Baker Lake Harvest Study

Northwest Map Deep Rose Lake

Key Map

Deep Rose Lake	Meadowbank River	Woodburn Lake
Aberdeen Lake	Schultz Lake	Quoich River
Mallery Lake	Pitz Lake	Baker Lake

0 5 10 15

Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada
GeoBase®
National Topographic Database
Government of Nunavut
Agnico-Eagle Mines Inc.
Caslys Consulting Ltd.

Prepared for:

AGNICO-EAGLE

By:

Nunavut ENVIRONMENTAL CONSULTING LTD

CASLYS CONSULTING

99°30'W 99°W 98°30'W 98°W

66°N 65°45'N 65°30'N

ZE69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 ZE47

ZF ZG ZH ZI ZJ ZK ZL ZM ZN ZO ZP ZQ ZR ZS ZT ZU ZV ZW ZX ZY

ZZ69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 ZZ47

Buliard Lake

Back River

Lower Garry Lake

Deep Rose Lake

ZP58

Baker Lake Harvest Study

West Central Map
Aberdeen Lake

Key Map

Deep Rose Lake	Meadowbank River	Woodburn Lake
Aberdeen Lake	Schultz Lake	Quoich River
Mallery Lake	Pitz Lake	Baker Lake

0 5 10 15
Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada
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Government of Nunavut
Agnico-Eagle Mines Inc.
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99°30'W 99°W 98°30'W 98°W

65°15'N 65°N 64°45'N 64°30'N

A69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 A47

B C D E F G H I J K L M N O P Q R S T U

K58

V69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 V47

Sand Lake

Naujatuuq Lake

River

Naujatuuq

Oumanaugaq Lake

Oumanaugaq Bay

Peqetuaz Hill

Kuaghok Narrows

Aberdeen Lake

Baker Lake Harvest Study

Southwest Map
Mallery Lake

Key Map

Deep Rose Lake	Meadowbank River	Woodburn Lake
Aberdeen Lake	Schultz Lake	Quoich River
Mallery Lake	Pitz Lake	Baker Lake

0 5 10 15

Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada
GeoBase®
National Topographic Database
Government of Nunavut
Agnico-Eagle Mines Inc.
Caslys Consulting Ltd.

Prepared for:

AGNICO-EAGLE

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CASLYS CONSULTING

99°30'W 99°W 98°30'W 98°W

64°30'N 64°15'N 64°N 63°45'N

V69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 V47

W X Y Z AA AB AC AD AE AF AG AH AI AJ AK AL AM AN AO AP

AQ69 68 67 66 65 64 63 62 61 60 59 58 57 56 55 54 53 52 51 50 49 48 AQ47

Aberdeen Lake

Marjorie Hills

Dubawnt River

Marjorie Lake

AF58

Wharton Lake

Mallery Lake

Maniituq Hill

Tebesjuak Lake

Kunwak River

Piniarvik Peninsula

Baker Lake Harvest Study

North Central Map Meadowbank River

Key Map

Deep Rose Lake	Meadowbank River	Woodburn Lake
Aberdeen Lake	Schultz Lake	Quoich River
Mallery Lake	Pitz Lake	Baker Lake

0 5 10 15

Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada
GeoBase®
National Topographic Database
Government of Nunavut
Agnico-Eagle Mines Inc.
Caslys Consulting Ltd.

Prepared for:

AGNICO-EAGLE

By:

Nunavut Environmental Consulting Ltd

CASLYS CONSULTING

97°30'W 97°W 96°30'W 96°W

66°N 65°45'N 65°30'N 65°15'N

ZE46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 ZE24

ZF ZG ZH ZI ZJ ZK ZL ZM ZN ZO ZP ZQ ZR ZS ZT ZU ZV ZW ZX ZY

ZZ46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 ZZ24

Back River

Meadowbank River

ZP35

Amer Lake

Nanau Lake

Whale Tail

Baker Lake
Harvest Study

Central Map
Schultz Lake

Key Map

Deep Rose Lake	Meadowbank River	Woodburn Lake
Aberdeen Lake	Schultz Lake	Quoich River
Mallery Lake	Pitz Lake	Baker Lake

0 5 10 15
Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada
GeoBase®
National Topographic Database
Government of Nunavut
Agnico-Eagle Mines Inc.
Caslys Consulting Ltd.

Prepared for:
AGNICO-EAGLE

By:
Nunavut Environmental Consulting Ltd
CASLYS CONSULTING

97°30'W 97°W 96°30'W 96°W
65°15'N 65°N 64°45'N 64°30'N
A46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 A24
B C D E F G H I J K L M N O P Q R S T U
V46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 V24
K35
N

Pipedream Lake
Meadowbank
Third Portage Lake
Amarulik Lake
Whalebone Hill
Schultz Lake
Thelon River
Akitit Hill
Whitehills Lake
Half Way Hills
Ayaktuukvik Lake

Baker Lake Harvest Study

South Central Map
Pitz Lake

Key Map

Deep Rose Lake	Meadowbank River	Woodburn Lake
Aberdeen Lake	Schultz Lake	Quoich River
Mallery Lake	Pitz Lake	Baker Lake

0 5 10 15

Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada
GeoBase®
National Topographic Database
Government of Nunavut
Agnico-Eagle Mines Inc.
Caslys Consulting Ltd.

Prepared for:

AGNICO-EAGLE

By:

Nunavut ENVIRONMENTAL CONSULTING LTD

CASLYS CONSULTING

97°30'W 97°W 96°30'W 96°W

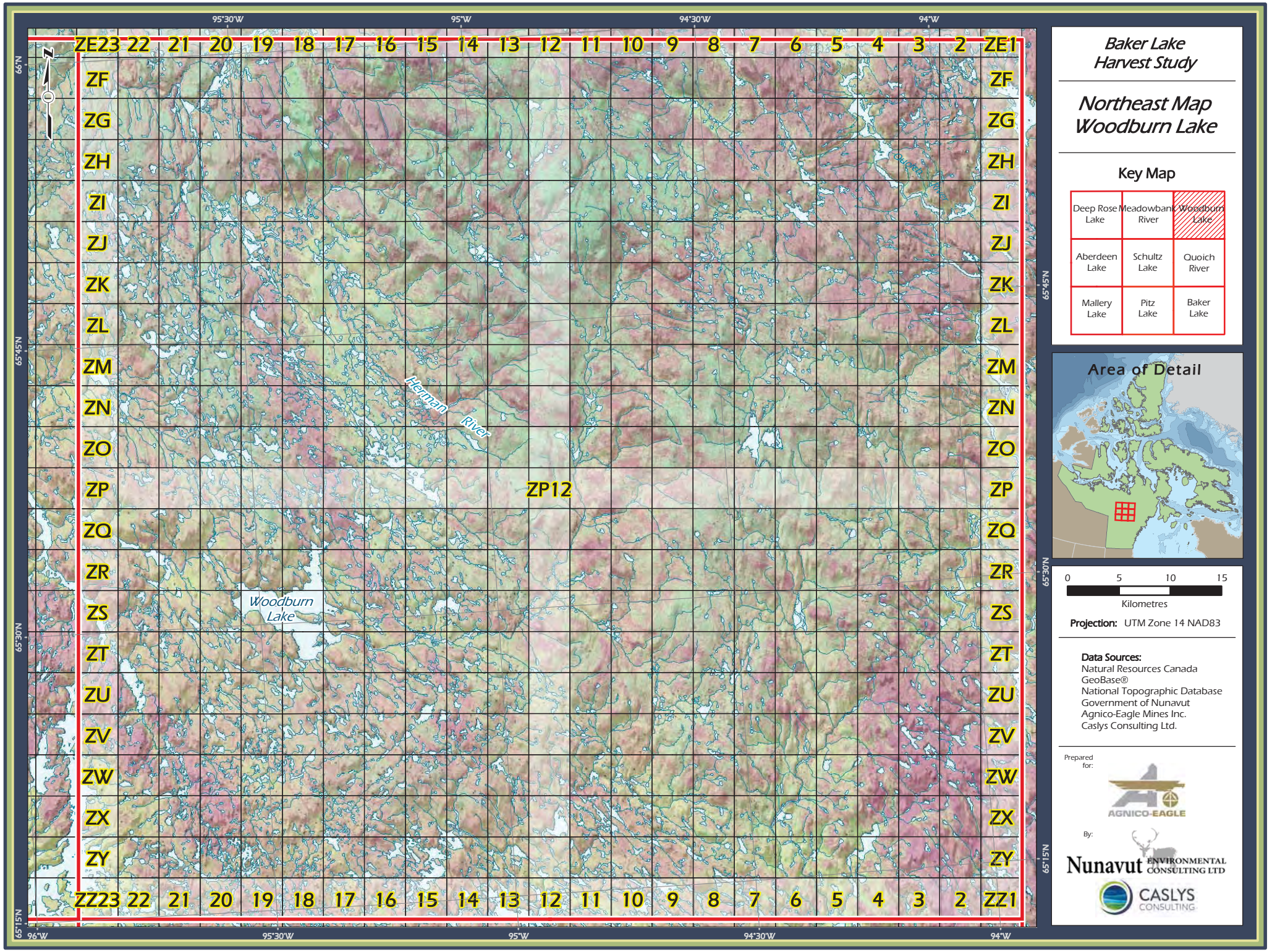
64°30'N 64°15'N 64°N 63°45'N

V46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 V24

W X Y Z AA AB AC AD AE AF AG AH AI AJ AK AL AM AN AO AP

AQ46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 AQ24

Qikittalik Lake
Thelon River
Sigalausivik Hill
Thom Lake
Baker Lake
Judge Sissons Lake
Iglujat Hills
Sagliq Island
Qamanaugaq Lake
Mihaluk Lake
AF35
Kingatnaaq Hill
Paunraqtuuq Hill
Tiriksiujarvik Hill
Pitz Lake
Princess Mary Lake
Aumaluuktuuk Lake



Baker Lake Harvest Study

Northeast Map Woodburn Lake

Key Map

Deep Rose Lake	Meadowbank River	Woodburn Lake
Aberdeen Lake	Schultz Lake	Quoich River
Mallery Lake	Pitz Lake	Baker Lake

0 5 10 15

Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada
GeoBase®
National Topographic Database
Government of Nunavut
Agnico-Eagle Mines Inc.
Caslys Consulting Ltd.

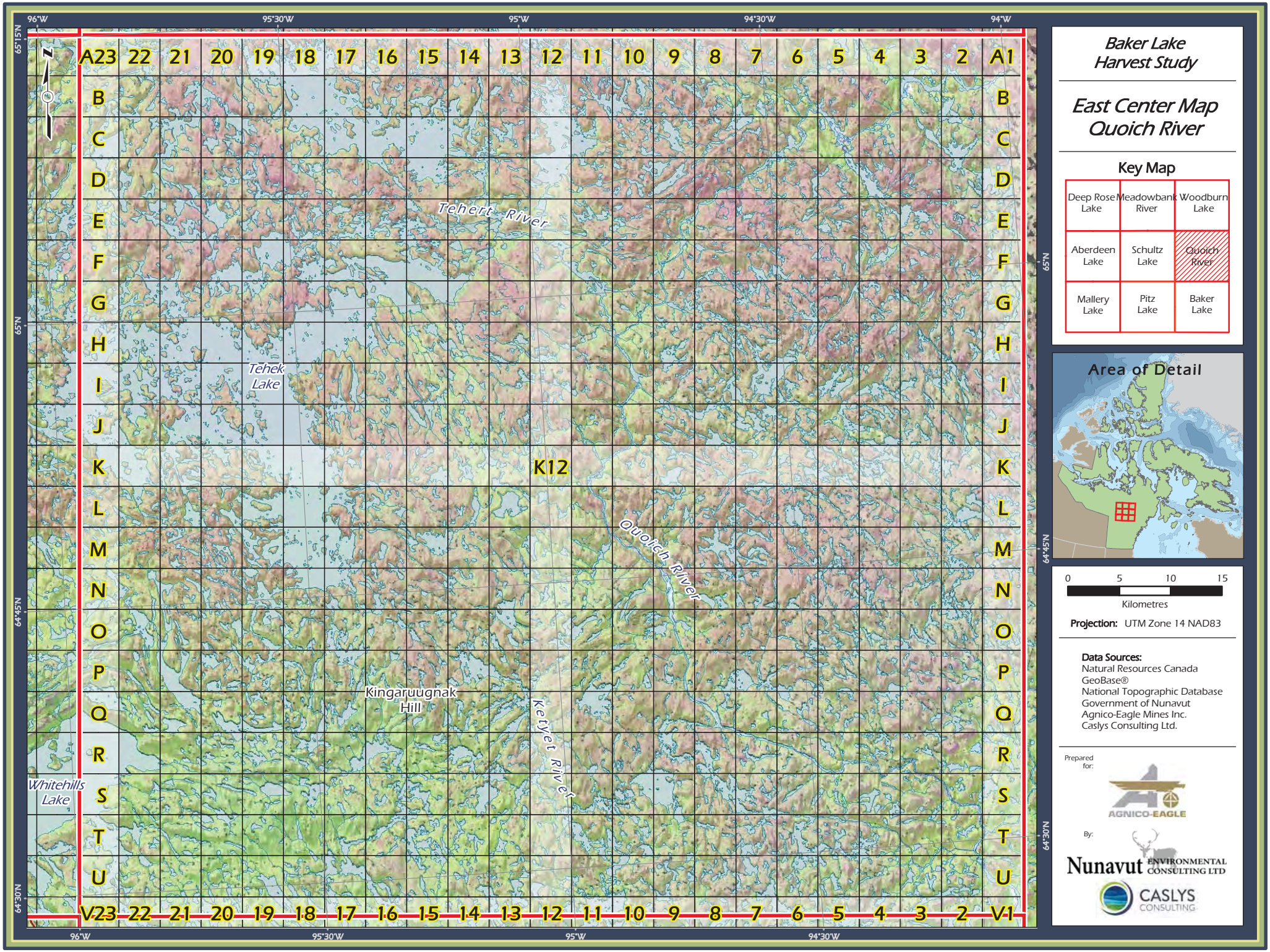
Prepared for:

AGNICO-EAGLE

By:

Nunavut Environmental Consulting Ltd

CASLYS CONSULTING



Baker Lake Harvest Study

East Center Map
Quoich River

Key Map

Deep Rose Lake	Meadowbank River	Woodburn Lake
Aberdeen Lake	Schultz Lake	Quoich River
Mallery Lake	Pitz Lake	Baker Lake

Area of Detail

0 5 10 15
Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada
GeoBase®
National Topographic Database
Government of Nunavut
Agnico-Eagle Mines Inc.
Caslys Consulting Ltd.

Prepared for: AGNICO-EAGLE

By: Nunavut Environmental Consulting Ltd

CASLYS CONSULTING

Baker Lake Harvest Study

Southeast Map Baker Lake

Key Map

Deep Rose Lake	Meadowbank River	Woodburn Lake
Aberdeen Lake	Schultz Lake	Quoich River
Mallery Lake	Pitz Lake	Baker Lake

Area of Detail

0 5 10 15

Kilometres

Projection: UTM Zone 14 NAD83

Data Sources:
Natural Resources Canada
GeoBase®
National Topographic Database
Government of Nunavut
Agnico-Eagle Mines Inc.
Caslys Consulting Ltd.

Prepared for:

AGNICO-EAGLE

By:

Nunavut Environmental Consulting Ltd

CASLYS CONSULTING

How to Use the Baker Lake Harvest Calendar

Agnico Eagle Mines Ltd., in cooperation with the Baker Lake Hunters and Trappers Organization (HTO), want to understand hunting and fishing patterns by Baker Lake residents. Specifically, we want to understand how the Meadowbank and Whale Tail Gold Project, located north of Baker Lake, might change traditional harvesting patterns. To ensure that traditional hunting and fishing activities are not negatively affected, we have developed this calendar where participants can record harvest information throughout the year.

Near the back of the calendar is a page that shows the animal and fish species that are included in the study. Please write down the species, number, sex, and location of animals or fish that you have harvested on each date on the calendar. When writing down the location, please use the XY coordinate system provided on the nine maps at the back of the calendar.

For example, if you harvested a male caribou on January 16th on Big Hips Island you would write down "1 male caribou, AF19" in the January 16th square of the calendar.

You will also be visited or contacted by the hunter harvest coordinator occasionally throughout the year. The coordinator's job will be much easier if you write down your harvest information in the calendar as soon as possible.

Please return the calendar to the Agnico Eagle office in Baker Lake at the end of the year or give the calendar to the coordinator when he visits in January. Although each participant will receive a gift expressing our thanks, a draw will also be held in January for a number of high quality prizes.

If you have any questions., please contact the Baker Lake Harvest Study Consultant, Dylan White, at 1-266-500-4202 or dsgwhite@gmail.com. You can also contact an HTO member in the community or email Martin Gebauer at martin@gebauerassociates.com.

ᖃᓄᖅ ᐅᐸᓗᖅᓯᐅᑦ ᐊᑐᒐᐅᓯᖅᐸ

ᐊᒃᓃᑯ ᐋᒍ ᐅᔭᕋᒃᑕᕆᐊᑦ, ᐱᓕᕆᖃᑎᖃᕐᓗᑎᒃ ᖃᒪᓂʼᑐᐊᕐᒥᑦ ᐆᒪᔪᓕᕆᔨᐊᓛᒃᑯᓐᓂᑦ, ᑐᑭᓯᐊᓕᕈᒪᔪᑦ ᒪᖅᑲᐃᓐᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖃᑦᑕᖅᑐᑦ ᖃᒪᓂᑦᑐᐊᕐᒥᐅᓄᑦ. ᐱᓗᐊᖅᑐᒥᑦ, ᖃᐅᔨᕙᓚᔭᕗᑦ ᖃᓄᖅ ᐊᐳᖅᑎᓐᓈᖅᑐᖅ ᐊᒻᒪᓗ Whale Tail ᒎᓗᒥᒃ ᐱᓕᕆᐊᖅ, ᐃᓂᐅᔫᒥᑦᑐᖅ ᐅᐊᖕᓇᖓᓂᑦ ᖃᒪᓂʼᑐᐊᑉ, ᐊᓯᐊᙳᖅᑎᑦᑎᓇᔭᕆᖓᓪᓚᑦ ᐱᖅᑯᓯᕆᔭᐅᔪᒃᑯᑦ ᒪᖅᑲᐃᓐᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᖃᑦᑕᖅᑐᓂᒃ. ᐱᖅᑯᓯᕆᔭᐅᔪᒃᑯᑦ ᒪᖅᑲᐃᖃᑦᑕᕐᓂᖅ ᐊᒻᒪᓗ ᐃᖃᓪᓕᐊᖃᑦᑕᕐᓂᐅᔪᑦ ᐱᐅᖏᑦᑐᒥᒃ ᐊᒃᑐᖅᑕᐅᕐᑯᓇᒥᑦ, ᐋᖅᑭᒃᓯᓚᐅᖅᑐᒍᑦ ᐅᐸᓗᖅᓯᐅᑎᒥᒃ ᐃᓚᐅᖃᑕᐅᔪᑦ ᑎᑎᕋᐃᖃᑦᑕᕆᐊᕆᔪᖕᓇᕐᓂᐊᖅᑕᖕᒐᓂᒃ ᒪᖅᑲᐃᑕᖕᒥᓐᓄᑦ ᑐᑭᓯᐅᒪᔾᔪᑏᑦ ᒥᒃᓵᓐᖓᔪᓂᒃ ᐅᑭᐅᓗᒃᑖᕐᒥᑦ.

ᖃᓂᒐᖕᓂᑦ ᑐᓄᐊᑕ ᐅᐸᓗᖅᓯᐅᑎᐅᑉ ᒪᒃᐱᖅᑐᒐᖅ ᑕᑯᔅᓴᐅᑎᑦᑎᔪᖅ ᓂᕐᔪᑎᓂᒃ ᐊᒻᒪᓗ ᐃᖃᓗᖕᓂᒃ ᐃᓚᐅᖅᑕᐅᔪᓂᒃ ᖃᐅᔨᓴᐃᓂᕐᒥᑦ. ᑎᑎᕋᖅᑕᕐᓂᐊᖅᐸᑎᑦ ᓂᕐᔪᑏᑦ ᐃᖃᓗᐃᓪᓗ, ᖃᔅᓯᐅᓂᖏᑦ, ᐊᖑᑎᓗᐃᑦ ᐊᕐᓇᓪᓗᐃᑦ, ᐊᒻᒪᓗ ᓇᓂ ᐱᑕᖅᑕᐅᓚᐅᕐᒪᖔᑕ ᓂᕐᔪᑏᑦ ᐃᖃᓗᐃᓪᓗ ᐊᑐᓂ ᐅᐸᓗᖅᓯᐅᑎᒥᑦᐅᐸᓗᖕᒋᓐᓄᑦ. ᑎᑎᕋᕈᓂ ᐃᓂᐅᔪᖅ, ᐊᑐᕐᓂᐊᖅᐸᐃᑦ XY-ᒧᑦ ᐋᓴᐅᑎᐅᔪᑦ ᑕᐃᒪᐅᔪᑦ 9-ᓂᑦ ᓄᓇᙳᐊᕐᓂᑦ ᑐᓄᐊᓃᑦᑐᑦ ᐅᐸᓗᖅᓯᐅᑎᐅᑉ.

ᐆᒃᑑᑎᒋᓗᒍ, ᑐᒃᑐᓚᐅᕈᕕᑦ ᐊᖑᓯᖅᑐᕐᒥᑦ ᔭᓄᐊᕆ 16-ᒥᑦ (Big Hips) ᕿᑭᖅᑕᕐᒥᑦ ᑎᑎᕋᕐᓂᐊᖅᑕᐃᑦ "ᐊᑕᐅᓯᖅ ᐊᖑᓯᖅᑐᖅ ᑐᒃᑐ, AF19" ᔭᓄᐊᕆ 16 ᑭᐸᖕᓇᒃᑐᒥᑦ ᐅᐸᓗᖅᓯᐅᑎᒥᑦ.

ᐅᓪᓚᖅᑕᐅᓂᐊᖅᑐᑎᑦᑕᐅᖅ ᐅᖃᓘᑎᓐᓃᑦ ᖃᐅᔨᒋᐊᕐᕕᐅᖅᑕᖅᑐᑎᑦ ᖃᑯᒃᑯᑦ ᐅᑭᐅᐸ ᐃᓱᐊᓂᑦ ᒪᖅᑲᐃᑏᑦ ᒥᒃᓵᓄᑦ ᑐᑭᒧᐊᒃᑎᑦᑎᔪᒧᑦ. ᑐᑭᒧᐊᒃᑎᑦᑎᔨᐅᑉ ᐱᓕᕆᐊᖓ ᐊᔪᖅᓇᙱᓂᖅᓴᐅᓂᐊᖅᑐᖅ ᐅᐸᓗᖅᓯᐅᑎᒧᑦ ᑎᑎᕋᖃᐅᑎᒋᒃᑕᕈᒃᑎᒃ ᒪᖅᑲᐃᓚᐅᖅᑕᑎᑦ.

