023-03-27
DESIGNED	SW
PREPARED	CDB
REVIEWED	DC
APPROVED	CDLM

PROJECT NO.	CONTROL	REV.	FIGURE
21502960	4000/4040	0	13-1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

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PATH: Y:\Journalty\CAD-GIS\Client\Agnico_Eagle_Mines_Ltd\Whale_Tail\9_PROJECTS\21502960\4000\4040\02_PRODUCTION\MXD\Report\21502960_4000_4040_13_01_Peregrine_Falcon_Nest_Locations_2022.mxd PRINTED ON: 2023-03-27 AT: 12:33:50 PM

13.5.2 Nest Occupancy Analysis

Results of the analysis did not indicate project-related effects on rough-legged hawk occupancy ($\lambda = 1.08 \pm 0.17$ [mean ± standard error]). Although the value is positive, the standard error overlaps one, indicating that the population is unlikely to be increasing or decreasing (i.e., likely stable). Marginal decrease in peregrine falcon occupancy was observed ($\lambda = 0.98 \pm 0.04$) but results could not be strongly correlated to effects from the Project. Results may be related to inconsistent monitoring (e.g., monitoring that ensures minimal disturbance) and lack of statistical power to determine project-related effects. Full results of the nest occupancy analysis are included in Appendix G (Arctic Raptors 2023).

13.6 Accuracy of Impact Predictions

A summary of the impact predictions identified in the TEMP Version 7 (Agnico Eagle 2019) is provided in Table 13-3. Results of the nest occupancy analysis indicate that there has been a marginal decrease in peregrine falcon nest occupancy, but this cannot be strongly correlated to effects from the Project. Results may be related to inconsistent monitoring and lack of statistical power to determine project-related effects (Appendix G).

Table 13-3: Accuracy of Impact Predictions to Nesting Raptors and Raptor Mortality

Potential Effect	Threshold	Threshold Exceeded (2022)	Adaptive Management Implemented	Monitoring Methods
Disturbance to Nesting Raptors	Raptor nest failures will not be caused by Mine-related activities. Threshold is one nest failure per year.	NO	NO	Active raptor nest monitoring Daily and weekly systematic pit and Mine site ground surveys
Raptor Mortality	One individual	NO	NO	AWAR and WTHR surveys Daily and weekly systematic pit and Mine site ground surveys Incident and vehicle encounter reports

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

13.7 Management Recommendations

Agnico Eagle will continue to monitor raptor nests in accordance with the TEMP Version 7 (Agnico Eagle 2019). This includes annual raptor nest surveys of quarries along the AWAR, WTHR, pits, and waste rock piles; development of nest management plans; and implementation of the Peregrine Falcon Management and Protection Plan, when required. Active nests will be monitored throughout the season to determine nest success or failure. Agnico Eagle will continue to document raptor observations during other programs (e.g., road surveys, viewshed surveys).

Starting in 2021, multiple surveys have been completed each year by a third-party expert (Arctic Raptors), to allow estimation of nest detection error. Mitigations for raptors that were implemented in 2022 include applying deterrents to quarries in early May, regular monitoring of viewshed quarries, and signage to identify nesting raptors to limit disturbance (Appendix G; Arctic Raptors 2023).

14.0 WATERBIRD NEST MONITORING

14.1 Overview

The Whale Tail expansion required the construction of two dykes within Whale Tail Lake to divert water from the proposed pit to surrounding lakes and tributaries, resulting in flooding that with potential impacts to migratory birds and their nests. Trent University, in collaboration with Environment and Climate Change Canada (ECCC) and Agnico Eagle, conducted a research study to investigate mitigation options to minimize flooding-related impacts to birds in the Whale Tail South area. The objectives of the study were to:

1) Determine the effectiveness of audio and visual deterrents for prevention of flood-zone nesting.

2) Estimate the number of nests and species composition lost due to flooding.

3) Examine the behavioural response of birds to:

    a. deterrents (e.g., impacts to duration on the nest) and

    b. flooding (determine whether birds re-nested nearby after the flooding events)

Complete methods and results for Objectives 1, 2, and 3a are published and available online in the Trent University MSc Thesis "*Assessing and Mitigating the Impacts of Mining-Induced Flooding on Arctic-Nesting Birds*" (Holmes 2022) and are not revisited further here.