ᐅᑎᖅᑎᓐᓂᐊᖅᐸᐃᑦ ᐅᐸᓗᖅᓯᐅᑎ ᐊᒃᓃᑯᒃᑯᑦ ᑎᑎᕋᕐᕕᖓᓐᓄᑦ ᖃᒪᓂʼᑐᐊᕐᒥᑦ ᐃᓱᐊᓂᑦ ᐅᑭᐅᐸ ᐅᖃᓘᑎᓐᓃᑦ ᑐᓂᓗᒍ ᑐᑭᒧᐊᒃᑎᑦᑎᔨᒧᑦ ᐅᓪᓚᖅᐸᑎᑦ ᔭᓄᐊᕆᒥᑦ. ᐊᑐᓂ ᐃᓚᐅᖅᑕᐅᔪᑦ ᑐᓂᔭᐅᓂᐊᕋᓗᐊᖅᑐᓂᒃ ᑐᓂᕈᓯᐊᕐᒥᒃ ᒪᑦᓇᖅᕕᐅᓂᖏᓐᓄᑦ, ᐊᒧᓯᓂᐊᖅᑐᑦᑕᐅᖅ ᐱᑖᖅᑕᐅᔪᒃᓴᓂᑦ ᖃᐅᓯᐊᔪᖕᓂᑦ ᐱᑦᑎᑎᑦᑎᐊᕐᕙᓂᒃ ᔭᓄᐊᕆᒥᑦ.

ᐊᐱᖅᑯᑎᒃᓴᖃᕈᕕᑦ, ᖃᐅᔨᒋᐊᕐᕕᒋᓗᒋᑦ ᑲᒥᖅᓱᓂᕐᒥᑦ ᒪᖅᑲᐃᑕᐅᔪᓂᒃ ᖃᐅᔨᓴᐃᓂᕐᒧᑦ ᖃᐅᔨᒋᐊᖅᑕᕐᕕᒃ, ᑎᓚᓐ ᐅᐊᐃᑦ ᐅᕙᓂ 1-266-500-4202 ᐅᖄᓘᑏᑦ ᑎᑎᕋᕐᓗᑎᑦ ᐅᕙᖓ dsgwhite@gmail.com. ᖃᐅᔨᒋᐊᕐᕕᒋᔪᓐᓇᕐᒥᔭᑎᑦ ᑲᒥᖅᓱᓂᕐᒥᑦ ᐆᒪᔪᓕᕆᔨᐊᓛᒃᑯᑦ ᐅᖄᓘᑏᑦ ᖃᓇᑕᐅᔭᒃᑯᑦ ᑎᑎᕋᕕᒋᓗᒍ ᒫᑎᓐ ᑭᐸᐅ ᐅᕙᖓ martin@gebauerassociates.com..

Produced By:

AGNICO EAGLE

and

APPENDIX G

Arctic Raptors Report

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Background

The purpose of the raptor monitoring program from 2015 – 2019 focused on searching for nesting sites located near to, and far from proposed or existing infrastructure. Monitoring of raptors is outlined in the Agnico Eagle Meadowbank Division Terrestrial Ecosystem Management Plan (TEMP; Agnico Eagle Mine 2019). The TEMP outlines requirements for avoiding and managing disturbance to nesting raptors, as follows:

- Develop a nest-specific response plan for identified raptor nests within areas of concern to ensure that nesting success is not affected by development activities
- Follow GN-DoE guidelines for avoiding disturbance to raptor nests
- Active nest monitoring

In addition, the TEMP also outlines the general monitoring approach, as follows:

- document and map raptor nesting sites (see Project Certificate No. 008 Condition 33)
- evaluate the success of mitigation to prevent disturbance to raptors or raptor nests
- estimate project-related disturbance effects.
- develop nesting site-specific management plans for nests within 1.5km of project infrastructure, including minimum "no disturbance" buffers.
- In the event of deterrence of removal of a nest, Agnico must contact the Government of Nunavut (GN) and secure the required permits (see Project Certificate No. 008 Condition 36).

The GN provided additional feedback from information provided in 2018 Annual Report, as follows:

- the current monitoring does not have the power to detect and mitigate Project-related effects on raptor nesting success.
- the study design does support analysis that would allow detection of project-related nest failures (e.g., by examining nest success as a function of intensity of project-related disturbance).

Species Descriptions

Peregrine Falcon (*Falco peregrinus tundrius*)

The Arctic peregrine falcon (Figure 1) is medium- to large-sized falcon. It has a dark hood and face with distinct dark malar stripe, cream to white throat, slate-grey back, barred belly, legs, and tail. Long pointed wings, stocky body. Plumage of immature birds brown rather than grey, and the breast is streaked rather than barred. In adults, the cere and orbital ring are yellow, and bluish in immature birds. Compared with gyrfalcons, the peregrine is smaller and less stocky. In flight, the wings of peregrines appear narrower and more pointed. In peregrine falcons, wing tips extend to bottom of the tail when perched, while in gyrfalcons, wing tips extend two-thirds down the length of tail.

F. p. tundrius breeds mainly north of the treeline from Alaska east throughout northern Canada to Greenland. It breeds throughout the taiga and tundra wherever suitable nesting habitat and sufficient prey are present. In Nunavut, peregrines appear to have their highest densities in the Kivalliq and Kitikmeot regions. Highest breeding density on record is on the western shores of Hudson Bay in the Kivalliq Region.

Figure 1 Peregrine Falcon (male)

F. p. tundrius is a long-distance migrant, wintering mainly throughout South and Central America, but also in southern United States and Mexico. Northern-breeding American and Arctic peregrines are highly migratory (Yates et al. 1988, Schmutz et al. 1991, Fuller et al. 1998), and although fall migration occurs over a broad geographic range (Fuller et al. 1998), Yates et al. (1988) indicated that "separate and distinct autumn migratory populations pass through the east and Gulf coasts" of the United States.

Peregrine falcons usually nests on cliffs and rocky outcrops, but also nest on hilltops, river canyons, rock screes, and on occasion directly on the ground (Court et al. 1988, Ratcliffe 1993). They prefer nesting in locations close to water in south-facing, rugged terrain. Hunting habitat includes rugged coastline areas and rolling tundra that consists of raised beaches, dry tundra, sedge meadows, wetlands, and lakes that are inhabited by a diversity of breeding songbirds and shorebirds.

Peregrine Falcons do not build a nest but make a depression (called a scrape) in the substrate on a cliff ledge. Scrapes are usually approximately 20 cm in diameter and 4 cm deep. Females usually do the majority of incubation and brooding of small young. Males provision incubating females and provide most of the prey when nestlings are small. Thereafter, females do most of the feeding, beginning to hunt after young are large enough to thermoregulate on their own. Clutch size is typically 3 or 4 eggs in Nunavut. In Rankin Inlet and Igloolik, the median incubation period of the first egg was 36 days and decreased 1 day for each additional egg. The incubation period of the 4th egg (33 days) was similar to what has been reported elsewhere (Burnham 1983).

The Arctic peregrine falcon is a generalist predator with a diverse diet that includes passerines, shorebirds, ducks , gulls, terns, jaegers, black guillemots, and, when available, collared lemmings, brown lemmings,

and Arctic ground squirrels. Bradley and Oliphant (1991) indicated that, around Rankin Inlet, small birds (64% of prey items) represented the greatest portion of prey items, followed by microtine rodents (25%), large birds (8%), and Arctic ground squirrels (4%). The most important prey measured by percent biomass were large birds (43%), followed by small birds (25%), microtine rodents (18%), and Arctic ground squirrels (15%).

In Nunavut, the earliest documented arrival for Peregrine Falcons is 10 May at a known breeding site near Rankin Inlet. Although arrival timing varies with spring conditions, most sites are occupied during the 3rd week of May. Median laying date in Rankin Inlet (9 June) is typically earlier than Igloolik (15 June) and northern Baffin Island (16 June). Median date of hatching ranges from 14 July at Rankin Inlet to 18 July on northern Baffin Island and 20 July at Igloolik (Jaffre et al. 2015). Birds depart the breeding grounds from mid-September through early October, arriving on the wintering grounds throughout Central and South America in November.

Gyrfalcon (*Falco rusticolus*)

The gyrfalcon (Figure 2) is large with pointed wings, but more rounded and broader than the wings of other falcon species. The tail is relatively long. When perched, wings extend 2/3 down the tail. The body is thick and powerful, particularly in females. Adults have yellow ceres, eye-rings and legs. As in all falcons, the eyes appear black. Three main color morphs occur: black, grey and white. White adults have almost pure white breasts and bellies, with dark wingtips (dipped-in-ink appearance). Grey adults have slate-colored back, with white underparts mottled with gray arrowhead-shaped markings. Dark adults are dark grey overall above and dark-streaked breasts and belly. There is extreme reverse sex dimorphism, with males being approximately 2/3 the size of females (Ferguson-Lees et al. 2001).

Gyrfalcons distribution extends throughout the circumpolar Arctic. Most of the breeding range occurs north of 60°N, but breeding pairs are known to exist as far south as 55°N, mainly along seacoasts in eastern Canada. Many adults remain within the breeding range throughout the year, but some disperse southwards in winter, small numbers reaching the norther United States (Cade 1982, Poole 1987). Immature birds are much more likely to winter to south of breeding range, and females are thought to disperse more widely, with many males remaining relatively close to breeding territories throughout the year.

Ptarmigan are often cited as the most important prey species by biomass, but Arctic ground squirrel and Arctic hare are also important, as well as small mammals (mice and voles) and other birds (ducks, sparrows, buntings). In central Nunavut, Poole and Boag (1988) identified eleven species of birds and five species of mammals among the prey. Birds accounted for three quarters of the diet, and adult rock ptarmigan were the most common. Arctic ground squirrel and arctic hare made up the bulk of mammalian prey.

Males occupy and defend nesting territories as early as the end of January, with females arriving in mid-March. In Nunavut, laying typically begin in the first week of May with most pairs laying by the end of the second week in May. Nestlings typically hatch in mid-June, but hatching can occur throughout June. Nestlings fledge in late July or early August after 7 weeks in the nest. In Nunavut, gyrfalcon usually nest on cliff ledges, ideally beneath sheltering overhang; sometimes nests in trees or on man-made structures. Nests are generally on rock ledges or abandoned rough-legged hawk or common raven nests. Use of alternate nest sites is not uncommon. Pairs do not necessarily attempt breeding every year, depending on food supply. Typical clutch size is 3-4 eggs (Booms et al. 2008) that are incubated for 34-36 days mostly by the female (ca. 80%). The North American population including Nunavut is considered to be stable

(Clum and Cade 1994, Kirk and Hyslop 1998). Although low spring temperatures are associated with later arrival at nesting territories in Nunavut (Poole and Bromley 1988), there was no effect on laying dates. However, (Poole and Bromley 1988) indicated that increased spring precipitation (snow) reduced reproductive success.

Figure 2. Gyrfalcon (female)

Rough-legged Hawk (*Buteo lagopus)*

The rough-legged hawk (Figure 3) is a medium-large bird of prey, with a small beak, predominantly brown in colour and often mottled. Plumage is highly variable with recognized light and dark morphs. Extensive field experience is required to distinguish between males and females, and between adults and juveniles based on plumage alone. A broad chest band is evident in most plumage variations, and in flight, a dark carpal patch is characteristic in light morph individuals. One or more dark terminal bands appear on the tail. The wing tips are long enough to reach or extend past the tail when the animal is perched. Legs are feathered to feet (Ferguson-Lees et al. 2005).

Widespread throughout North America, breeding from the Aleutian Islands, the interior of Alaska, Yukon, northern Mackenzie, and across Nunavut to northern Labrador and Newfoundland and south to Manitoba and southeastern Quebec. In Nunavut, rough-legged hawks are present over most of the territory except for islands without lemmings (Bechard and Swem 2002).

Regularly hovers, or “kites” while facing into the wind scanning for prey. Soars with wings raised in a slight dihedral (V-shape). It is a diurnal raptor that still-hunts from prominent perching structure on both breeding and wintering grounds. Prey is captured on the ground. Courtship involves soaring and calling,

with the male engaged in a flight display of repeated undulating stoops rising upward to mid-air stall. It is gregarious on migration, often travelling in flocks, but small groups or individuals are not uncommon.

Breeding pairs prefer rugged terrain areas with steeper slopes in areas associated with vegetation, and were most likely to nest in large, productive valleys surrounded by high-elevation plateaus (Galipeau et al. 2016). It is widely distributed in winter, usually found in open habitat such as prairies, plains, coastal marshes, agricultural fields, and airports (Johnsgard and Johnsgard 1990). More common in wintering areas with short growing seasons and low precipitation, with highest densities in the northern United States, Great Basin area, and the western shortgrass prairies (Bock and Lepthien 1976, Bock et al. 1977).

The rough-legged hawk is a small mammal specialist; thus, its breeding activity is generally associated with local abundance of ground squirrels, voles, or lemmings (Hanski 1991, Potapov 1997). It will prey on birds when small mammals are scarce, particularly juvenile passerines and shorebirds, and will resort to consuming carrion (Watson 1986). Usually reproductively mature at 2 years of age. Stick-nests are built soon after arrival on territory, typically on cliffs, bluffs, or on the ground. Clutch size varies (1-7 eggs), depending on food availability, but 3-5 eggs are usual and laid in May. Incubation 31-33 days, provided almost entirely by the female. Nestling period is 35-40 days, and fledglings remain dependent on adults for another 2 weeks. The male provisions the young and the female feeds the young. Pairs show nest site fidelity, and in locations where ground squirrels are entirely absent, they may forgo breeding or have small broods when lemmings are low (Bechard and Swem 2002). Bechard and Swem (2002) indicated that egg-laying date was associated with spring temperatures and snow-free ledges, but Potapov (1997) reported no effect of snow melting date or spring/summer temperatures on number of nesting pairs.

Figure 3. Rough-legged Hawk (male)

Methods

Field Surveys

Structured surveys were conducted from 2015 – 2017, 2019 and 2021-2022 (Table 1). The focus of these surveys was to search known nesting sites for the presence of cliff-nesting raptors. In addition to the structured surveys, favorable habitat was searched opportunistically when ferrying between known sites, camps, or other mine infrastructure and when raptors or signs of site use (e.g., whitewash, orange-colored lichen, and unused nests) were observed. Sites were considered occupied if one or more adults displayed territorial or reproductive behavior (e.g., vocalization and/or flight behavior associated with defense of breeding territory or presence of nest building, nest, or eggs). Locations with partially built or unused nests without detection of breeding aged adults were noted as such (e.g., old stick nest; no birds detected). Raptor monitoring in 2022 involved two helicopter surveys (28 May – 03 June, 12 – 17 August), and ground - monitoring of potential nesting habitat (natural cliffs, quarries and borrow pits) along the Whale Tail Haul Road (WTHR; Meadowbank to Whale Tail) and All Weather Access Road (AWAR; Baker Lake to Meadowbank).

Table 1. Survey effort from 2015-2022 for raptors breeding in the vicinity of the Meadowbank/Whale Tail complex.

Year	2015		2016		2017		2018		2019		2020		2021		2022	
Survey	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
Start	28/05	—	18/05	21/07	28/05	—	—	—	13/06	—	—	—	23/05	04/08	28/05	12/08
End	30/05	—	20/05	23/07	30/05	—	—	—	15/06	—	—	—	30/05	08/08	03/06	17/08
Hours	12	—	10	10	12	—	—	—	10	—	—	—	12	12	11.7	12.4

Mapping

Shapefiles for the AWAR, Haul Road, and project footprints were read into R using the `readOGR` function in the `rddal` package and converted to a data frame for `ggplot2` using the `fortify` function. The spatial extent for the mapping exercise was set using the `get_map` function in the `ggmap` package. Maps portraying species-specific nesting sites were plotted using `ggmap`.

Data Analysis

Distance to disturbance

Spatial objects (lines and polygons) describing the project footprint were acquired from Agnico Eagle. Euclidean distances from nesting sites to the nearest spatial object were calculated in R (R Development Core Team 2017) using the `sp, rgeos,` and `geosphere` packages.

Occupancy

Although estimation of nesting site occupancy can serve as a metric of population status (MacKenzie et al. 2002, 2003), detection of nesting pairs is imperfect, and estimating the proportion of occupied sites without accounting for detection error can lead to underestimation of true occupancy (Kéry and Schmidt 2008). Occupancy modeling estimates parameters that influence occupancy, and simultaneously accounts for imperfect detection (Marsh and Trenham 2008). In any given year, the status of a nesting site is limited to one of only two outcomes: occupied or not occupied. Occupancy modelling estimates the following parameters:

1. initial colonization – the probability that a nesting site is occupied in the first survey year (ψ),
2. colonization – the probability that an unoccupied site becomes occupied between years (ε),
3. extinction – the probability that occupied site becomes unoccupied between years (γ); and,
4. detection – the probability that PEFA are detected given that the nesting site is occupied (*p*).

Nesting site survival is estimated as the reciprocal of extinction (i.e., the probability an occupied site remains occupied between years; 1-γ). In addition, environmental covariates can be added to an occupancy model to test whether they influence the above parameters using a logit link function. Multi-year occupancy was calculated in R (R Development Core Team 2019) using the 'unmarked' package. When appropriate, data were standardized (e.g., distance to disturbance was standardized by subtracting the mean from each distance value and dividing by the standard deviation), and then formatted specifically for 'unmarked' using the *unmarkedMultFrame* function.

Occupancy among years was analyzed separately for peregrine falcons, rough-legged hawks, and gyrfalcons. To do so, the total number of nesting sites was filtered to include only those nesting sites that were occupied at least once between 2015 and 2022 for each species. Model fitting of candidate models (Table 2) was performed using the *colext* function. Akaike Information Criterion (AIC) was used for model selection.

Three candidate models were selected *a priori* to estimate the effect anthropogenic disturbance and time (Table 2). The aim of this analysis was two-fold: 1) to estimate the proportion of occupied nesting sites annually, and; 2) to estimate the trend in nesting site occupancy from 2015 to 2022. Trend in occupancy was estimated using annual occupancy probabilities to calculate average rate of change (λ) at the population level (MacKenzie et al. 2003) where a value <1 indicates population decline and >1 indicates an increase. Initial occupancy and detection probability were set to constant (i.e., 1) time varying (i.e., year), respectively, for all models. Model structure for extinction and colonization varied according to the test for effects (see Table 2).

Table 2. Candidate models

Model structure	Model #	Tests for effect of:
ψ(1) + ε(1) + γ(1) + *p*(year)	m0	Null (contrast to m1 and m2)
ψ(1) + ε(d2d) + γ(d2d) + *p*(year)	m1	Distance to disturbance (project infrastructure)
ψ(1) + ε(year) + γ(year) + *p*(year)	m2	Time (captures effect of missing covariates)

Reproductive success

Over the course of the eight-year period, three surveys were conducted during brood rearing (July 2016 August 2019, and August 2022). For this report, estimates of reproductive success are reported as the number of young hatched from a single nesting attempt by a pair of birds, regardless of age at the time they were observed. Because nestling age varied considerably between years and among sites, measures of annual productivity *per se* are expected to be biased high. All nesting sites were assumed to be contained within a unique nesting territory (i.e., no nesting territories were occupied by more than one pair of birds, regardless of the potential for alternative nesting sites within nesting territories).

Results

Mapping

Across eight different survey years (see Table 1), 144 locations considered to be typical of raptor nesting habitat were surveyed at least once from 2015 – 2017, 2019, and 2021 - 2022. Of the 144 locations surveyed (Figure 1), nesting raptors have been detected at 87 nesting sites (Table 10). Peregrine falcons have been documented at 71 nesting sites, rough-legged hawks at 30 nesting sites and gyrfalcons have been documented at ten nesting sites.

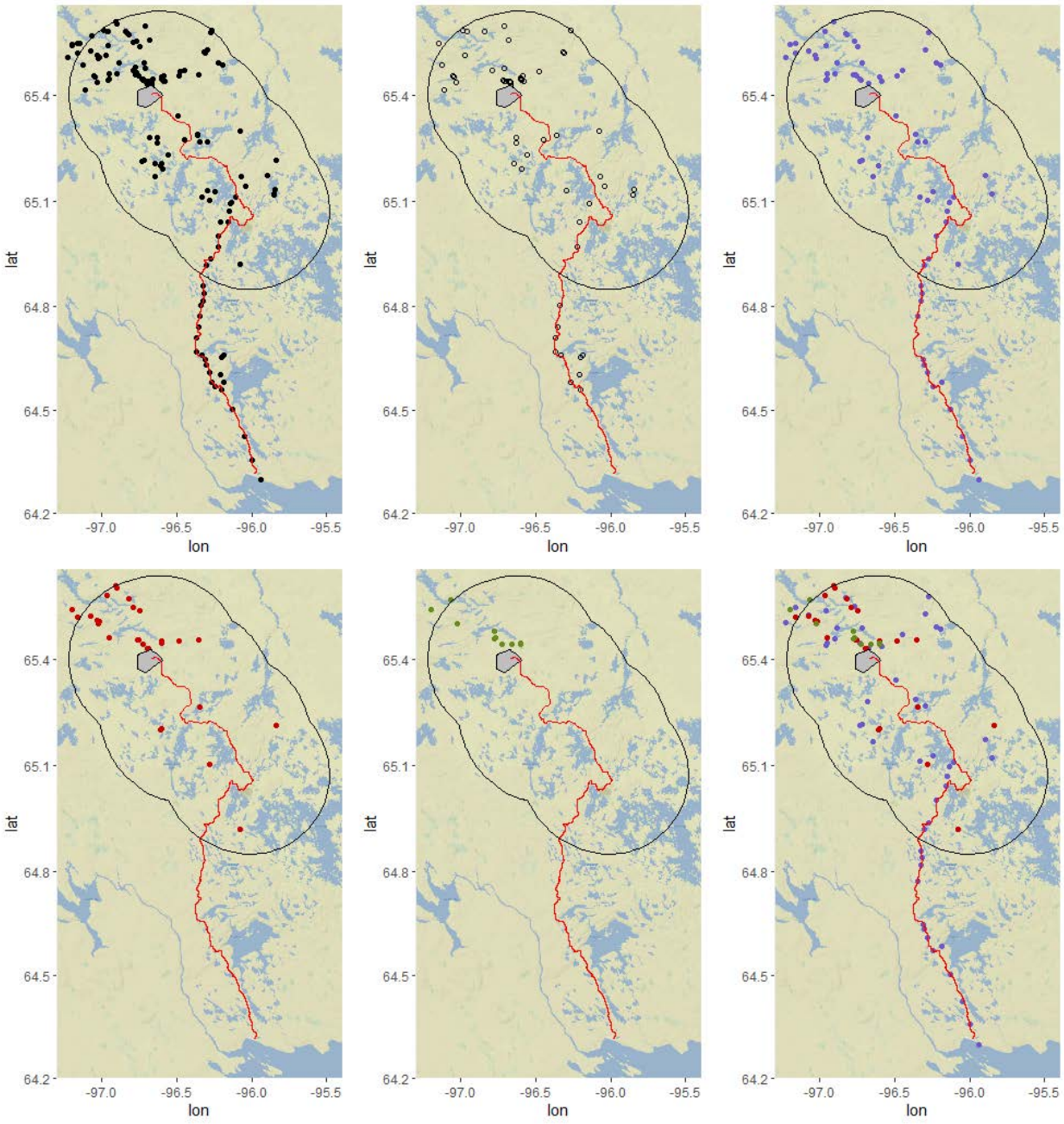

Figure 4. All cliffs surveyed (n=144; top L), cliffs with no record of occupancy (n= 57; top C), PEFA nesting sites (n = 71; top R), RLHA nesting sites (n=30; bottom L), GYRF nesting sites (n=10; bottom C), and all recorded nesting sites combined (bottom R) for the period 2015 – 2022 in the vicinity of the Meadowbank/Whale Tail complex

Distance to Disturbance

Mean distance from known occupied nesting sites to project infrastructure was 8.99 km (SD=7.87 km, range = 0 – 24.68 km). Eighteen nesting sites fell within 1.5 km of the AWAR Road, Haul Road, or Whale Tail Mine footprint and are considered candidates for development of a site-specific management plans. Seventeen of the 18 nesting sites within 1.5 km of the footprint have been occupied by peregrine falcons, and one nesting site has been occupied by rough-legged hawks. Fourteen of the 17 peregrine falcon nesting sites were in rock quarries excavated for road building and maintenance, and three were located on natural cliffs. The single rough-legged hawk nesting site located with 1.5 km of the project footprint was located on a natural cliff. There were no gyrfalcon nesting sites detected within 1.5 km of the project footprint. Fifteen nesting sites were within the 600m limit (500m baseline setback, plus additional 100m setback during the breeding season) identified by the Government of British Columbia (2013) for species with moderate ability to co-exist with human activity.

Occupancy

Peregrine Falcons

The top occupancy model included colonization and extinction effects of distance to disturbance, and a year effect for detection. However, the delta AIC for the second-ranked null model was 1.82, strongly suggesting that the effect size of distance to disturbance was not important (Table 3). Using the null model, trend in occupancy (Figure 5) was $\lambda = 0.98$ (SE=0.04). The minimum and maximum number of nesting sites sampled in any year was 15 (2018) and 71 (2022), respectively (Table 5). The minimum and maximum number of breeding pairs detected was 8 (2020) and 36 (2022), respectively (Table 5).

Table 3. Model selection based on AIC score for peregrine falcons.

Model structure	Model #	Parameters	AIC score	delta AIC	AICwt	Cumltvwt
-.d2d.d2d.year	m1	13	780.05	0	0.713	0.71
-.-.-.year	m0	11	781.87	1.82	0.287	1
-.year.year.year	m2	23	794.72	14,67	5E-04	1

Table 4. Parameter estimates (null model; log odds scale) for peregrine falcon initial occupancy (psi) colonization (gamma) and extinction (epsilon), and a year effect for detection (rho).

	psi(Int)	col(Int)	ext(Int)	p(Int)	p(2016)	p(2017)	p(2018)	p(2019)	p(2020)	p(2021)	p(2022)
estimate	0.80	-0.87	-0.82	0.58	1.07	8.96	1.39	1.65	2.01	-0.38	0.21
SE	0.55	0.20	0.20	0.58	0.68	1.13	0.98	1.24	1.24	0.70	0.66

Table 5. Count of PEFA nesting sites sampled, detected, colonized, extinct, static, and common from 2015 - 2022 for birds breeding in the vicinity of the Meadowbank/Whale Tail complex.

year	sampled	detected	colonized	extinct	static	common
2015	55	29	NA	NA	NA	NA
2016	58	32	8	9	34	51
2017	66	31	4	9	45	58
2018	15	9	2	3	10	15
2019	66	28	1	5	9	15
2020	16	8	4	2	10	16
2021	69	25	3	2	11	16
2022	71	36	19	10	40	69

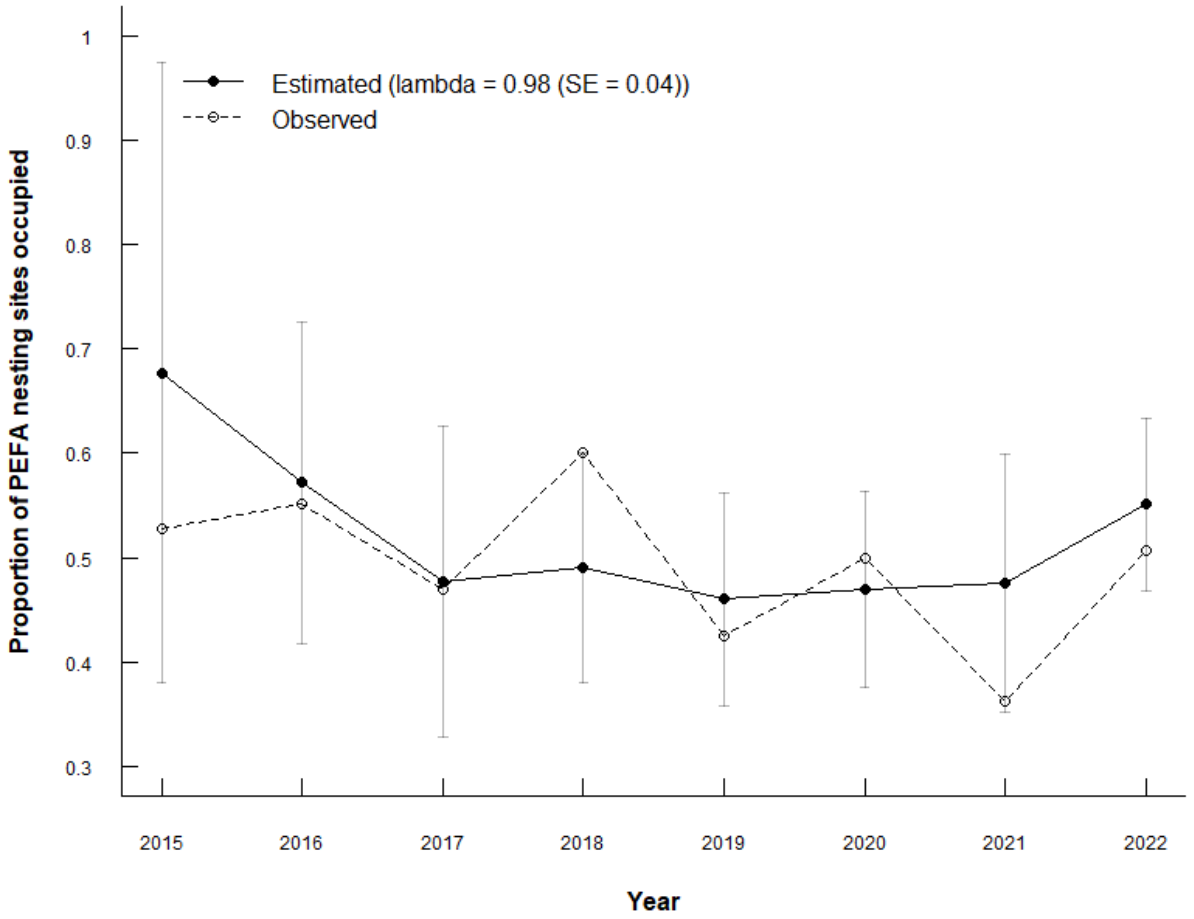

Figure 5. Proportion of PEFA nesting sites occupied from 2015 – 2022 in the vicinity of the Meadowbank/Whale Tail complex. The proportion observed (open circles with dashed lines) are point estimates, and do not account for detection error. The proportion estimated (closed circles with solid lines) accounts for detection error and includes standard error bars. Lambda = 0.98±0.04

Rough-legged Hawks

The null model was ranked first among the candidates for rough-legged hawk occupancy (Table 6). Trend in occupancy (Figure 6) calculated as average rate of change at the population level was λ = 1.08 (SE=0.17), where a value <1 indicates population decline and >1 indicates an increase (MacKenzie et al. 2003). The minimum and maximum number of nesting site sampled in any year was 0 (2018 and 2020) and 29 (2022), respectively (Table 8). The minimum and maximum number of breeding pairs detected was 0 (2018 and 2020) and 16 (2017), respectively (Table 8).

Table 6. Model selection based on AIC score for rough-legged hawks.

Model structure	Model #	Parameters	AIC score	delta AIC	AICwt	Cumltvwt
-.-.-.year	m0	11	271.54	0	0.760	0.76
-.d2d.d2d.year	m1	13	273.83	2.29	0.240	1.00
-.year.year.year	m2	23	290.18	18.64	0.000	1.00

Table 7. Parameter estimates (null model; log odds scale) for rough-legged hawk initial occupancy (psi) colonization (gamma) and extinction (epsilon), and a year effect for detection (rho).

	psi(Int)	col(Int)	ext(Int)	p(Int)	p(2016)	p(2017)	p(2018)	p(2019)	p(2020)	p(2021)	p(2022)
estimate	-1.13	-0.10	-0.66	2.10	-1.30	6.73	0.00	-2.33	0.00	-2.43	-3.03
SE	2.21	0.40	0.45	15.00	14.93	73.54	92.65	15.08	92.65	15.07	15.06

Table 8. Count of rough-legged hawk nesting sites sampled, detected, colonized, extinct, static, and common from 2015 - 2022 for birds breeding in the vicinity of the Meadowbank/Whale Tail complex.

year	sampled	detected	colonized	extinct	static	common
2015	19	4	NA	NA	NA	NA
2016	25	12	5	1	13	19
2017	27	16	6	4	15	25
2018	0	0	0	0	0	0
2019	27	7	0	0	0	0
2020	0	0	0	0	0	0
2021	28	10	0	0	0	0
2022	29	7	3	7	18	28

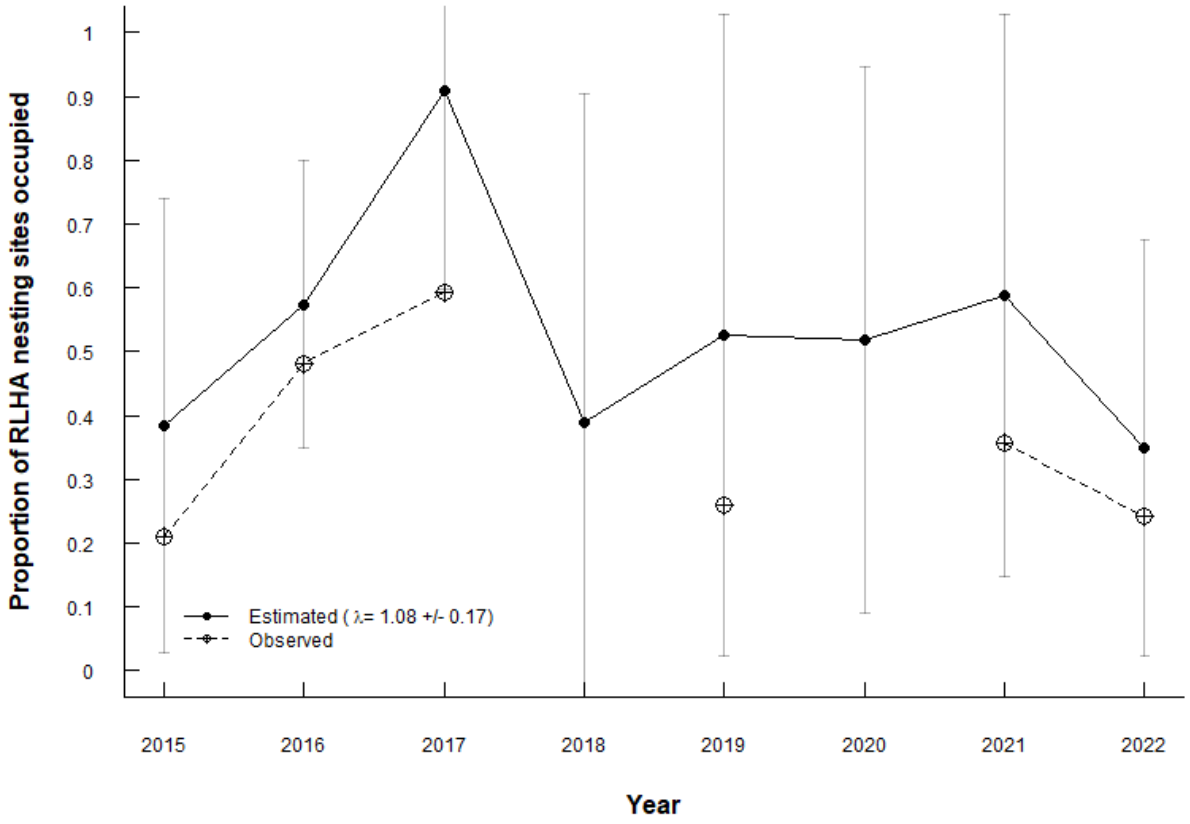

Figure 6. Proportion of RLHA nesting sites occupied from 2015 – 2022 in the vicinity of the Meadowbank/Whale Tail complex. The proportion observed (open circles with dashed lines) are point estimates without error bars, and do not account for detection error. The proportion estimated (closed circles with solid lines) accounts for detection error and includes standard error bars. Lambda = 1.08±0.17

Gyrfalcons

The null model was ranked first among the candidates for gyrfalcon occupancy (Table 9). Trend in occupancy (Figure 7) calculated as average rate of change at the population level was λ 1.12 (SE=0.21), where a value <1 indicates population decline and >1 indicates an increase (MacKenzie et al. 2003). The minimum and maximum number of nesting site sampled in any year was 0 (2018 and 2020) and 10 (2022), respectively (Table 11). The minimum and maximum number of breeding pairs detected was 0 (2018 and 2020) and 5 (2022), respectively (Table 11).

Table 9. Model selection based on AIC score for gyrfalcons.

Model structure	Model #	Parameters	AIC score	delta AIC	AICwt	Cumltvwt
-.-.-.year	m0	11	108.09	0.00	0.77	0.77
-.d2d.d2d.year	m1	13	110.56	2.47	0.23	1.00
-.year.year.year	m2	23	125.24	17.15	0.00	1.00

Table 10. Parameter estimates (null model; log odds scale) for gyrfalcon initial occupancy (psi) colonization (gamma) and extinction (epsilon), and a year effect for detection (rho).

	psi(Int)	col(Int)	ext(Int)	p(Int)	p(2016)	p(2017)	p(2018)	p(2019)	p(2020)	p2021)	p(2022)
estimate	-1.13	-0.10	-0.66	2.10	-1.30	6.73	0.00	-2.33	0.00	-2.43	-3.03
SE	2.21	0.40	0.45	15.00	14.93	73.54	92.65	15.08	92.65	15.07	15.06

Table 11. Count of gyrfalcon nesting sites sampled, detected, colonized, extinct, static, and common from 2015 - 2022 for birds breeding in the vicinity of the Meadowbank/Whale Tail complex.

year	sampled	detected	colonized	extinct	static	common
2015	7	4	NA	NA	NA	NA
2016	8	2	1	3	3	7
2017	7	2	1	1	5	7
2018	0	0	0	0	0	0
2019	8	2	0	0	0	0
2020	0	0	0	0	0	0
2021	9	5	0	0	0	0
2022	10	4	1	3	5	9

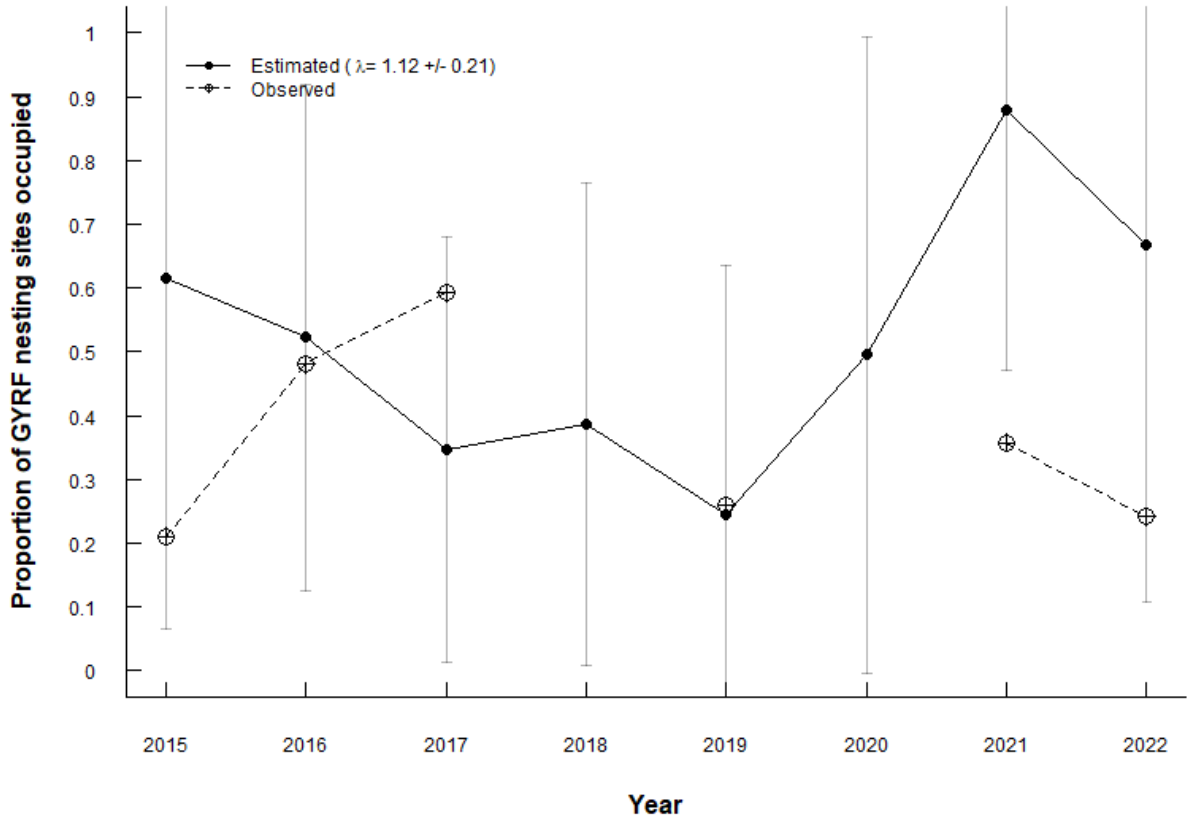

Figure 7. Proportion of gyrfalcon nesting sites occupied from 2015 – 2022 in the vicinity of the Meadowbank/Whale Tail complex. The proportion observed (open circles with dashed lines) are point estimates without error bars, and do not account for detection error. The proportion estimated (closed circles with solid lines) accounts for detection error and includes standard error bars. Lambda = 1.12±0.21

Reproductive Success

Table 12. Estimates of reproductive success for peregrine falcons, rough-legged hawks, and gyrfalcons detected in 2016 and 2021 - 2022 in the vicinity of the Meadowbank/Whale Tail complex. Values are reported as the number of young hatched from a single nesting attempt by a pair of birds, regardless of nestling age at the time they were observed. Because nestling age varied considerably between years and among sites, measures of annual productivity per se are expected to be biased high.

	Peregrine falcons			Rough-legged Hawks			Gyrfalcons		
Year	2016	2021	2022	2016	2021	2022	2016	2021	2022
Count of occupied sites	32	25	32[!]	12	10	7	2	5	4
Count of nestlings	9	9	37	20	11	6	4	6	0
Productivity (apparent)	0.28	0.36	1.16	1.67	1.1	0.86	2.00	1.2	0[*]

[!] Count of sites at which nestlings were detected, [*] Gyrfalcon nestlings may have fledged prior to surveys.

Conclusion

This report applies GN-DoE guidelines (Government of British Columbia 2013) to assess potential disturbance to known nesting sites that have been identified over the course of eight survey-years. Agnico Eagle has detected peregrine falcon nesting sites in 15 rock quarries excavated for building and maintenance of the AWAR Road. To date there have been no instances of rough-legged hawks or

gyrfalcons nesting in rock quarries. To date there have been no instances of raptors establishing nests on artificial structures along the Haul Road or Whale Tail site.

Monitoring has focused on searching for, documenting, and mapping nesting sites for three raptor species (peregrine falcons, rough-legged hawks, and gyrfalcons). Study design was limited to single surveys in some years, which limits estimation of detection error. To address this limitation, starting in 2021, the study design was updated to incorporate multiple surveys annually, and took advantage of the distribution of known nesting sites to monitor occupancy as a function of distance to project-related disturbance. This approach addresses the GN comment in the 2018 Annual Report regarding the potential for insufficient power to detect to project-related effects by correcting for inconsistent monitoring within and among seasons. There has been no incident requiring permitting for removal of a nest (Term and Condition 36).

This report meets Term and Condition 33 by documenting and mapping raptor nesting sites (Figure 4, Table 5). There is no evidence for project-related related disturbance effects for peregrine falcons, rough-legged hawk occupancy, and gyrfalcons.

In 2022, there was no deterrence done for quarries along the AWAR, WTHR and mine sites, except for Quarry 22, which has become regularly occupied nesting territories. Where occupied nesting sites where detected, mine-related activity within the quarries was restricted. Nesting sites were monitored to minimize disturbance. Nest visits were conducted periodically to conduct egg and nestling counts. Presence of nesting pairs was not made public to minimize disturbance. To fulfill the requirement to develop management and response plans, Agnico Eagle shall update the TEMP in 2023 to include the following: 1) for roadside quarries where work is planned, deterrents will be placed in the quarries in early May prior to arrival on territory; 2) for roadside quarries where no work is planned, regular monitoring shall be conducted to determine occupancy status; 3) for dormant quarries, nesting raptors shall be monitored regularly throughout the breeding season to determine reproductive status (signage shall be placed to identify the presence of breeding raptors and will include a no stopping zone for vehicular traffic). Improved monitoring and management of these nesting sites has the potential to fulfill the requirements outlined in the TEMP (active nest monitoring, evaluating the success of mitigation to limit disturbance to raptors or raptor nests, and estimating project-related nest failures). However, for this to be achieved, factors associated with natural disturbance (e.g., weather, prey abundance, predation) must also be estimated to avoid confounding the effect of natural disturbance with project-related disturbance. In 2023, two specific sites visits are scheduled and will contribute to meeting NIRB Project Certificate Term and Condition.

Table 13. Geographic coordinates (decimal degrees), distance to disturbance (Km) for known nesting sites surveyed between 2015 and 2022. Nesting sites that require management plans are identified.