Visual and audio deterrents tested in the 2018 and 2019 programs were not recommended as effective mitigation measures for preventing bird nest loss. Nest densities observed from 2018 and 2019 were used to estimate nest displacement during 2018 to 2020. Nest displacement to date was estimated to be lower than FEIS Addendum predictions. The 2020 field program intended to determine behavioural response to flooding (i.e., nest density and recolonization time in the area post-flooding) but was not completed due to COVID-19.

Follow-up studies in 2021 indicated that while the average number of nests and bird density increased from 2019 to 2021 in upland control plots and nest density declined in flood zone plots, these differences were not statistically significant (Holmes 2022). Further analysis in 2022 of individual re-sightings support the hypothesis that birds will re-nest nearby post-flood, at least anecdotally. Six re-sighted Lapland longspur (*Calcarius lapponicus*) moved their nests an average of 180 m and uphill by 4 masl (metres above sea level), while six semipalmated sandpipers (*Calidris pusilla*) moved their nests an average of 151 m and downhill by 0.18 masl.

The complete analysis and report on behavioural responses will be included in a second Trent University MSc Thesis manuscript (Sarah Bonnett), expected to be submitted in 2023. References for any publications produced in 2023 will be provided in the 2023 Annual Report, but otherwise reporting under the Migratory Bird Protection Plan is considered complete at this time.

15.0 BREEDING BIRD MONITORING

15.1 Overview

The breeding bird PRISM (Program for Regional and International Shorebird Monitoring) plot and breeding bird transect monitoring programs were designed to evaluate potential Project-related changes in breeding bird species abundance, richness, and diversity over time. The program is one component of the larger monitoring strategy to evaluate the success of mitigation measures implemented to minimize the amount of vegetation (i.e., bird habitat) removed or degraded (e.g., dustfall) by the Project, and whether certain Mine activities such as the Mine site or AWAR have resulted in reduced or compromised habitat function or effectiveness (i.e., zone of influence) for breeding birds.

For the breeding bird transects, data analysis in 2011 and 2015 indicated that no road-related effects had occurred to date, and thresholds had not been exceeded; therefore, annual transect surveys were permanently suspended after 2015. In 2022, Agnico Eagle reached an agreement with the ECCC to contribute to regional bird monitoring programs by conducting 48 PRISM plots from 2021 to 2031, and to complete Breeding Bird Surveys (BBS) along the AWAR and WTHR when possible and at a minimum of every three years.

15.1.1 Breeding Bird Surveys

Two BBS routes, consisting of 50 stations set every 800 m each, were established by qualified personnel along AWAR and the WTHR in 2022. Unfortunately, no official surveys were conducted in 2022 due to a non-work-related medical issue. Detailed descriptions of the routes and station locations are provided in the Meadowbank Complex 2022 Breeding Bird Surveys and PRISM Plots Summary Report (Appendix H).

15.1.2 PRISM Plots

Four PRISM plots were surveyed during two field days in June 2022. In total, twelve bird and one mammal species were observed in the PRISM plots and five bird and four mammal species were observed incidentally while travelling between plots. Horned lark (*Eremophila alpestris*) and Lapland longspur were the only species observed at all four plots, and savannah sparrow (*Passerculus sandwichensis*) and semipalmated sandpiper were observed at three plots each. Full results of the 2022 surveys, as well as sampling methods and locations are available in Appendix H.

15.2 Management Recommendations

Agnico Eagle will continue to survey 48 PRISM plots selected by Canadian Wildlife Service over 10 years (2021 to 2031), and completion of AWAR and WTHR Breeding Bird Survey (BBS) routes opportunistically when qualified individuals are on site. At a minimum, these BBS routes will be conducted every three years during the operations, closure and post-closure phases of the project.

With the limited survey efforts due to an unforeseen medical issue, it is recommended that a minimum of 12 PRISM plots and both BBS routes be surveyed in June 2023. The four PRISM plots completed in 2022 will need to be revisited to take photographs of the plots from the plot corners.

16.0 NON-NATIVE PLANT SURVEYS

16.1 Overview

This section includes the methods, results, and mitigation measures to minimize the spread of non-native invasive plant species resulting from mine activities. The Government of Nunavut (GN) and Environment and Climate

Change Canada (ECCC) define a non-native species as ‘an organism that is not normally found in a region’ (CESCC 2010). Additionally, according to Section 91 of *The Wildlife Act*, SNU 2003, c 26, invasive species shall not be released into a habitat in which that species does not belong or never naturally occurred. Any introductions of non-native plant species must be promptly reported to the GN Department of Environment. In 2019, Agnico Eagle initiated a non-native plant monitoring study to assess and monitor the potential introduction of non-native plant species, including weeds or invasive species (Golder 2020b). Subsequent monitoring events occurred in the month of July in each of 2020-2022. Surveys will continue to be completed annually as per the TEMP Version 7 (Agnico Eagle 2019).