NSID	Quarry	minD2D	Plan
4	NA	4.72	N
6	NA	3.30	N
9	NA	4.01	N
11	NA	3.57	N
14	NA	2.49	N
16	NA	2.74	N
17	NA	2.89	N
21	NA	16.49	N
23	NA	14.49	N
24	NA	14.41	N
25	NA	17.27	N
26	NA	17.67	N
27	NA	21.59	N
28	NA	22.34	N
31	NA	9.28	N
34	Q21	2.27	N
38	NA	20.87	N
39	NA	19.68	N
41	NA	24.30	N
42	NA	0.49	Y
44	Q19	0.06	Y
45	Q18	0.10	Y
46	NA	1.64	N
49	NA	2.68	N
51	NA	2.60	N
52	NA	1.66	N
54	NA	8.47	N
55	NA	9.35	N
58	NA	0.66	Y
61	NA	10.45	N
62	NA	6.26	N
63	NA	10.64	N
64	NA	10.90	N
65	NA	7.01	N
67	NA	7.37	N
68	NA	11.65	N
69	NA	9.60	N
71	NA	7.19	N
73	NA	4.73	N
74	NA	4.31	N
75	NA	4.44	N
77	NA	1.98	N
78	NA	7.66	N
79	NA	12.88	N
83	NA	24.05	N

85	NA	15.66	N
86	NA	15.91	N
87	NA	16.55	N
88	NA	16.77	N
89	NA	18.98	N
90	NA	19.13	N
91	NA	10.27	N
92	NA	20.10	N
93	NA	3.42	N
94	NA	10.48	N
95	NA	22.06	N
97	NA	20.65	N
99	NA	12.63	N
100	NA	7.36	N
107	NA	12.44	N
108	NA	24.67	N
109	NA	24.69	N
117	NA	9.56	N
121	NA	23.83	N
123	NA	8.21	N
126	NA	0.75	Y
127	NA	22.19	N
128	NA	10.27	N
130	Q22	0.18	Y
132	Q17	0.00	Y
133	Q16	0.06	Y
134	Q15	0.07	Y
136	Q13	0.00	Y
140	Q9	0.08	Y
141	Q8	0.03	Y
142	Q7	0.01	Y
144	Q5	0.00	Y
146	Q3	0.01	Y
147	Q2	0.60	Y
148	Q1	0.02	Y
149	NA	2.93	N
150	NA	7.84	N
152	NA	1.53	N
156	NA	0.06	Y
157	NA	5.13	N
158	NA	14.90	N

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APPENDIX H

Meadowbank Bird Surveys Report

MEADOWBANK COMPLEX

2022 BREEDING BIRD SURVEYS AND PRISM PLOTS SUMMARY REPORT

15 FEBRUARY 2023

Table of Contents

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SECTION 1 • OVERVIEW

Environmental baseline studies were conducted in the Project area prior to Meadowbank Mine approvals and integrated into Project designs according to the Terrestrial Ecosystem Management Plan (TEMP). Wildlife Valued Ecosystem Components (VECs) for the Meadowbank Complex were identified in consultation with regulatory agencies and Baker Lake residents. Upland Breeding Birds was one of the key terrestrial VECs determined for the Meadowbank project; therefore, an extensive bird monitoring program, consisting of Program for Regional and International Shorebird Monitoring (PRISM) plots at the mine site and a reference area, and bird transects along the All-Weather Access Road (AWAR), was established to determine potential effects of the Meadowbank Mine project. The breeding bird PRISM plot and bird transect monitoring programs were designed to evaluate potential Project-related changes in breeding bird species abundance, richness, and diversity over time.

In 2020, Agnico Eagle sent Environment and Climate Change Canada (ECCC) the comprehensive 2003-2015 analysis of all PRISM and breeding bird transect data. Results of the comprehensive analysis determined there were no significant effects of the Project or Mine-related infrastructure on bird abundance, diversity or community composition, which supports that mitigation is effective. In 2022, Agnico Eagle Meadowbank Complex finalized a collaboration agreement with ECCC, with a focus on contributing to regional bird monitoring programs. The agreement includes a commitment to conduct 48 PRISM plots selected by CWS over 10 years (2021 to 2031), and to complete Breeding Bird Survey (BBS) routes along the AWAR and the Whale Tail Haul Road (WTHR) opportunistically when qualified individuals are on site. At a minimum, these BBS routes will be conducted every three (3) years during the operations, closure, and post-closure phases of the project. PRISM and BBS were scheduled to restart in 2022.

In 2022, two BBS routes consisting of 50 stations each were established along the AWAR and the WTHR. As well, four (4) of 48 designated PRISM plots were surveyed at Meadowbank site. In 2023, both BBS routes will be surveyed and a minimum of 12 PRISM plots will be surveyed at the Meadowbank and Whale Tail sites (i.e., Meadowbank Complex).

SECTION 2 • OBJECTIVES

The primary objectives of this report are to:

1) Provide a brief overview of the Meadowbank Complex and the rationale for breeding bird surveys;
2) Describe the methods used to conduct the BBS and PRISM surveys;
3) Summarize results of the 2022 BBS and PRISM surveys; and
4) Make recommendations for surveys in subsequent years.

SECTION 3 • METHODOLOGY

3.1 BREEDING BIRD SURVEYS (BBS)

Breeding Bird Survey (BBS) route stops were established in accordance with the North American BBS methods provided by Canadian Wildlife Service (CWS). These methods are coordinated by the United State Geological Survey's (USGS) Patuxent Wildlife Research Center in partnership with ECCC, CWS and Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO, Mexico).

The BBS protocol consists of 50 survey stations set every 800 m for a total of 40 km along the AWAR (Route 62049) and 40 km along the WTHR (Route 62091). The starting points and orientation of BBS routes along the AWAR and WTHR were chosen by ECCC personnel in early 2022 (see **Figures 3.1** and **3.2**). Stations were established by field personnel on 15 June 2022, and GPS coordinates and detailed descriptions of each station were recorded (see **Appendix I** for details). The route and stations are a permanent survey to be conducted on a schedule provided by ECCC (i.e., at a minimum every 3 years during operations, closure and post-closure, and opportunistically when PRISM surveys are conducted). The first year of BBS surveys will be conducted between 15 and 30 June 2023, the prime bird breeding season. Details on BBS survey protocols are provided in **Appendix II**.

Valid stop descriptions of each stop along both routes will also be maintained and kept up to date in the USGS database. Agnico Eagle will notify the Canadian national BBS office if adjustments to stop locations are necessary due to safety issues.

3.2 PRISM PLOTS

The PRISM plot surveys followed ECCC protocols in compliance with the Meadowbank-ECCC Collaboration agreement. A total of 48 plots were chosen by ECCC in early 2022, many of which were previously established at Meadowbank and Whale Tail (see **Figures 3.3** and **3.4**). Four (4) plots were surveyed in 2022 and 12 plots are proposed to be surveyed in 2023. The remaining 32 plots will likely be surveyed in 2024 or other years prior to the expected 2031 closure date, although the option exists to survey more or all remaining plots each year.

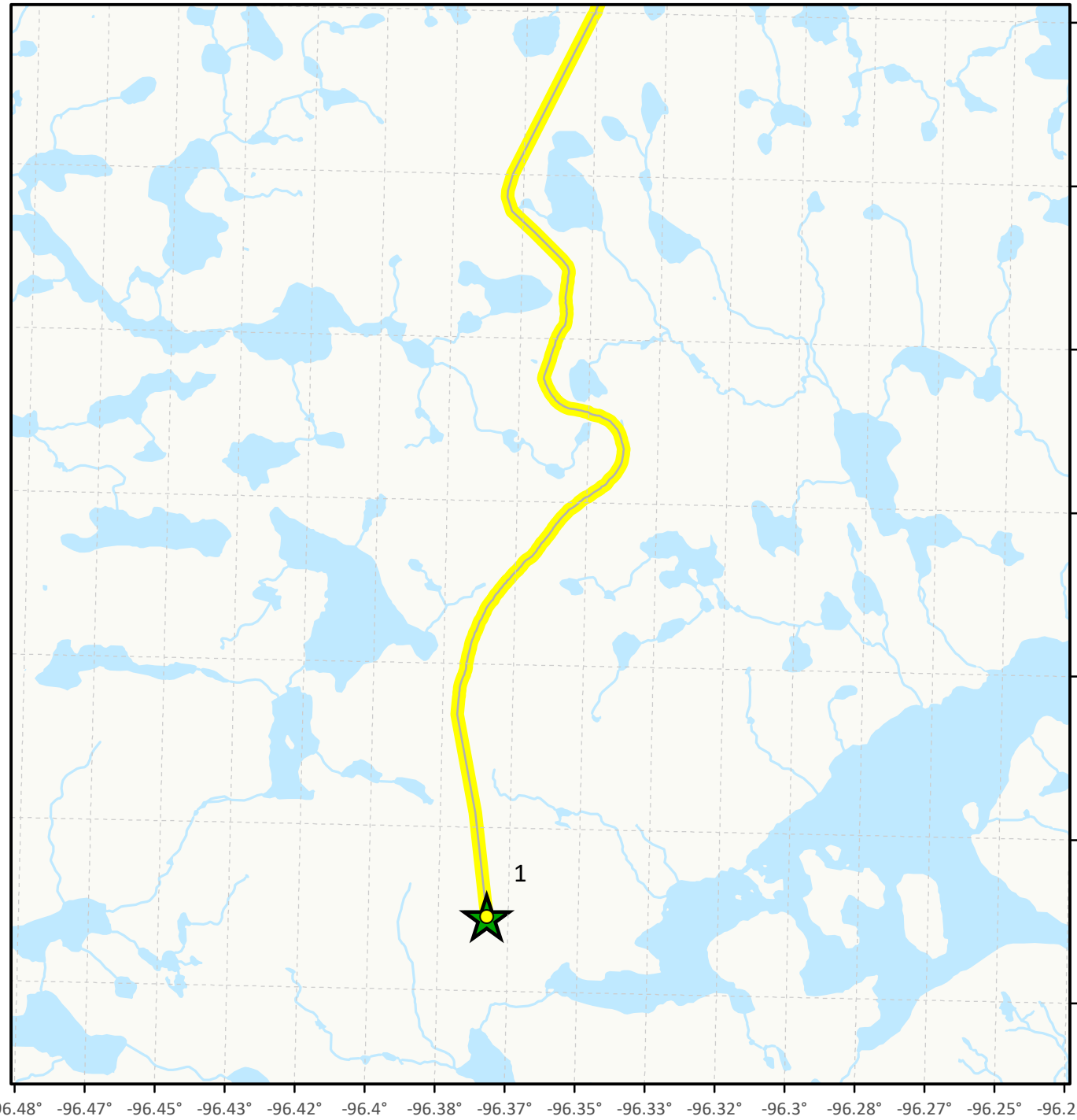
In 2022, the four (4), 300x400 plots were surveyed by a team of two field qualified personnel that transected the site every 25 m (team members were spaced 25 m apart and used geolocation to orient along transect lines). The purpose of the surveys was to document all birds (i.e., absolute abundance) on the plots and to contribute to the ECCC Arctic database on bird diversity and abundance.

PRISM survey raw data will be provided to ECCC CWS technical expert and the CWS Environmental Assessment Officer every year by March 31. Raw data will include: a) bird and plot habitat data entered into the CWS provided spreadsheet; and b) a digital scan of all field data sheets. Photos of PRISM plot corners as per PRISM protocols were inadvertently not taken in 2022 for the four (4) PRISM plots, but these plots will be revisited in 2023 to take corner photos.

2021

Figure 3.1: Location of the Breeding Bird Survey (BBS) Route Along the Meadowbank All-Weather Access Road (AWAR)

Route - Parcours: 62-049 MEADOWBANK MINE **Start time - Heure de départ:** 0330



STOPS ARE ONLY SHOWN FOR ROUTES THAT HAVE BEEN GPSed or otherwise identified. If no stops are showing, please submit your GPS coordinates ASAP.

SEULS LES ARRÊTS QUI ONT ÉTÉ LOCALISÉS PAR GPS OU AUTREMENT IDENTIFIÉS SONT INDIQUÉS. Si aucun arrêt n'est affiché, SVP envoyer vos coordonnées dès que possible.

Legend - Légende

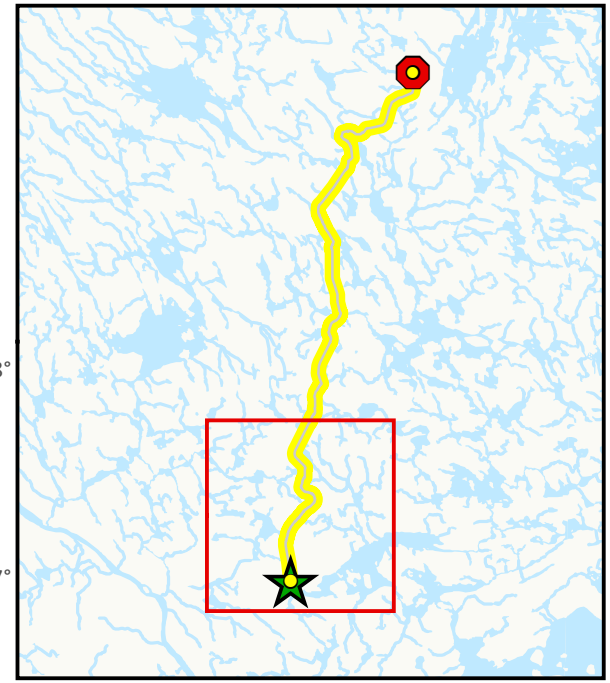
Start - Départ

End - Fin

Route - Parcours

Stop - Arrêt

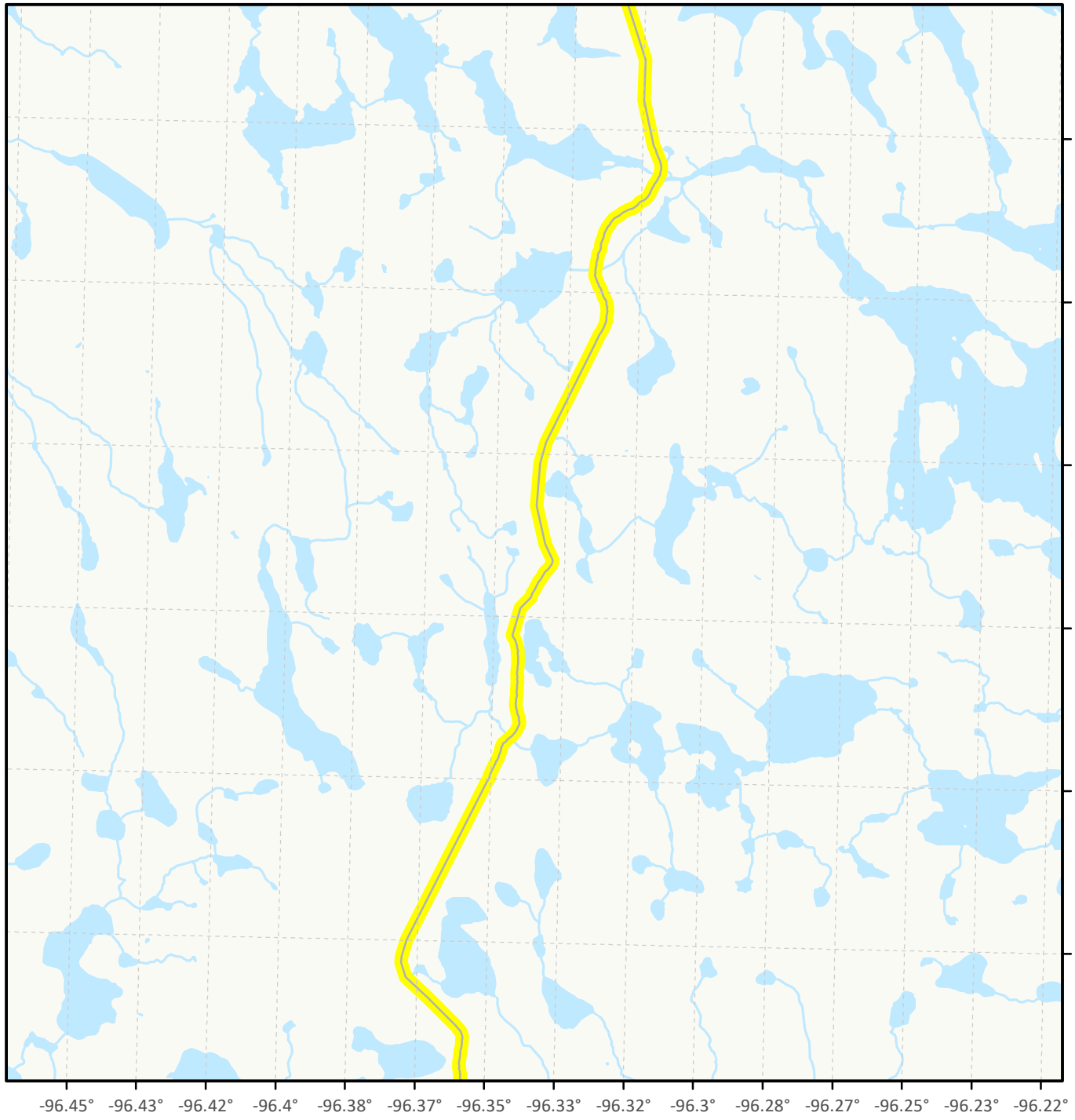
0 0.8 1.6 2.4 3.2 Km



2021

Figure 3.1: Location of the Breeding Bird Survey (BBS) Route Along the Meadowbank All-Weather Access Road (AWAR)

Route - Parcours: 62-049 MEADOWBANK MINE **Start time - Heure de départ:** 0330



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Legend - Légende

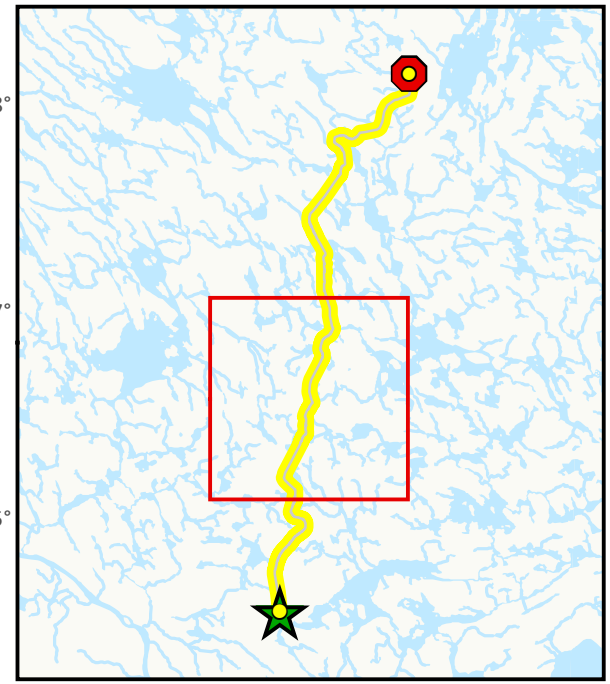
Start - Départ

End - Fin

Route - Parcours

Stop - Arrêt

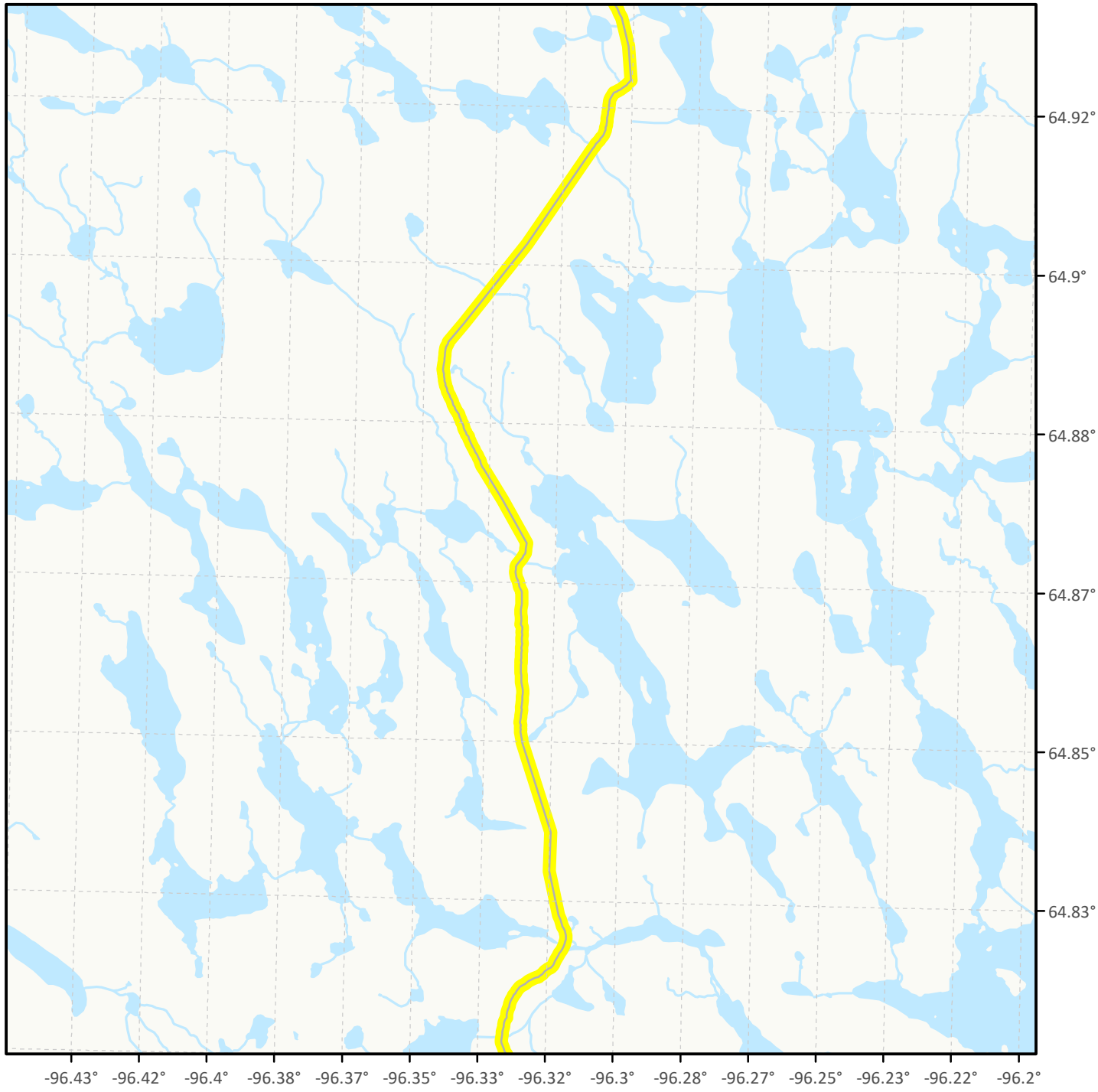
0 0.8 1.6 2.4 3.2 Km



2021

Figure 3.1: Location of the Breeding Bird Survey (BBS) Route Along the Meadowbank All-Weather Access Road (AWAR)

Route - Parcours: 62-049 MEADOWBANK MINE **Start time - Heure de départ:** 0330



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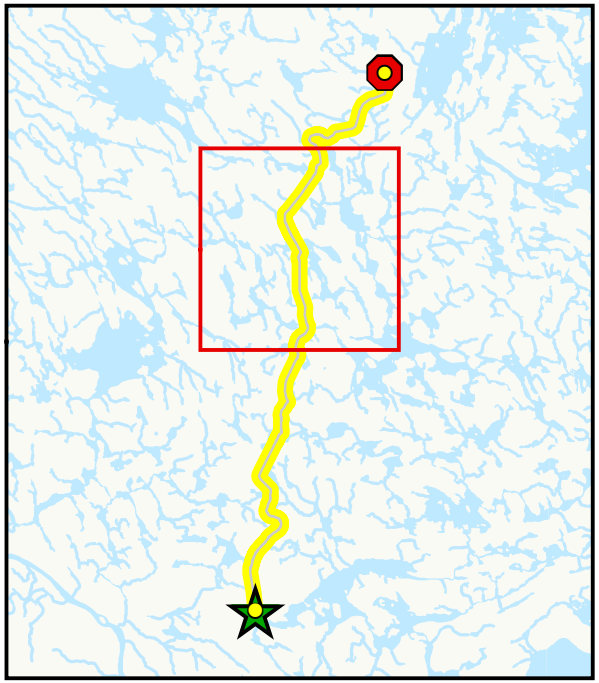
Route - Parcours

Stop - Arrêt

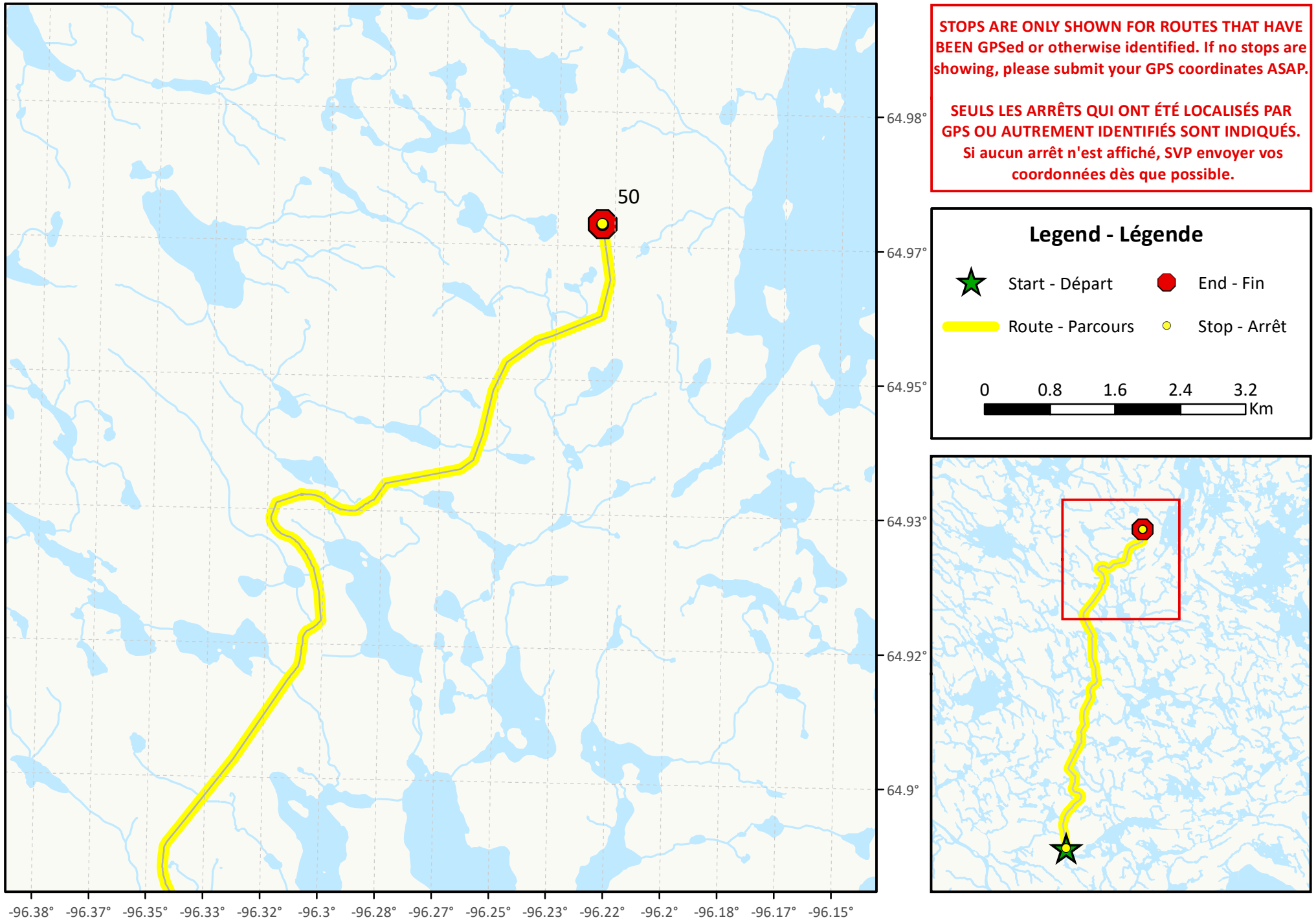
0 0.8 1.6 2.4 3.2 Km



2021

Figure 3.1: Location of the Breeding Bird Survey (BBS) Route Along the Meadowbank All-Weather Access Road (AWAR)

Route - Parcours: 62-049 MEADOWBANK MINE **Start time - Heure de départ:** 0330



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Legend - Légende

Start - Départ

End - Fin

Route - Parcours

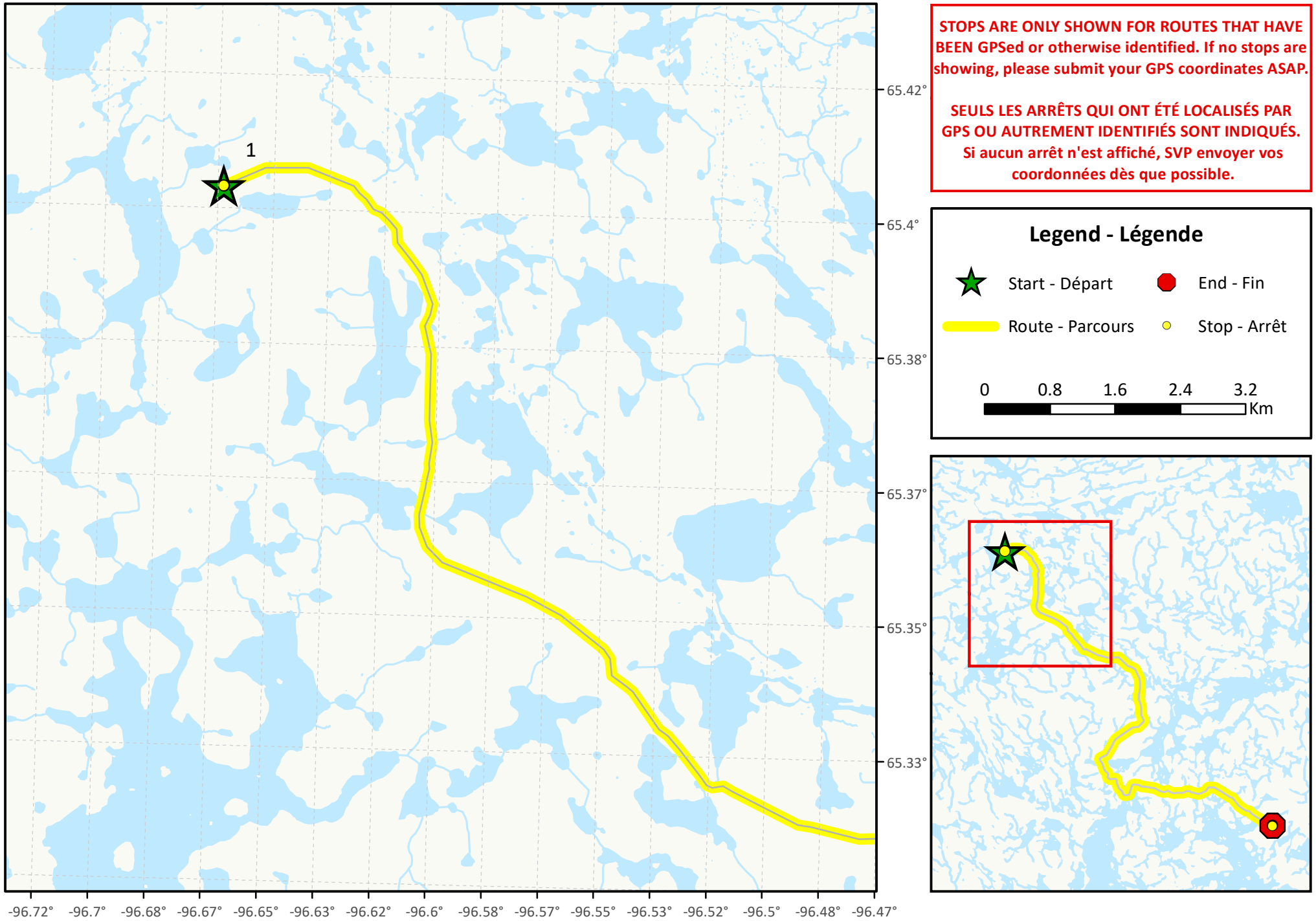
Stop - Arrêt

0 0.8 1.6 2.4 3.2 Km

2021

Figure 3.2: Location of the Breeding Bird Survey (BBS) Route Along the Whale Tail Haul Road (WTHR)

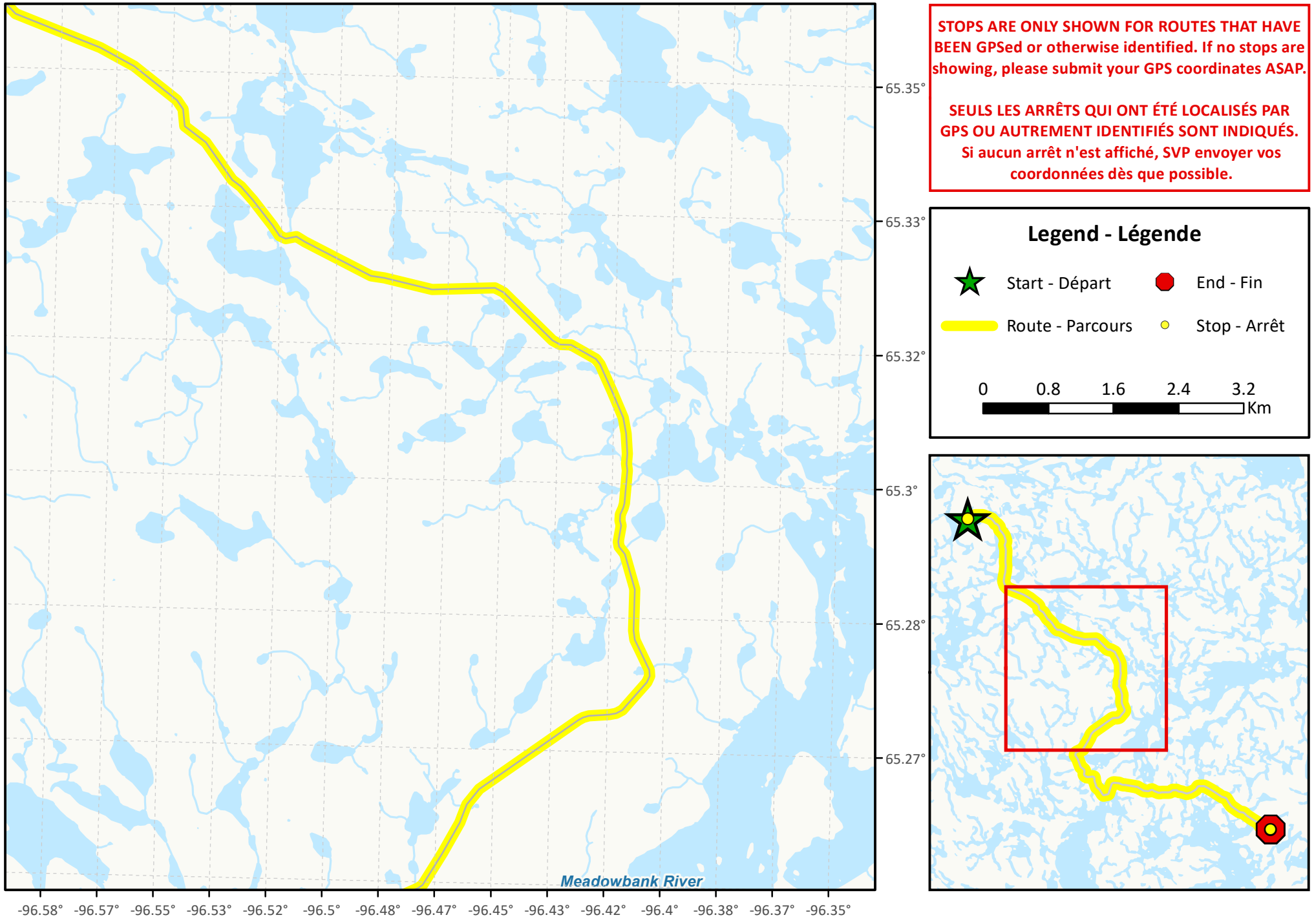
Route - Parcours: 62-091 WHALE TAIL MINE **Start time - Heure de départ:** 0330



2021

Figure 3.2: Location of the Breeding Bird Survey (BBS) Route Along the Whale Tail Haul Road (WTHR)

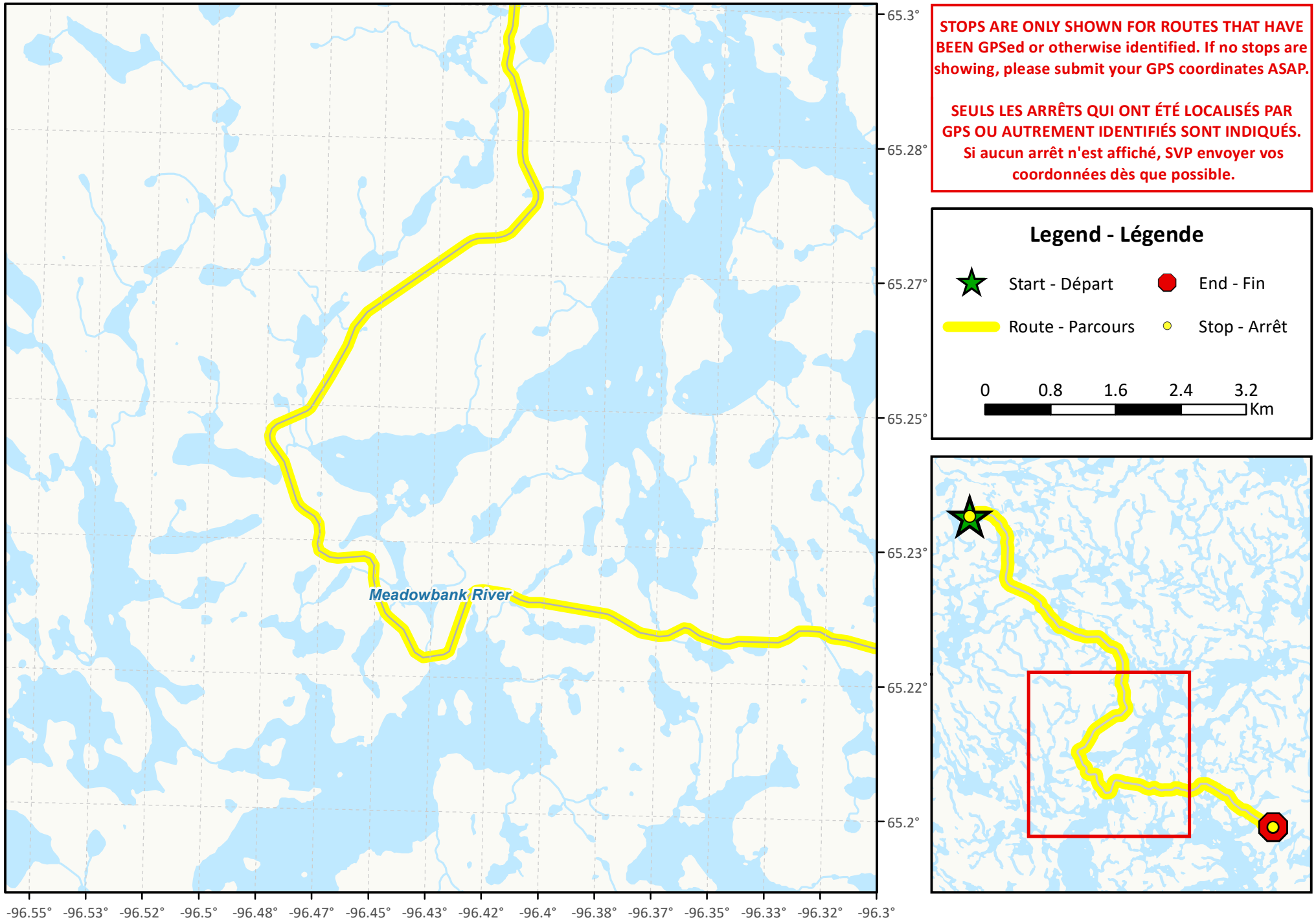
Route - Parcours: 62-091 WHALE TAIL MINE **Start time - Heure de départ:** 0330



2021

Figure 3.2: Location of the Breeding Bird Survey (BBS) Route Along the Whale Tail Haul Road (WTHR)

Route - Parcours: 62-091 WHALE TAIL MINE **Start time - Heure de départ:** 0330



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Legend - Légende

Start - Départ

End - Fin

Route - Parcours

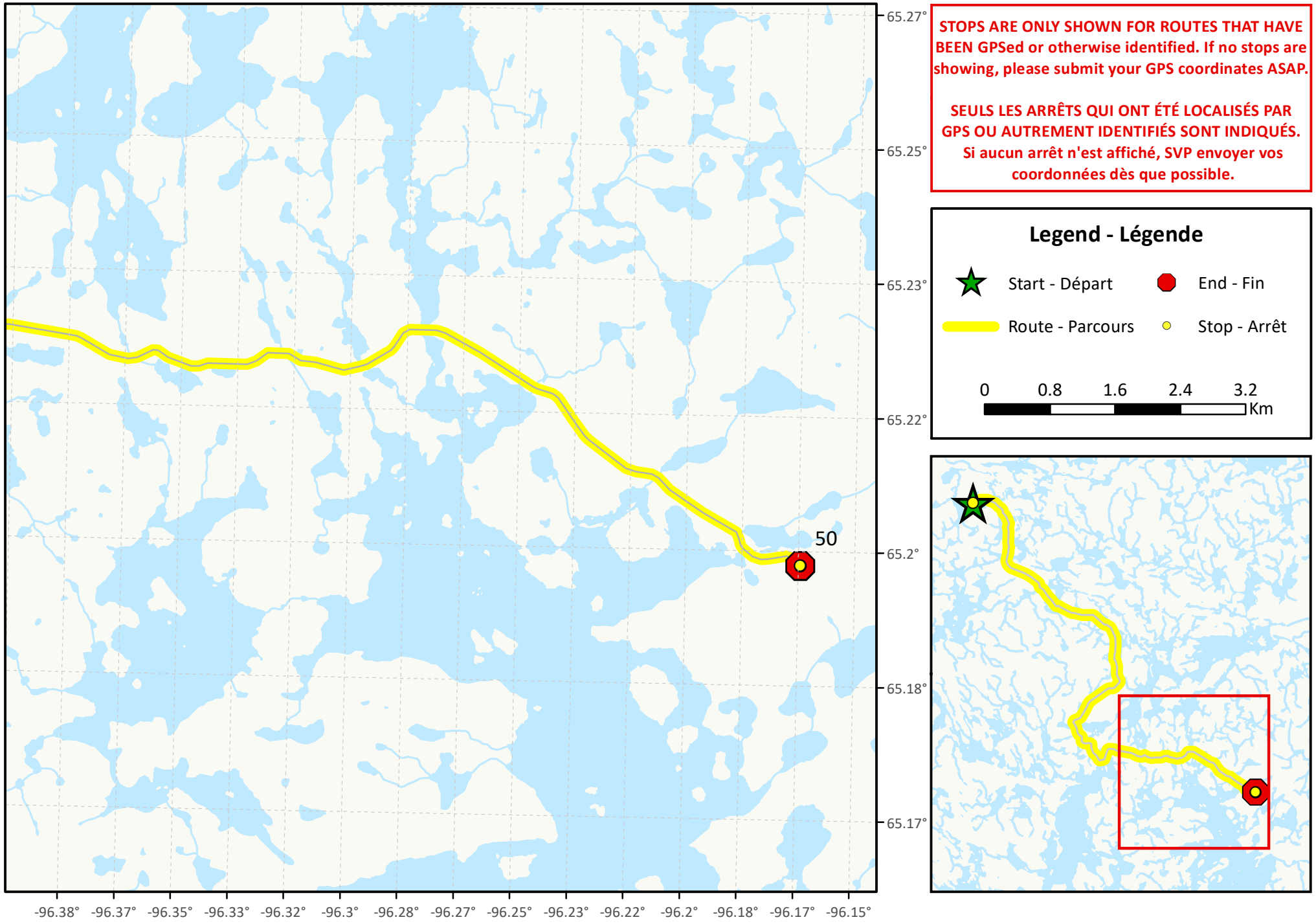
Stop - Arrêt

0 0.8 1.6 2.4 3.2 Km

2021

Figure 3.2: Location of the Breeding Bird Survey (BBS) Route Along the Whale Tail Haul Road (WTHR)