16.2 Methods

The Canadian Endangered Species Conservation Council (CESCC) lists 17 species not normally found in Nunavut with a potential for becoming established, 14 of which are vascular (non-native) plants to the region (CESCC 2010; Table 1). These species were included as targets for the non-native plant surveys. Additionally, any species known to be non-native to Nunavut were also included as targets for non-native plant surveys, to meet requirements of Section 91 of *The Wildlife Act*, SNU 2003, c 26.

Surveys at the Meadowbank Complex were conducted by a Golder vegetation ecologist between 20 to 26 July 2022. The Meadowbank Complex area includes the AWAR, WTHR, Baker Lake tank farm, Whale Tail Mine site, and Meadowbank Mine site areas.

Species were documented as they were encountered. Non-native plant surveys consisted of targeted surveys focused within high-priority or high-potential areas within the Project footprint. The high-potential areas were identified as the Project area perimeter, highly trafficked areas (e.g., fuel station), areas surrounding buildings, shipping containers, along existing roads/trails or areas of disturbance within the Project area, as well as adjacent to the AWAR and WTHR road. High potential areas also included survey locations from 2019 to 2021 where non-native plants were observed. In areas where non-native species were observed, meander surveys were conducted outside of the disturbance footprint to determine if these species had established in the native tundra. Given the length of the AWAR and WTHR, the roads were travelled via vehicle at slow speeds, while observers looked for obvious signs of weed infestations along road margins. Periodic stops were undertaken to complete meanders in areas with high potential for weed occurrences (e.g., pull-outs, work areas, road-side quarries, and other areas with disturbed substrates). A GPS was used to collect a track file of the meander route and point locations of surveys conducted. A total of 193 individual locations were surveyed for non-native plants in 2022 (Table 16-1). This number is slightly lower than the number of survey locations in 2021 (202 locations) however, some locations around the Meadowbank Mine Site were eliminated as some populations of previously observed plants had merged together.

When non-native or invasive plant species were encountered, the following information was recorded: site ID; surveyor name; GPS coordinates; photos of the occurrence / infestation; species name; estimated area of infestation; estimated number of plants (e.g., <10, 10 to 100, 100 to 1,000, >1,000) of each species; estimated cover of bare ground; growth stage (i.e., seedling, in bud, seed set, expired); recommended action for each species; and record of any hand pulling completed.

16.3 2022 Results

No non-native plants, as identified by the CESCC, were recorded along the AWAR, WTHR, Baker Lake tank farm, Whale Tail and Meadowbank Mine sites. Eleven surveys were completed in undisturbed tundra to survey the

presence/absence of non-native weeds. No non-native plants were found in the undisturbed areas surveyed. A summary of the locations where weed surveys were completed is presented in Table 16-1 and Figure 16-1.

Table 16-1: Summary of 2022 Non-Native Plant Survey Effort

Location of survey	Total number of survey locations
AWAR	16
AWAR quarry	23
Baker Lake tank farm	2
Meadowbank Mine site	85
Undisturbed tundra	11
Whale Tail Mine site	31
WTHR	11
WTHR Esker/Quarry	14
Total	**193**

AWAR = All Weather Access Road, WTHR = Whale Tail Haul Road.

16.3.1 Historical Results

From 2019 to 2021, many observations of what was then identified as flixweed (*Descurainiasophiaa*) were reported (Agnico Eagle 2019, 2020a and 2022b) (Table 16-2). A specimen of this species was collected in July 2022 and sent to the Canadian Museum of Nature for identification by a botanist. The specimen was confirmed to be the native species, northern tansy mustard (*Descurainia sophioides*) (P. Sokoloff [personal communication, August 24, 2022]). This species is a biennial herb that colonizes gravel bars, roadsides, waste sites and disturbed soils which is why it is so abundant at the Meadowbank site. It is common in the western arctic around settlements and along roads (Aiken et al. 2007). Known populations of northern tansy mustard have been collected from Baker Lake and Rankin Inlet (BC CDC 2022). The differences between northern tansy mustard and flixweed are subtle. In flixweed, the septae, which are the walls that divide the seed pod (fruit) into chambers, are veined; while in northern tansy mustard the septae are not veined (FNA 2022). Flixweed also has stellate (star like) hairs which are only visible under five to ten times magnification, while northern tansy mustard has glandular hairs (Densmore et al. 2001). Due to the visual similarity between these two species, ongoing monitoring is recommended.