Route - Parcours: 62-091 WHALE TAIL MINE **Start time - Heure de départ:** 0330



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Stop - Arrêt

0 0.8 1.6 2.4 3.2 Km

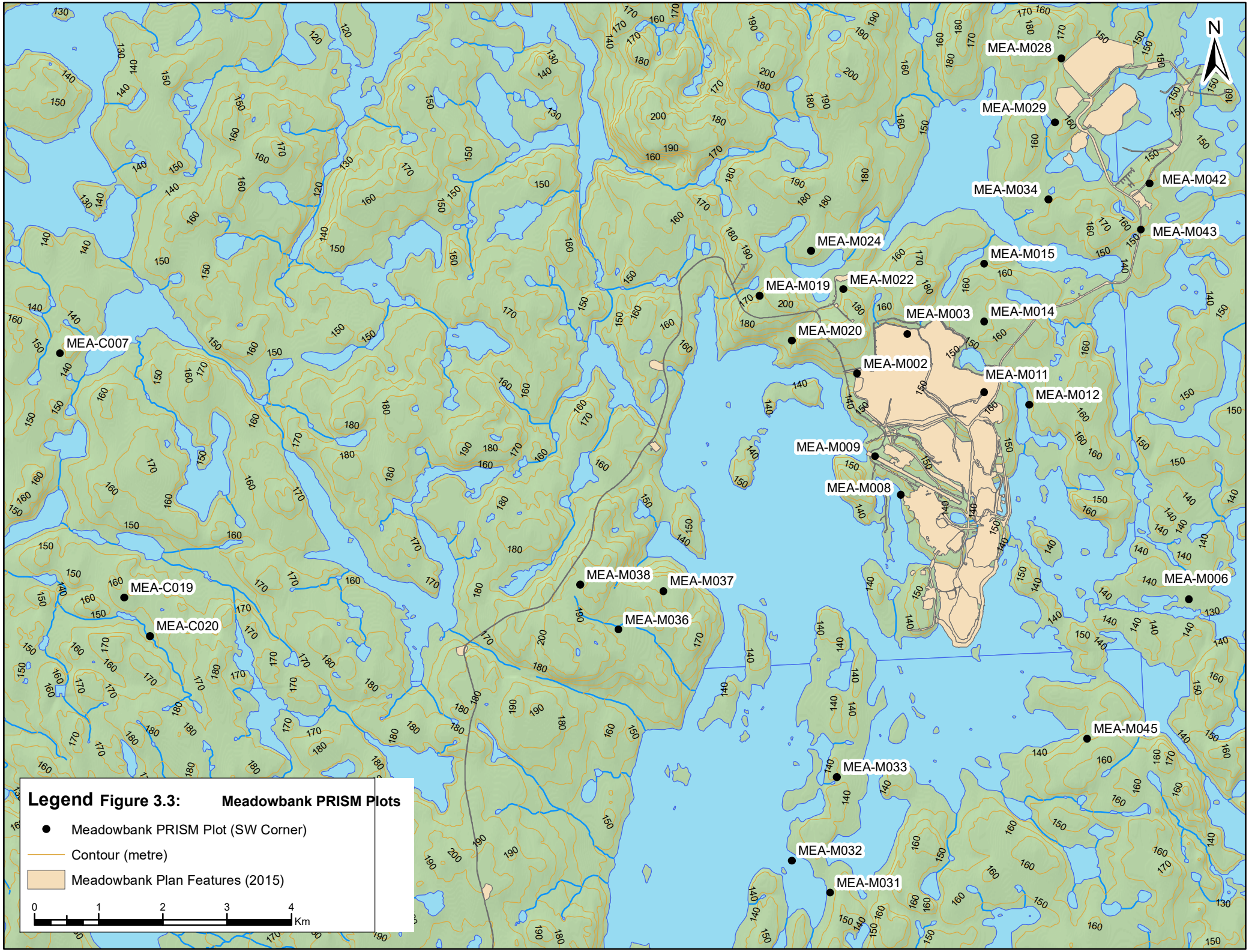

Figure 3.3: Meadowbank PRISM Plots

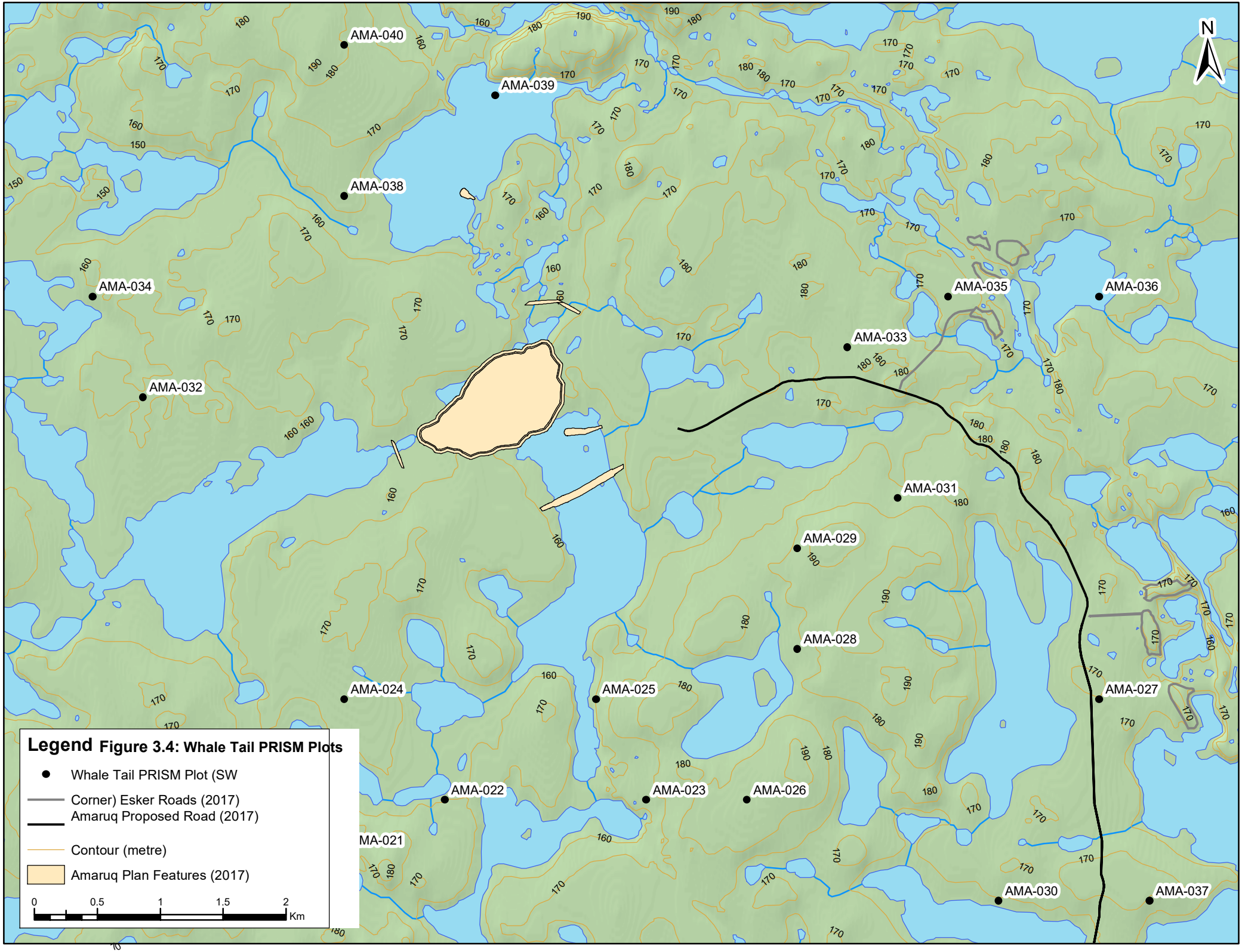

Figure 3.4: Whale Tail PRISM Plots

SECTION 4 • 2022 BIRD SURVEY RESULTS

4.1 BREEDING BIRD SURVEYS (BBS)

Due to a non-work-related medical issue with one of the field biologists, only establishment of BBS route stops (i.e., 50 stops per route) along the Meadowbank AWAR (62049) and WTHR (62091) routes was conducted (see **Table 4.1** for timing of route establishment, **Figures 3.1** and **3.2** for general BBS locations, and **Appendix I** for station descriptions and coordinates).

Table 4.1: Breeding Bird Survey (BBS) 2022 Fieldwork Dates for Meadowbank All-Weather Access Road (AWAR) and Whale Tail Haul Road (WTHR) Routes.

Date 2022	Weather	Observers	Fieldwork Type
June 15	10° C, 40% cloud cover, fresh breeze BF4	Lars Qaqqaq Dylan White	BBS route station establishment for the Meadowbank (62049) and Whale Tail (62091) routes

4.2 PRISM PLOTS

Given the limited field time in 2022 due to a field biologist's medical issue, only four (4) PRISM plots were surveyed in 2022: MEA-M008, MEA-M024, MEA-M032, and MEA-M033 (see **Table 4.2** for timing).

Table 4.2: Meadowbank and Whale Tail PRISM Plot 2022 Fieldwork Dates.

Date 2022	Weather	Obs.	Fieldwork Type
June 14	20° C, 20% cloud cover, gentle breeze BF 2	Lars Qaqqaq Dylan White	PRISM Plots: MEA-M008, MEA-M032, and MEA-M033
June 16	14° C, 50% cloud cover, fresh breeze BF 4	Lars Qaqqaq Dylan White	PRISM Plot: MEA-M024

Seventeen (17) bird and five (5) mammal species were observed during 2022 PRISM plot surveys (**Table 4.3**). Nine (9) of these (5 birds and 4 mammals) were observed incidentally while traveling between plot sampling locations (**Table 4.3**), while the other species were observed while surveying PRISM plots. Species numbers, behaviours and other details have been recorded in the PRISM plot data spreadsheets as per the templates provided by CWS and will be provided to ECCC by March 31, 2023.

Table 4.3: Wildlife Species Observed Incidentally and on Meadowbank and Whale Tail PRISM Plots in 2022.

Common Name	Scientific Name	2022 Observation				
		PRISM PLOTS (MEA-)				Incidental
		M008	M024	M032	M033	
BIRDS						
American Pipit	*Anthus rubescens*	X	X			
Bald Eagle	*Haliaeetus leucocephalus*					X
Canada Goose	*Branta canadensis*		X			
Common Raven	*Corvus corax*					X
Herring Gull	*Larus argentatus*					X
Hoary Redpoll	*Acanthis hornemanni*			X	X	
Horned Lark	*Eremophila alpestris*	X	X	X	X	
Lapland Longspur	*Calcarius lapponicus*	X	X	X	X	
Least Sandpiper	*Calidris minutilla*	X				
Peregrine Falcon	*Falco peregrinus*					X
Ptarmigan Species	*Lagopus* sp.				X	
Redpoll Species	*Acanthis* sp.		X			
Rock Ptarmigan	*Lagopus muta*			X		
Sandhill Crane	*Grus canadensis*		X	X		
Savannah Sparrow	*Passerculus sandwichensis*		X	X	X	
Semipalmated Plover	*Charadrius semipalmatus*					X
Semipalmated Sandpiper	*Calidris pusilla*		X	X	X	
Willow Ptarmigan	*Lagopus lagopus*			X		
White-crowned Sparrow	*Zonotrichia leacophrys*	X			X	
MAMMALS						
Arctic Fox	*Vulpes lagopus*					X
Arctic Ground Squirrel	*Urocitellus parryii*					X
Arctic Hare	*Lepus arcticus*					X
Barren-ground Caribou	*Rangifer tarandus* ssp. *groenlandicus*		X	X		
Muskox	*Ovibos moschatus*					X

SECTION 5 • RECOMMENDATIONS

In 2023, a minimum of 12 PRISM plots should be surveyed at Meadowbank and Whale Tail Sites between June 15 and 30, 2023, and both BBS routes (Meadowbank AWAR and WTHR) should be surveyed during this June period.

As well in 2023, corner photos need to be taken for all PRISM plots including the four (4) plots conducted in 2022: MEA-M008, MEA-M024, MEA-M032, and MEA-M033.

SECTION 6 • LITERATURE CITED

Rausch, J., and Clyde, N. 2022. The Arctic PRISM Survey Details – For Agnico Eagle Crews to Meadowbank/Amaruq (part of Arctic PRISM Region 6.2).

APPENDIX I

Breeding Bird Survey (BBS) Station Description and Coordinates for the Meadowbank All-Weather Access Road (AWAR) and the Whale Tail Haul Road (WTHR) Routes

BBS STOP DESCRIPTIONS

Meadowbank Mine Route, Nunavut - 62049

Date collected: 06 September 2022 **Printed Date**: 13 February 2023

Directions to Start: km 49/50 Top of hill, pull off 2 old fuel drums present, overlooking lake valley. Cardinal directions in stop descriptions are based on the road heading generally northbound. In other words, if directly left of road direction, the descriptions here will always say "west" even if it is not true compass west. Road direction should be considered the "N" compass arrow relative to the stop descriptions.

Stop	Description
01	km 49/50 Top of hill, pull off 2 old fuel drums present, overlooking lake valley
02	Just after km 50, top of small rise pull out on the east, gravelly terrain nearby
03	On wide squarish pull-off, ~100 m before km 51, slight rocky rise to the east
04	On wide, rocky, squarish pull-off before top of hill, roundish boulder about 40 m east, rocky hillside to the east
05	Pull off just before and directly facing. Blind hill 53 sign. Squarish bay of lake to the west
06	Pull off at top of hill before, and overlooking, quarry to the N. Small pond to the west
07	Just past km 54 on pull off. Several discrete, somewhat circular rocky patches to the E
08	About 200 m before km 55 at somewhat sunken pull-out on slight rise. Reddish boulders E of pull-out
09	Park km 55. On road opposite a pull out (W). Small pond to the east
10	On pull out about 300 m past km 56 just before road turns to the right/E. Small rise directly east with small lake beyond
11	Pull out beside km 57. Rocky terrain adjacent in all directions
12	Pull out just before top of hill. valley to the east with pond and raised mound beyond. Stop is before quarry
13	On the road across from sunken pull out W. Large view of flat tundra pan to the east with large and small lake
14	On the road opposite a small pull off. Past km 59. Broad view of tundra pan with lakes to E, heath tundra hill to the west
15	On the road at the top of a slight rise, lakes visible to the E and W. No pull offs are adjacent
16	Past km 61 at sunken pull off with light boulder. 20km/h speed limit sign just visible >200 m ahead
17	First pull off past bridge gravelly ridge ahead, large lake to east, pond to west
18	Pull off just past km 63 lake nearby to E and another just visible to the west
19	Pull off just past km 64 at blind hill 65 sign. Broad heath and graminoid to the E and W. Hill to the N
20	Pull off on table land after (i.e. N) of blind hill 65. Lake nearby to the east. Rockpile on near shore of lake to the E
21	At sunken pull off at km 66 (just past), pond to the west, broad heath to the east
22	At pull out just over a small rise and just before km 67. Mound and lake to east, land rises to the west
23	Pull off just past quarry (which is just behind and to the west), large lake to NW lake to NE
24	Large pull off just past small pond (S of point, east of road), large lake visible to west. Lake visible to east
25	Pull off past km 69 and large bridge over large watercourse. Watercourse valley hill to N

26	Pull off just before quarry. Wetland/pond to the east, rocky ridges around quarry to the west ~100 m past km 70
27	Broad view of valley with lake to the west. Heath tundra rise with rocky bands to east.
28	On Road ~150 m before km 72 at top of a small rise. Long lake visible to west isolated rocky mound to the east
29	On road shoulder at top of hill next to sign "Quarry" and a wooden table was there in 2022. Line of reddish rock at quarry's crest with lake beyond
30	Pull out just before bridge, wetland watercourse connecting lakes west and east
31	Pull off just before slight rise broad views to east and west lakes both sides
32	On shoulder where road is wider, past km 75. Boulders to the east broad views all directions
33	On road directly at km 76. Pond to ENE. Broad views all directions
34	On road at height of land. About 50 m beofre km 77, roacky ridge extends perpendicular to east
35	Pull off with graminoid patches W and rock patches E. Broad views
36	Large pull off at dust collection site (i.e. wooden stands perpendicular to road). Large lake with island to the ESE, between km 78 and 79
37	Large pull off before bridge. Past km 79 Many boulders in all directions.
38	On road directly opposite entrance to quarry. Pond to N
39	Small sunken pull off just before km 81. Large lake to E, lake to west
40	Pull out heath tundra on all sides. graminoids and pond to ENE. Road jobs right in ~250 m
41	On road at culvery part way through large bend in road. Graminoid lowlands running perpendicular from culvert past km 82
42	On road shoulder just before bridge over watercourse
43	On shoulder just before rocky mound (blind spot for traffic) where road turns to the right. Heath tundra to east and west
44	Pull off at top of rise between km 84 and 85 small lake to the east
45	Pull off at top of blind hill 86 between km 85 and 86. Valley with several lakes visible to the WSW
46	At N end of long pull off past km 86. Small ponds ahead on both sides of road
47	Pull off in the midst of rocky terrain. Pary way up climb of hill
48	Pull off just before km 88 nearly at top of climb up heath tundra hill
49	Pull off with small pond just east. Rocky slopes and quarry to the N
50	Pull off just north of quarry past km 89. Meadobank waste piles visible to the NE, lake to west, large lake to east

Stop Coordinates

Route and Stop Coordinates Information

State : 62-Nunavut
Route Number : 049
Route Name : MEADOWBANK MINE
Year Collected: 2021
Method : Mapping software
Datum : NAD83
Spheroid : GRS80
Coordinate type : Decimal Degrees
Reason for Entry : unknown

Stops	Latitude	Longitude	Precision (meters)	Position Verified by Obsv
1	64.6730860	-96.3713990	3	
2	64.6799680	-96.3731430	3	
3	64.6869340	-96.3760550	3	
4	64.6940400	-96.3793110	3	
5	64.7007070	-96.3775540	3	
6	64.7069360	-96.3718300	3	
7	64.7128460	-96.3587850	3	
8	64.7178550	-96.3476710	3	
9	64.7128460	-96.3587850	3	
10	64.7266850	-96.3559010	3	
11	64.7331670	-96.3578520	3	
12	64.7401290	-96.3559950	3	
13	64.7448980	-96.3656400	3	
14	64.7509280	-96.3689840	3	
15	64.7601460	-96.3581590	3	
16	64.7663880	-96.3506910	3	
17	64.7722930	-96.3435050	3	
18	64.7803360	-96.3448600	3	
19	64.7878580	-96.3381830	3	
20	64.7967780	-96.3404200	3	
21	64.8049930	-96.3343430	3	
22	64.8114540	-96.3271300	3	
23	64.8176880	-96.3267650	3	
24	64.8248150	-96.3211450	3	
25	64.8299960	-96.3126800	3	
26	64.8375090	-96.3165290	3	
27	64.8449120	-96.3197150	3	
28	64.8523630	-96.3236160	3	
29	64.8599950	-96.3245880	3	
30	64.8688070	-96.3257810	3	
31	64.8745780	-96.3291350	3	
32	64.8809160	-96.3375690	3	
33	64.8877930	-96.3455300	3	
34	64.8946550	-96.3396100	3	
35	64.9005970	-96.3294860	3	
36	64.9062040	-96.3196870	3	
37	64.9123670	-96.3099340	3	
38	64.9183340	-96.3047240	3	
39	64.9243460	-96.3015170	3	
40	64.9299360	-96.3097170	3	
41	64.9347970	-96.3119390	3	
42	64.9345830	-96.2985810	3	
43	64.9353950	-96.2854800	3	
44	64.9381980	-96.2678560	3	
45	64.9435970	-96.2542820	3	
46	64.9507430	-96.2498430	3	
47	64.9551920	-96.2354880	3	
48	64.9579210	-96.2209460	3	
49	64.9652960	-96.2181880	3	
50	64.9716410	-96.2213660	3	

BBS STOP DESCRIPTIONS

Whale Tail Mine Route, Nunavut - 62091

Date collected: 06 September 2022 **Printed Date**: 13 February 2023

Directions to Start: Pull off at km 179 facing southbound along Amaruq Rd. All cardinal directions are given in the following descriptions based on the road being generally southbound. In some cases W of road (i.e. right) may be point N, however it is still described as W or right in all cases. In other words, use the southbound direction of the road as a "S" arrow.

Stop	Description
01	Pull off at km 179 facing southbound along Amaruq Rd
02	Pull off (there are two, use 2nd/southern of the two) rock field W, rock and heath E
03	Pull off part way up the hill after km 178, pond to ESE, esker visible to W
04	Shoulder directly across from pull off just before km 176, lake visible ahead to NW
05	Shoulder near lake edge to the E. Esker saddle and lakes to the W
06	Shoulder at sunken pull off, small lakes/ponds to W. Sand of Quarry visible beyond
07	Last pull off on right side of road before km 174, large stunning esker and lake to the W, heath plateau and lake E
08	Pull off up the rise but still ~150 m shy of km 173, surrounded by rocky uplands small lake SE
09	Shoulder directly at culvert before hill. Rocky watercourse connects lakes to W and E
10	Shoulder directly at culvert partway up hill rocky heath E, eskers and lakes W
11	Pull off past culvert surrounded by rock uplands esker and lakes visible at WSW
12	First pull off after km 170 rocky pond to NW rocky uplands all around
13	last pull off on the right before km 169 large esker and lake to the NW, rocky uplands to the E
14	Shoulder at culvert with rocky hill to the E. Wet graminoid to the NE, 200 m before km 168
15	Shoulder/soft pull off just before quarry. Lake visible W and lake is close to E
16	Shoulder in lowland near rocky flats with watercourse. Lake visible to E and W
17	Pull off past km 166 and quarry at top of rise surrounded by rocky uplands all sides, esker to W
18	Pull off with orange markers with pull off on opposite side. Rocky flats with wet graminoid E, rocky hills W with lake and esker beyond
19	Shoulder with pull off adjacent. Rocky uplands on all sides, lake ahead to NE valley with lake to E
20	Pull off just before km 163, small lake to E, Rocky uplands W
21	Pull off just at, and just past, km 162. Rd bends to the right ahead pond to WSW
22	Large pull off with small pond NE nearby. Rocky uplands all around esker quarry SW
23	Shoulder / on road with pull off on opposite site. 25 m before 160 bridge sign, ~150 m before bridge. Watercourse and pond wrapping from E to NW
24	Pull off near top of the first of a series of climbs. Pull out w orange markers. Large lake to W, lake to SE
25	Shoulder / on road with pull off directly opposites. Rocky uplands. Mid-slope, past bridge, lake past rocky ridge to E

26	Soft/sunken pull off past road-turns-right sign. Rocky uplands lakes visible in valley beyond to E
27	Soft and sunken pull off with lake to SE and large lake to the W. Rocky uplands
28	Pull off , rd turns left and over hill ahead. Extensive rocky uplands, lakes distant to E
29	Pull off past blind hill 155, with orange markers and large boulder. Rolling, rocky uplands all directions lake to N
30	Pull off on rise before larger hill, pond directly W, with lake to NE, rocky hill to E
31	Shoulder after km 153 lakes to SE, E and NE, Rocky uplands to W
32	Shoulder at km 152 marker (directly before this sign), valley with lake to west, small lake E, pond near by east
33	Shoulder just past km 151, just before road-turns-left sign. Valleys with lakes to E and SW
34	Shoulder directly before km 150. Rocky hill to the E and rise to large lake to W
35	Shoulder directly beside road-turns-right sign. rocky upland and large lake to W
36	Pull off with lake to NNE. large lake at W, rocky uplands
37	Shoulder just before first flag after brief road separation. Large bridge is ~400 m NNW rocky hill both E and W
38	Shoulder directly before km 147 lakes to E, Meadowbank River visible to W
39	Shoulder directly opposite pull off with wet rocky gully to the E, road continues up and to the right ahead
40	Pull off directly in front of the quarry access road (i.e. block it), lake downhill to W quarry to E
41	Shoulder nearby but not quite at low point on saddle between lakes E and W. Both sides clearly visible from stop location
42	Pull off mid-slope with lakes at NE, N and W. Rocky uplands throughout
43	Shoulder directly opposite pull off just before blind hill 143 sign, lake to E and more distant to SW
44	Shoulder directly opposite pull off, past km 142, at low point on road, before a climb, lake nearby to E
45	Shoulder just before bridge with watercourse connecting lake W to lake ENE via rocky gully
46	Shoulder with no pull offs adjacent. Perpendicular to west hits a pile of boulders on uqarry crest, rocky plateau E, lake ENE
47	Sunken pull off with graminoid tundra E and W, rocky heath NE and N
48	Shoulder opposite a pull off past lake bridge, before blind hill 138, lake to E and W
49	Shoulder opposite pull off on top of blind hill 138, lake on E rocky uplands W
50	Shoulder directly beside road-turns-left sign. Lake nearby to E, rocky hill W with pond/watercourse to NW

Stop Coordinates

Route and Stop Coordinates Information

State : 62-Nunavut
Route Number : 091 **Route Name :** WHALE TAIL MINE
Year Collected: 2021 **Method :** Mapping software
Datum : NAD83 **Spheroid :** GRS80
Coordinate type : Decimal Degrees **Reason for Entry :** unknown

Stops	Latitude	Longitude	Precision (meters)	Position Verified by Obsv
1	65.4027523	-96.6602590	3	
2	65.4051420	-96.6426090	3	
3	65.4022640	-96.6250950	3	
4	65.3966510	-96.6129820	3	
5	65.3919240	-96.6052930	3	
6	65.3843550	-96.6035080	3	
7	65.3772360	-96.6024140	3	
8	65.3700410	-96.6016070	3	
9	65.3626840	-96.6041060	3	
10	65.3570740	-96.5979510	3	
11	65.3544710	-96.5833730	3	
12	65.3513400	-96.5656640	3	
13	65.3472120	-96.5513410	3	
14	65.3416340	-96.5401250	3	
15	65.3359860	-96.5290480	3	
16	65.3297810	-96.5159020	3	
17	65.3272840	-96.5006060	3	
18	65.3245970	-96.4804770	3	
19	65.3238810	-96.4656170	3	
20	65.3228120	-96.4480210	3	
21	65.3173370	-96.4306630	3	
22	65.3126530	-96.4182370	3	
23	65.3045330	-96.4122490	3	
24	65.2967260	-96.4135520	3	
25	65.2888660	-96.4102040	3	
26	65.2819960	-96.4090760	3	
27	65.2751720	-96.4053720	3	
28	65.2711890	-96.4202130	3	
29	65.2649950	-96.4429140	3	
30	65.2603580	-96.4564130	3	
31	65.2538250	-96.4640470	3	
32	65.2484010	-96.4757050	3	
33	65.2409660	-96.4756660	3	
34	65.2341210	-96.4664080	3	
35	65.2315360	-96.4547540	3	
36	65.2261210	-96.4382830	3	
37	65.2208500	-96.4387930	3	
38	65.2209880	-96.4268840	3	
39	65.2274450	-96.4211830	3	
40	65.2263540	-96.4026710	3	
41	65.2254290	-96.3855550	3	
42	65.2227840	-96.3708370	3	
43	65.2225490	-96.3528860	3	
44	65.2220880	-96.3359200	3	
45	65.2234020	-96.3209360	3	
46	65.2219530	-96.3056970	3	
47	65.2237200	-96.2896170	3	
48	65.2266930	-96.2742450	3	
49	65.2246850	-96.2640720	3	
50	65.2205400	-96.2480450	3	

APPENDIX II

Breeding Bird Survey (BBS) Protocols

Environment Canada Environnement Canada

North American Breeding Bird Survey
Instructions and Safety Guidelines

Strict adherence to the rules is essential for proper analysis of results. Please read all instructions and safety guidelines prior to conducting your survey.

BBS Requirements

It is very important **that the observer should know the songs, calls, and visual identification of all species** likely to be encountered. It is advisable, even for experienced observers, to learn the less common species. You can register with NatureInstruct's Dendroica, an interactive website designed to help improve bird identification skills by sight and sound. Also, since identification by songs and calls is required, acute hearing is extremely important. An observer with hearing loss should not be running Breeding Bird Surveys. All new observers must complete the BBS online methodology training module before conducting their survey.

Scouting Your Route

Much time can be lost due to closed roads, washed out bridges, and wrong turns. The importance of familiarization with the 50 stops and the proper turns before the day of the run cannot be over-emphasized. A scouting trip can save time and frustration, especially for first-time observers or observers starting new routes. Scouting trips are an excellent time to mark stops on the map, record stop descriptions, and/or record stop coordinates. First-time observers should also conduct a test run to get familiar with the BBS protocol and data forms. If the route is far away, try 10 or 20 practice stops somewhere close to home.

When to Run Routes

In Canada, the acceptable dates for running routes are between 28 May and 7 July. In more southern areas, it is preferable to run routes in early or mid-June. In general, it is best to keep the date of your survey as similar as possible between years.

Starting Your Route

Begin at the marked start point on the map (stop number 1). **Do not reverse the route** even if the end is closer to home. At the official starting time, which is be pre-printed on the data cover sheet, begin counting birds at the marked starting point. The official start time is always 30 minutes before sunrise. Keep in mind that daylight savings time is often in effect, and local papers and TV stations often give incorrect sunrise data. If you want to confirm your official start time, please contact the national office (BBS@ec.gc.ca). Be at the start point early so that you can get set up (e.g., record weather data and actual start time).

Stop Locations

Stops are generally located at 0.8 km (800 m or ½ mile) intervals. Unfortunately, car odometers vary. The most important issue concerning stops is that **all 50 stops should be made in exactly the same location from year to year**.

Canada

If you are running an unmarked route for the first time (i.e., no stops marked on the map and/or stop descriptions available), the best approach is to drive 0.8 km (800 m or ½ mile) between every stop. Important: please make a list of stop descriptions and mark their locations using a GPS unit, so that your stops can be duplicated in the future.

If you have a route map with stops marked on it or a list of stop descriptions available, use those stops regardless of what your odometer says unless the marked stops are entirely unreasonable. If this is the case, please contact the national office (BBS@ec.gc.ca). If a route problem arises, see Route Problems.

It is important that a clear written stop description and accurate GPS coordinates exist for each stop. Please enter or edit your stop descriptions online, ensuring that you update your stop descriptions is ever they change (see Stop Descriptions). Please collect GPS coordinates and enter them online (see Stop Coordinates).

Stop Descriptions
If your route has outdated stop descriptions or does not have any at all, please document them and/or ensure they are up-to-date. Not all subsequent BBS observers on your route will have a GPS unit, so even if exact GPS coordinates are available, stop descriptions should have enough detail that a new observer is able to find the same stop using the written descriptions. Stop descriptions should be updated as necessary whenever major landmarks change along the route. You can enter stop descriptions online or return hard copies in the mail.

Stop Coordinates
If you are able, please obtain GPS coordinates in **decimal degrees using NAD83** (e.g., 49.1234, -79.12345) for all 50 of your stops. If you are already familiar with your GPS unit, it only takes a few seconds to capture each GPS point so this can usually be done at the same time you run your BBS route (especially if you have an assistant along). However, if you are not familiar with your GPS unit, please do **not** let it interfere with your bird counts. Record the GPS points during your scouting trip instead. **Remember: these GPS points can be collected outside the breeding season as well.** You can enter stop coordinates online or return hard copies in the mail.

For those of you who would like to collect GPS information but do not own a GPS unit, Environment Canada has several units to lend. Please contact the national BBS office (BBS@ec.gc.ca) or your regional coordinator for help.

Counting Birds
One and only one observer should count birds. Counting should be done from outside the car but from a stationary point. Every bird seen within 400 m by the one observer, or heard from any location, should be counted during the three minutes at each stop. Do not exceed three minutes even if you are sure a certain "good bird" is there and not calling -- it will probably be recorded some other year, and valid negative data are as important as positive in this survey. Do not stay less or more than three min. **Absolutely no method of coaxing birds should be used** under any circumstances during the three-minute counting periods. This means no "pishing," tape playbacks or any other method. It is crucial that all surveys be done consistently, because the goal of the survey is to establish a comparison index not an actual count or census. Birds seen between stops or before and after the three minutes or on scouting runs should not be counted, but may be noted in the margin. Such birds are of some interest, but do not spend extra time pursuing them, **as it is important to finish within the time limit,** which should be 4 to 5 hours; bird activity changes drastically after this time. Do

not wait to record birds after the three minutes have been completed; always record as you hear or see the birds. Waiting leads to errors of omission and significantly delays the completion of the survey.

Which Birds to Count

Count every individual (except dependent young including downy chicks of waterbirds and shorebirds) of all species seen or heard during each three-minute period. Estimate flocks too large to count in the brief time they are seen. Do not use check marks even for abundant species; always provide a count. No one will detect all birds within hearing or seeing distance. Hundreds of birds could be present, but not all will be active during each three-minute count. You must not try to guess how many you are missing. **Report only those birds actually seen or heard during the prescribed three-minute stops**. Be careful not to count any individuals known or strongly suspected to have been counted at a previous stop. Any bird known to be a non-breeder (late migrant, injured bird, or summer vagrant) should be included, **but marked on the data sheet as a non-breeder (Mig)**. Easily identifiable subspecies of birds, such as Northern Flicker (yellow- vs. red-shafted), Dark-Eyed Junco (Slate-coloured, Oregon, etc.), and Yellow-rumped Warbler (Myrtle vs. Audubon's) should be identified whenever possible. Species recorded that are not already listed on the forms should be added at the bottom. **There is no need to fill in AOU numbers**; we will do that for you. **Any species unusual to the area, whether it appears on the form or not, should be supported by including some details of the observation.**

Counting Vehicles

At the bottom of the field sheets, record the number of vehicles that pass by during each three-minute stop. Treat all motorized vehicles equally; motorcycles, cars, buses, trucks, semi-tractor trailers, etc., each count as one vehicle if they pass by the point while the count is in progress. Count only those vehicles that are on the road where the count is taking place. Do not count vehicles passing by on nearby thoroughfares even if their noise is interfering with your ability to detect birds. If a stop is located at an intersection, count the vehicles traversing both roads during the count. **It is useful if the assistant can count and record the number of vehicles, thereby freeing up the observer to concentrate on the birds. We suggest using a mechanical hand-counter or tallying device to count vehicles**. If a stop is on a heavily traveled road, it is acceptable to estimate the number of vehicles that passed by during the three-minute stop, since counting birds is the primary objective of the survey. In addition, if you feel counting vehicles distracts too much of your attention from the bird survey, forego this step and indicate on the cover sheet that you did not count vehicles.

Excessive Noise

At the bottom of each field sheet there are five bubbles, one bubble for each stop. Fill in a circle completely if you feel constant excessive noise, other than that produced by counted vehicles, is significantly interfering with your ability to hear birds at that stop. Possible sources of excessive noise include, but are not limited to: lawn mowers, oil well pumps, trains, planes, tractors, vehicles on nearby roads, numerous barking dogs, and rushing river water. Do not fill in the circle if the disturbance is temporary (lasts < 45 seconds) or if you are able to temporarily suspend the count until the offending noise has ceased or moved on.

Acceptable Weather

To be comparable, routes must be run under satisfactory weather conditions: good visibility, little or no precipitation, light winds. Occasional light drizzle or a very brief shower may not affect bird activity but fog, steady drizzle, or prolonged rain should be avoided. Except in those prairie provinces where winds normally exceed Beaufort 3 (13-19 km/h; 8-12 mph), counts should preferably be made on mornings when the wind is less than 13 km/h (8 mph) and not done if the wind exceeds 19 km/h (12 mph). If you can walk faster than the

wind is blowing, wind conditions are very satisfactory. See Wind Speed Codes and Sky Condition Codes for more information.

Wind Speed Codes
Enter Beaufort Numbers on the cover sheet, as well as every 10 stops or if there is a marked change in conditions. Do not use mph or km/h.

Beaufort code	Indicators of Wind Speed	Wind speed km/h	Wind speed mph
0	Smoke rises vertically	< 2	< 1
1	Wind direction shown by smoke drift	2 - 5	1 - 3
2	Wind felt on face; leaves rustle	6 - 12	4 - 7
3	Leaves, small twigs in constant motion; light flag extended	13 - 19	8 - 12
4	Raises dust and loose paper; small branches are moved	20 - 29	13 - 18
5	Small trees in leaf sway; crested wavelets on inland waters	30 - 38	30 - 38

Sky Condition Codes
Enter these Weather Bureau code numbers on cover sheet, as well as every 10 stops or if there is a marked change in conditions.

Sky condition code	Indicators of sky condition
0	Clear or a few clouds
1	Partly cloudy (scattered) or variable sky
2	Cloudy (broken) or overcast
4	Fog or smoke
5	Drizzle
7	Snow
8	Showers

Route Problems
Scouting your route beforehand should eliminate most last-minute adjustments. If any problems arise, **notify the national office** (BBS@ec.gc.ca) as soon as possible. If it is not possible to scout a route and a problem arises while running it, remember that it is most important to use the **same stops in the same order as in previous years**. If a detour is necessary, go around and resume on the other side of the obstruction, attempting to preserve as many stops as possible. **Do not make new stops** along the detour unless necessitated by inaccessible sections of road or if detouring around will take in excess of an hour.

There are numerous local traffic regulations dealing with the proper and safe parking of vehicles along roadsides. Please observe these regulations while conducting your Breeding Bird Survey. Remember to use caution in selecting an appropriate stopping place, and when getting in and out of your vehicle. If a stop is in a dangerous location, it is acceptable to move it as much as 160 m (or 0.1 miles) forward or backward, or to put it on a side road. If this does not resolve the safety problem, skip the stop and contact the national office (BBS@ec.gc.ca). **Never stop at a location you consider to be dangerous in any way**. Counting may be extended

by 1 minute at stops with excessive traffic noise. This should be restricted to only a few stops; if many stops have excessive traffic, notify the national office. In some cases, a replacement route will have to be developed.

BBS Cover Sheet

Always complete and mail in the cover sheet of the field sheet form regardless of whether you are planning to enter your data online or planning to mail it in**.** Be sure to **furnish all the summary information requested on cover sheet**; including date, time and weather data. Please enter only one number or letter per block (start the date and starting time entries with a "0"). Please print plainly with a dark pencil or pen, but not a felt-tip marker, because all information must be scanned. The observer refers to the name indicated at the bottom of the sheet, not the driver or the recorder. Two people should not observe together and take turns putting each other's name in the observer block from year to year. Before submitting the cover sheet, always verify the address indicated on the front and answer the questions listed by filling in the bubble corresponding to the correct response (Y= Yes and N = No). When updating the address, always use CAPITAL letters and place one character per box. If surveying multiple routes, it is only necessary to update the address on one cover sheet.

Submit Data Online

Please submit your data online. Note that you will still need to mail in your cover sheet (See BBS Cover Sheet) and your original data sheets (i.e. those used in the field) to Environment Canada's Canadian Wildlife Service BBS office using the postage-paid return envelope after you have entered your data.

Submit Data by Mail

Observers without internet access can mail completed data forms to the Canadian BBS office using the postage-paid return envelopes. If you choose to mail your completed data forms to the BBS office for entry, remember that all data must either be recorded directly to the scan forms in the field or transcribed to the scan forms from your own field sheets**.** You must submit your data using **Arabic numerals** (i.e., 1, 2, 3, …, 15, 16, etc.). Print **firmly** with **dark** pencil or ink pen, write legibly, avoiding contact with edges of entry boxes. Do not obscure or mar the black cornerstones or identification boxes at the top left corner of the pages. **Do not use a felt-tip pen**; the ink is not waterproof so it smudges, washes out easily and makes corrections difficult. There is no need to fill in missing AOU numbers or staple the data sheets together. M**issing species may be written in lower case letters and abbreviated**.

If using any other method to record individuals (hash marks, dots, etc.), please use your own data sheets (or make a photocopy of the scan form for use in the field) **then transfer the species data to the scan form using Arabic numerals before sending it in**. Please double-check the transfer of data; we have found that many observers inadvertently omit information when transferring. For this and other reasons, always send **both sets of data sheets** to our office. Also, keep a photocopy of the original data sheets for your records; you will need the photocopy to check against the results we will send you at the end of the year and as insurance against lost mail.

Dictating Observations to a Tape Recorder

It is risky to record data by dictating observations to a tape recorder because the data can easily be lost by one sort of malfunction or another. Transferring the taped data is tedious and also subject to error. Another problem is that the tape is technically the original field sheet and it would be unreasonable for people to send us tapes. If you must use a tape recorder, indicate this on the assistant line and please be careful. With practice, an observer can easily count and record birds on the field sheet alone.

All Forms Must be Completed and Returned by August 31

Please use the provided pre-paid, pre-addressed envelope to return your **car sign**, **field sheets** (representing 50 stops), **cover sheet**, **route map** and **stop descriptions** each year. Please keep a copy of your bird data so that you can check the computer printout that will be sent at a later date. If you cannot run your route, please return the packet as soon as possible**. If you cannot cover your route during the prescribed period, please inform the** Provincial/Territorial Coordinator **or the national office** (BBS@ec.gc.ca) **as soon as possible**.

Processing Results

Upon receipt of the forms, the cover and field sheets are checked for completion and addresses are checked. Data from the cover and field sheets are then scanned into the computer and run through a computer edit program. A link to your data will be emailed to you for verification. Data are then posted to the BBS website.

Income Tax Deduction

It is not possible for Environment Canada's Canadian Wildlife Service to reimburse expenses or to issue tax receipts for participation in the BBS. However, out-of -pocket expenses for running a BBS route can be treated as a charitable donation through the non-governmental organization **Bird Studies Canada (BSC)** and participants can thereby receive income tax receipts. Please note: this system provides **a tax receipt only** and is not a reimbursement of expenses. Participants submit a record of their expenses along with a cheque, **payable to Bird Studies Canada**, of an amount equaling the expenses. BSC then treats the cheque as a donation and issues the participant a tax receipt. Along with the tax receipt BSC sends the participant a cheque equaling the amount of the donation. Cost of motels, campgrounds, meals, mileage, etc., involved with the scouting and running of official Breeding Bird Survey routes can be included in these costs. For details, see the **BSC Volunteer Support Form** enclosed in your package. Please return your completed Volunteer Support Form **to the Canadian BBS office** by **October 15** each year. We will process the request and then forward it to Bird Studies Canada.

Equipment Checklist

- Clipboard
- Pencils (dark, soft lead)
- Gasoline
- Hand counter or mechanical tally device
- Binoculars
- Thermometer
- Flashlight
- Watch with second hand (or timer)
- Data forms and/or field sheets
- Route Map & Stop Descriptions
- GPS unit

Breeding Bird Survey Safety Guidelines

We hope that your Breeding Bird Survey is filled with beautiful sunrises, breathtaking wildlife sightings, and wonderful birdsong. However, you may also have less pleasant experiences on your route. Hazardous route conditions, car breakdowns, bears or other potentially dangerous wildlife (including humans!), mosquito bites, dehydration, sun overexposure, and sleep deprivation are all possible along your BBS route. In order to reduce the risk of these incidents, we ask that you and your assistant familiarize yourselves with the suggested safety precautions outlined below.

Personal health

- Wear sun and insect protection, including sun block, insect repellent, hat, and protective clothing.
- Be aware of West Nile virus precautions. Get more information on the use of insect repellents.
- Bring drinking water and food. In the event of a delay, you will be much more comfortable after a snack and a drink!
- Be aware of your own personal limits. Postpone the survey if you are feeling unwell or are under the effects of medication or other substances which could impair your judgment.

Car safety

- Ensure that your car is in safe working condition and your gas tank is full before you leave home for your route.

Traffic hazards

- Abide by all traffic regulations and laws.
- Be especially aware of and alert to oncoming traffic while you are doing your point count. Keep to the side of the road, and step off the road if a car is approaching.
- Wear a fluorescent safety vest (one is provided to each new participant).
- Assess pullover areas for safety at each stop. Look for traffic hazards, wild animals, and suspicious-looking persons. If you feel that it is not safe to pull over, you can either move 160 m (or 0.1 miles) forward, backward, or on an available side road, or skip the stop altogether.
- It's an early start! Get a good night's sleep, and do not drive if you are feeling drowsy.

Road conditions

- Do **not** continue your route if road conditions are hazardous (e.g., washed out road, fallen trees blocking the path). Halt the survey and, if possible, try again on a later date.
- If it is unlikely that conditions will change during the season (e.g., bridge washed out, road consistently unmaintained or closed, traffic consistently too heavy), contact your national or provincial coordinator for advice.

Emergency contact

- Be sure to let someone else know your departure and arrival times, your route, and the location of your overnight accommodation if you are going to your route vicinity the night before your survey.
- Bring a cell phone for emergencies, but remember that more remote routes may not be within range of your cell phone service.
- Consider bringing an assistant. In the event of an emergency, two heads are better than one. As a fringe benefit, with your encouragement, an assistant may become a future BBS participant.

Respect all private property and laws.

APPENDIX I

Caribou Behaviour Monitoring

AGNICO EAGLE

Meadowbank Gold Mine

Caribou Behaviour Study, 2022

March 2023

Project No.: 0656774-01

The business of sustainability

ERM

March 2023

Meadowbank Gold Mine

Caribou Behaviour Study, 2022

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EXECUTIVE SUMMARY

The Meadowbank Complex, owned and operated by Agnico Eagle Mines Limited (Agnico Eagle), is located on Inuit Owned Land (IOL) and includes the Meadowbank Gold Mine (the Project) approximately 90 km north of the Hamlet of Baker Lake, and the Whale Tail Mine located approximately 150 km north of the Hamlet. A 108 km All Weather Access Road (AWAR) connects the Meadowbank Gold Mine to Baker Lake, and the 72 km Whale Tail Haul Road (WTHR) connects the Meadowbank Gold Mine to the Whale Tail Mine. During spring and fall migration, Lorillard caribou, along with smaller numbers of Wager Bay and Ahiak caribou occur in the Project area, regularly crossing through the Project site, AWAR, and WTHR.

As part of the Nunavut Impact Review Board (NIRB) Project Certificates #004 and #008, Agnico Eagle is required to study and report on the effects of the Project on caribou. The Agnico Eagle Terrestrial Ecosystem Management Plan (TEMP; 2019) includes behaviour monitoring for caribou.

Behaviour monitoring was conducted in 2020, 2021, and 2022. Agnico Eagle retained ERM Consultants Canada Ltd. (ERM) to update the field protocols used for behaviour monitoring in early 2020. ERM adapted standard methods for caribou behaviour monitoring developed by the Government of Northwest Territories Department of Environment and Natural Resources (GNWT ENR).