Trials of eradication on what were thought to be flixweed populations, but are now known as northern tansy mustard, were implemented in July 2021 at the Meadowbank Mine site. In total 17 sites underwent trails involving a combination of geotextile placement, hand pulling and mechanical removal. Results of these trials are found in Table 16-2. In summary, the geotextile fabric was effective at reducing populations of northern tansy mustard but only in its immediate vicinity. Areas adjacent to the geotextile fabric and areas with soil accumulated on top of the fabric had sustained populations of northern tansy mustard. Hand pulling and weed eating were found to be not effective methods at controlling northern tansy mustard. The eradication trials will be suspended now that it is known that northern tansy mustard is a native species. Northern tansy mustard may be considered useful for short term ground cover in reclamation areas, providing organic soil inputs on disturbed substrates (Agnico Eagle, 2022).

Table 16-2: 2021 Eradication Trial Results

Trial Location Name	Eradication Methods	Results	Estimated number of Individuals in 2020	Estimated number of Individuals in 2022
21F01	Weed eater	Not effective, population growth since eradication trial.	500	8,000
21F02	Geotextile/ hand pulling	Effective in areas directly under geotextile. Northern tansy mustard surrounding the geotextile fabric.	2,000	1,000
21F03	Geotextile/Weed eater	Effective in areas under geotextile fabric.	500	800
21F04	Hand pulling	Not effective. Northern tansy mustard present in large populations.	50	1,000
21F05	Geotextile/Weed eater	Not effective, northern tansy mustard present in large populations.	3,000	8,000
21F06	Hand pulling	Somewhat effective in managing small populations.	30	35
21F07	Weed eater/ hand puling	Not effective.	2000	50,000
21F08	Weed eater/ hand pulling	Little evidence of eradication success.	500	500
21F09	Hand pulling	Too large of a population to control by hand.	15,000	20,000
21F10	Geotextile	Not effective. Northern tansy mustard is growing on soil accumulated on top of fabric and adjacent to fabric.	1,000	50,000
W008	Geotextile	Geotextile only effective when in place and only in immediate area. Areas adjacent to geotextile have sustained populations. Areas where geotextile was removed have populations returned.	2,000	850
W012	Hand pulling	Not effective – no evidence that populations were reduced.	10,000	10,000
W013	Weed eater/hand pulling	Not effective.	200,000	200,000
W015	Geotextile	Geotextile effective when in place and only in immediate area. Geotextile was not covering entire population.	2,000	10,000
W024	Hand pulling	Not effective.	100	800
W027	Hand pulling	Not effective.	2,000	2,000
W039	Geotextile/Weed eater	Eradication only effective in areas immediately under geotextile fabric.	10,000	200,000

Similarly, previous annual TEMP reports have reported the non-native species, scentless chamomile (*Tripleurospermum inodorum*) (Table 16-3). Scentless chamomile is very similar to the native species sea mayweed (*Tripleurospermum maritima)*. Upon closer inspection by WSP ecologists, the populations observed in previous years have been confirmed to be the native species, sea mayweed. Sea mayweed have fleshy leaf lobes while scentless chamomile leaf lobes are not fleshy (FNA 2022). The margins of phyllaries (the leaf like structure that surrounds the flower head) in scentless chamomile are light brown and narrow, while in sea mayweed the phyllaries are dark brown and relatively wide (FNA 2022). The native species is common in coastal areas, among grasses near human habitation and has been confirmed in continental Nunavut (Aiken at al. 2007).

The populations of non-native species of lamb's quarters (*Chenopodium album)* and alsike clover (*Trifolium hybridum*) were observed in 2020. There have been no observations of these species in the years since 2020.

Table 16-3: Historical Non-Native Plant Survey Results

Year	Number of Survey Locations	Non-Native Plants Observed[a]
2019	107	Flixweed, scentless chamomile
2020	175	Flixweed, scentless chamomile, lamb's quarters, alsike clover
2021	202	Flixweed, scentless chamomile
2022	193	none

a) Both flixweed and scentless chamomile observed in previous years have been confirmed in 2022 to be native species, northern tansy mustard and sea mayweed respectively.