A Terrestrial Advisory Group (TAG) was formed in 2019 as a collaborative forum to discuss Inuit Qaujimajatuqangit (IQ), Traditional Knowledge (TK) and western science applications to mitigation and monitoring programs for the Meadowbank Mine, including on caribou movement in the project area. Following the discussion of the caribou behaviour survey results in 2020 and 2021, the TAG and particularly the Kivalliq Inuit Association suggested several improvements to the survey protocol and analysis methods. Agnico Eagle endeavored to incorporate all the suggestions of the TAG into the 2022 data collection process and analysis.

Field surveys were conducted primarily during spring and fall migration by the Agnico Eagle environmental technicians. These technicians were trained and were dedicated to conducting behaviour surveys. Each survey lasted 30 minutes, with scan samples conducted every three minutes.

The behaviour monitoring data from 2022 were combined with data from 2020 and 2021, and all results outlined in this report use all three years, unless otherwise stated. The key findings from the 2022 program were similar to 2020 and 2021, and included:

- The standard monitoring protocols adapted from the GNWT ENR worked well at the Project site.
- 104 surveys were conducted in 2022, compared to 134 in 2021 and 116 in 2020; 63 surveys occurred during spring migration from March to May, 18 occurred during calving and summer from June to August, and 23 occurred during fall migration from September to December.
- Caribou mostly exhibited the non-response behaviours of standing, laying, feeding, and walking.
- Observations were well distributed across a range of caribou group sizes from 1 to 2 individuals to >1,000.
- Larger groups of caribou tended to be recorded further from the road. Only five groups larger than 100 individuals were recorded within 100 m of the road at the start of the survey, two in 2021 and three in 2022.
- Caribou group size was not linked to response behaviour or walking behaviour in statistical analyses.
- Statistical analysis indicated that there is a trend for caribou at greater distance from the road (>1,000 m) to have a lower proportion of response behaviours (alert and running) than caribou within 100 m of the road.

- Approximately 54% of the surveys included a disturbance event; typically, haul traffic and light trucks from the mine, and occasionally all-terrain vehicles (ATVs) from Baker Lake on the AWAR for travel and harvesting.
- Following a disturbance event, the proportion of response behaviours in a group of caribou was significantly higher, but generally returned to baseline behaviours within one or two sampling intervals (i.e., three or six minutes).
- In response to comments from the KivIA, the behaviour of "walking" was investigated for whether it may be an "alert" behaviour instead of a non-response behaviour, however, disturbances did not statistically affect the proportion of caribou walking.
- Surveyors conducted nine special 90-minute surveys during convoys in 2022 and nine in 2021, to assess whether the response to convoys was similar to that of other vehicles. Caribou responded similarly to convoys but possibly for longer than for other vehicles. More convoy surveys are needed to analyse the data statistically.
- During periods when large groups of caribou are present, the AWAR and Haul Roads are closed following a decision tree in the Meadowbank Mine TEMP, reducing the potential to record interactions between vehicles and caribou. Road closure status did not affect behaviour in the statistical analysis, possibly due to it having less explanatory power than the other variables included.
- Groups of caribou were observed on both the east and west sides of the road in all seasons, but were more commonly observed on the west side during spring migration and the east side during fall migration (a.k.a. upstream of the dominant direction of travel). Statistical analysis found that side of road and season did not affect response behaviour (alert/running), but that caribou were significantly more likely to be walking on the upstream side of the road. The dominant behaviour on the downstream side was feeding or laying down.

Based on commitments in the Terrestrial Ecosystem Management Plan (TEMP), the overall objective of the caribou behaviour monitoring program was to determine if caribou activity budgets changed with distance from the mine, and to document caribou response to stressors. The primary hypothesis of this study was that caribou closer to the road would demonstrate a stronger response to vehicle disturbances. Overall, the results of the statistical analysis provided support for this hypothesis, as caribou tended to respond to disturbances, particularly when close to the road. However, the analysis also found that disturbances did not have a detectable effect on caribou behaviour after three to six minutes post-disturbance, suggesting that caribou behaviour returns to baseline relatively quickly following a disturbance. The updates applied to the survey protocol in 2021 and 2022 used feedback from the first year of data and analysis, and were helpful in improving the overall quality and accuracy of the data. Interestingly, even with these changes, the trends in the results were highly consistent between the three years of data. This increases the confidence that trends are repeatable year to year.

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ACRONYMS AND ABBREVIATIONS

Agnico Eagle	Agnico Eagle Mines Ltd.
AIC	Akaike information criterion
ATV	All-terrain vehicle
AWAR	Meadowbank Mine All Weather Access Road
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
GLMMs	Generalized linear mixed-effects models
GN	Government of Nunavut
GNWT ENR	Government of Northwest Territories Department of Environment and Natural Resources
IOL	Inuit Owned Land
KivIA	Kivalliq Inuit Association
km	Kilometre
km/hr	Speed expressed as kilometre per hour
m	Metre
NIRB	Nunavut Impact Review Board
T&C	Terms and Conditions
the Project	Meadowbank Gold Mine
TEMP	Meadowbank Mine Terrestrial Ecosystem Management Plan
WTHR	Whale Tail Haul Road

1. PROJECT OVERVIEW

The Agnico Eagle Mines Ltd. (Agnico Eagle) Meadowbank Gold Mine (the Project), located in the Kivalliq Region of Nunavut (Figure 1-1), received a Project Certificate (#004) from the Nunavut Impact Review Board (NIRB) in 2006. The adjacent Whale Tail Mine received a Project Certificate (#008) from the NIRB in 2018, which was amended in 2020. The Project Certificates, and subsequent Water Licenses (#2AM-WTP1830), GN and CIRNAC Land Lease, and the Kivalliq Inuit Association (KivIA) Production Lease, allowed development of five gold deposits in the 11 years since the start of operations at the Meadowbank Gold Mine and the first phase of the Whale Tail Mine. This has included construction of a gold mine and ancillary facilities including an All-Weather Access Road (AWAR), Whale Tail Haul Road (WTHR), barge unloading facilities, lay-down area, and a fuel tank farm near the Hamlet of Baker Lake.

The Meadowbank Gold Mine is located approximately 90 km north of the Hamlet of Baker Lake. Mining has ceased at Meadowbank, but the site hosts accommodation, an active mill, and ancillary mechanical, maintenance and vehicles. The Whale Tail Mine, located approximately 150 km north of the Hamlet, is an open-pit, truck-and-shovel mine operation and will produce an estimated 23.5 M tons of ore. Ore is hauled from Whale Tail to the Meadowbank Gold Mine for milling on the WTHR.

Studies of caribou behaviour were conducted during spring migration, summer, and fall migration in 2020, 2021, and 2022 at the Meadowbank Gold Mine, AWAR, and WTHR to monitor for potential Project effects on caribou.

1.1 Project Terms and Conditions and TEMP

Under the NIRB Certificate #008 for the Whale Tail Mine, Term and Condition 28 requires the Project to have a Terrestrial Ecosystem Management Plan (TEMP):

> *(NIRB #008; T&C 28) The Proponent shall maintain a Terrestrial Ecosystem Management Plan (TEMP) throughout all phases of the Project. The Plan shall include detailed monitoring, mitigation, and adaptive management measures for wildlife, with consideration for each Project activity predicted to affect wildlife, and with inclusion of specific triggers for mitigation and adaptive management intervention. The TEMP shall demonstrate consideration for all relevant commitments made by the Proponent throughout the Nunavut Impact Review Board's review of the Project.*

The Meadowbank Division TEMP (Agnico Eagle 2019) is designed to meet this condition. The TEMP includes a survey program for caribou that records caribou behaviour in response to various disturbances.

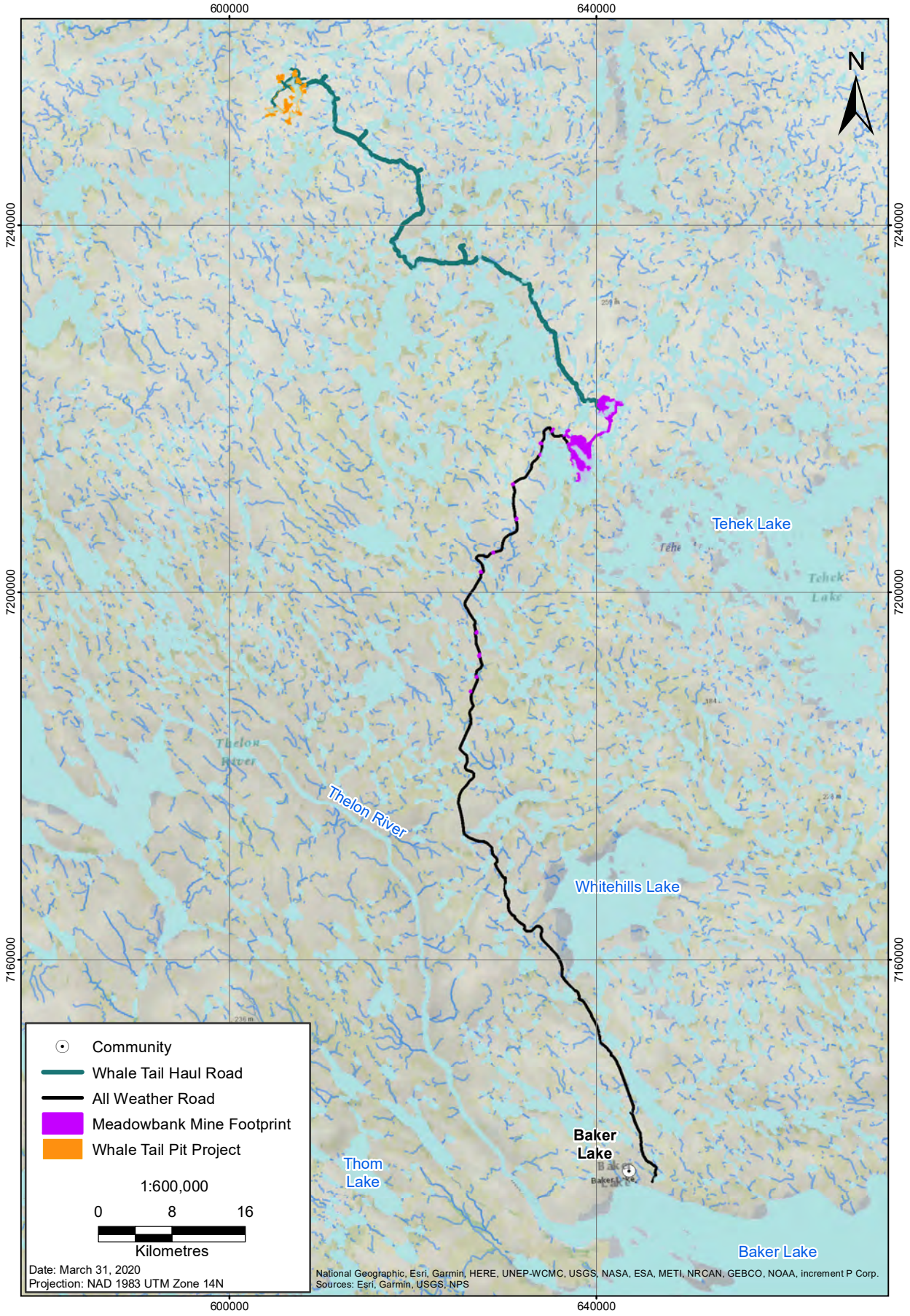


Figure 1-1: Location of Meadowbank Gold Mine and Whale Tail Pit Project

2. STUDY OBJECTIVES

Based on guidance from the TEMP, the overall objective of the caribou behaviour monitoring program is:

- To determine if caribou activity budgets change with distance from the mine, and to document caribou response to stressors.

The detailed objectives of the 2022 study were:

1. To conduct a study using behaviour survey methodology at the Project site to estimate how the roads and other site infrastructure may contribute to the effects of the Project on caribou.
2. To use information from the surveys (combined across three years of data collection) to determine factors predict caribou behaviour near the mine site, specifically comparing:
    - Near vs. far;
    - Large groups of caribou vs. small groups;
    - Surveys with and without disturbances;
    - Road open vs. closed; and
    - Upstream vs. downstream side of the road (east or west side, as determined by dominant direction of travel in each season).

The primary hypothesis of this study was that caribou closer to the road would demonstrate a stronger response to vehicle disturbances.

3. BACKGROUND

Five caribou sub-populations may interact with the Meadowbank Project Area: Lorillard, Wager Bay, Qamanirjuaq, Beverly, and Ahiak. Primarily, caribou from Lorillard herd interact with the Project, and smaller numbers of caribou from the Ahiak and Wager Bay herds interact with the Project. Collar data indicates that caribou occur mostly in the area in late winter and during fall rut.

3.1 Lorillard Herd

The majority of recorded interactions of collared caribou with the mine site and road have been from Lorillard caribou. The Lorillard caribou herd is a mid-sized caribou herd that numbered 33,454 animals in 2022 (GN DOE 2022). Previous estimates from 2002 and prior were grouped with Wager Bay because it was not known how the calving areas were delineated in the area. As a result, no assessment of trends can be made. The Lorillard herd range occurs entirely in Nunavut, with the core of its range stretching northward from Chesterfield Inlet on the Hudson Bay coast and westward toward Baker Lake.

The herd generally winters on the tundra in northern central mainland Nunavut. Spring migration is westward and north of Chesterfield Inlet, past the community of Baker Lake to a calving ground south of Wager Bay and close to the Hudson Bay coast (Nagy and Campbell 2012). During late April and early May, groups of animals from this herd interact with the community of Baker Lake, Meadowbank Mine, Whale Tail Mine, the AWAR and WTHR (Agnico Eagle 2020).

Following calving, the caribou form into large groups and generally move west and inland, gradually returning west towards their wintering areas by early December (Nagy and Campbell 2012). Throughout this period, caribou may interact with the Project infrastructure.

3.2 Existing Caribou Management Measures

As per the TEMP, during peak migration the road is closed to all but essential mine traffic. During road closures, essential mine traffic typically occurs in the form of scheduled convoys of vehicles travelling tightly in one group to minimize the sensory disturbance to caribou. During non-peak periods, caribou observations near the road trigger speed restrictions that apply to all mine traffic. Road closures are triggered separately for the WTHR and the AWAR. Drivers for the mine are also trained to slow when caribou are within sight and follow the mitigation measures outlined in the TEMP.

Caribou surveys were considered an essential activity by the Project, allowing the survey pickup truck to be used on the AWAR and WTHR even when these roads were closed to normal mine traffic.

3.3 Terrestrial Advisory Group

A Terrestrial Advisory Group (TAG) was formed in 2019 as a collaborative forum to discuss Inuit Qaujimajatuqangit (IQ), Traditional Knowledge (TK) and western science applications to mitigation and monitoring programs for the Meadowbank Mine, including on caribou movement in the project area. Members of the group include the Government of Nunavut (GN) and the Kivalliq Inuit Association (KivIA) and the Baker Lake Hunters and Trappers Association (HTO). Following the discussion of the caribou behaviour survey results in 2020 and 2021, the TAG and particularly KivIA suggested several improvements to the survey protocol and analysis methods. These improvements included adding a variable for road closures and testing whether caribou walking could be considered a response behaviour. In 2022, a variable for caribou movement direction relative to the road was added and additional information was collected on the speed of passing vehicles. Agnico Eagle endeavored to incorporate all the suggestions of the TAG into the 2022 data collection process and analysis.

4. STUDY AREA

The Meadowbank Gold Mine is located approximately 90 km north of the Hamlet of Baker Lake, and the Whale Tail Mine is located approximately 150 km north of the Hamlet. Overall, the Meadowbank Complex, consisting of both mines, processing facility, roads, and associated infrastructure and activities, is approximately 300 km inland from the northwest coast of Hudson Bay and is above the tree line near the Arctic Circle. The local physiography is characterized by numerous lakes and low, rolling hills covered mainly by lichen/rock complexes, and heath tundra.

The study area for behaviour monitoring included the existing footprint for the Meadowbank Gold Mine site, the AWAR, and the WTHR (See Figure 1-1). Surveys were conducted on any caribou that could be visually surveyed from Project infrastructure up to a distance of 3 km with the aid of binoculars.

5. METHODS

5.1 Field Surveys

Survey methods followed protocols for monitoring caribou behaviour developed by the Government of Northwest Territories Department of Environment and Natural Resources (GNWT 2017). During 2020, ERM refined these methods for Agnico Eagle's Nunavut mine operations. The updated methods focus on scan samples, *in lieu* of both scan and focal samples. Given time and personnel constraints, this was determined to be a more efficient use of time and produce better quality data that is suitable for statistical analysis. The updated methods also include an initial survey step to randomize which group of caribou to monitor when multiple groups are available. In 2022 and 2021 these methods were further refined to reflect lessons learned in 2020. The 2021 updates included recording additional information such as whether the caribou occurred on the east or west side of the road. The 2022 updates included recording the direction of caribou travel and the speed of vehicle traffic. Detailed survey protocols are attached in Appendix A.

The overall method for the field surveys was to identify caribou groups visible from the mine site, AWAR and WTHR; randomly select groups for observation; and record the behaviour of individuals in groups of different sizes, including their responses without any disturbance and in response to mine-related activities and natural factors. Surveys were conducted mainly during the spring migration when the largest number of caribou pass through the Project area but were also conducted opportunistically during summer and fall migration.

A reconnaissance survey was first conducted to identify where caribou groups were located. Where multiple groups were observed, surveyors chose which group to sample using a random number table, or specifically chose groups to fill data gaps. Field methods included the recording of site information at the location of each survey, including GPS coordinates, weather conditions, road structure, and location of the caribou group in relation to the surveyors and the road. Individuals in the observed-group were categorized when the survey started and every three minutes (referred to here as a "time interval") until 30 minutes had elapsed.

Behaviour categories and their definitions were standardized following GNWT (2017) classifications. The behaviour categories were feeding, lying down, standing, alert, walking, and trotting or running.

At each three-minute interval, surveyors recorded the numbers of individuals in the group exhibiting each behaviour at that time. If the group was too large to be counted in each interval (>100 individuals), an identifiable subset of the group was surveyed during each interval and the total group size was recorded on the datasheet. In the case that a disturbance event occurred during the survey the time and type of disturbance was recorded. A disturbance is defined as any human-caused loud noise, low-flying aircraft, or vehicle travelling on the road. Of the disturbances recorded in the three years of data collection, 97% were from road related disturbances (vehicles) and 3% were from blasts or helicopters. Blast disturbances were monitored under the scope of a different program, developed in collaboration with the TAG. In the analysis all disturbances are treated equally.

Alert behaviour and trotting or running were considered disturbance "response behaviours" and were grouped together in the subsequent data analysis. In this report, alert and running behaviours are referred to collectively as response behaviours, but it is important to note that this is irrespective of whether there were disturbances recorded. Caribou may exhibit these behaviours without a disturbance occurring. Walking was also assessed as a response behaviour in some analyses, which are specifically noted in the results.

Following recommendations from the TAG in 2021, an additional set of longer surveys was completed to specifically look at the behavioural response to convoys of vehicles. These surveys were 90 minutes each, consisting of a "before convoy", "during convoy" and "after convoy" survey. Observers sought out

caribou that were likely to remain within view for 90 minutes based on surrounding terrain. Nine surveys were completed in 2022 and nine in 2021 using this extended methodology. These are explored visually in the results, but were not analysed in a separate statistical analysis due to the small sample size.

5.2 Data Analysis

The objective of the data analysis was to quantify trends in the survey data, and determine whether factors such as distance to Project infrastructure (road), group size, or the disturbances could be used to explain caribou behavior. The primary hypothesis was that caribou closer to the road would demonstrate a stronger response to disturbances. An initial exploratory analysis was conducted to visualize the data and determine the appropriate method for analyzing the data.

A regression analysis was conducted to test whether the data from these surveys could be analyzed statistically. To increase the power to detect changes in caribou behaviour, the behaviour categories were grouped for analysis into response behaviours (alert and running) and non-response behaviours (feeding, lying down, standing, and walking).

Following the 2020 analysis, there was a suggestion from the TAG to explore whether the proportion of walking caribou changed as a response to disturbance. This was done to see if walking would be better categorized as a response behaviour or a non-response behaviour. To test this, a model that included walking, running, and alert behaviours was run in addition to the original model with just running and alert behaviours.

Generalized linear mixed-effects models (GLMMs) were used to assess the differences in the proportion of response behaviours in surveyed animals as a function of various controlling variables, including the occurrence of disturbances. This regression framework provides a means to control for habitat, environmental variables, repeated measurements, and spatial correlation.

Statistical analyses were conducted using the data from each three-minute time interval in each survey. To reiterate, each survey consisted of 11 observations: Minute zero plus 10 three-minute time intervals, totalling one 30-minute survey. Three dependent variables were tested:

1. The first dependent variable tested was the proportion of response behaviours in each time interval, modelled using a binomial distribution.
2. The second dependent variable tested was the proportion of walking and response behaviours behaviour in each time interval, modelled using a binomial distribution.
3. A third dependent variable was developed to track the number of minutes it took caribou to return to background behavior levels every time there was a disturbance. In order for a response to be included, the proportion of alert or running caribou after a disturbance had to be 40% greater than in the interval before disturbance. The response was considered “over” when the proportion of alert or running caribou returned to with the level observed in the interval before the disturbance (±5%). This variable, called “duration of response”, was assessed for each survey and modelled with a normal distribution.

The three dependent variables were modelled against a suite of potentially important variables to determine if there was any statistical relationship with response behaviour. The variables included in this analysis were group size, distance to road, temperature, wind speed, season and side of the road (upstream/downstream), the roads status (closed or open), and a binary variable identifying whether or not a disturbance occurred in the survey. Season and side of the road were included as an interaction term, because direction of travel is seasonally dependent. This means that season and side of the road are included in the model together as an interaction *and* individually as fixed effects. The interaction term makes it possible to identify the “upstream” and “downstream” side of the road, based on the season.

A random effect was included for survey ID, because the three-minute intervals within each 30-minute survey are interrelated.

Because the proportion of responding caribou in a given interval is potentially linked to the conditions in the intervals before, two additional binary variables were added identifying whether a disturbance occurred in the interval prior, and whether a disturbance occurred two intervals prior. This accommodation for a six minute “lag” was sufficient for most disturbance events, which typically did not result in a response longer than three minutes. Lastly, the survey ID was added as a random effect to account for general behavioural differences between groups of caribou surveyed.

For each dependent variable, GLMMs were constructed and tested for model fit, as evidenced by the Akaike Information Criterion (AIC). AIC is a number that is helpful for comparing models as it includes measures of both how well the model fits the data and how complex the model is (simpler is usually better). The top models were identified as having a low AIC and were within a 2 unit difference in AIC ($\Delta AIC \leq 2$) of the top ranked model (i.e., the model with the lowest AIC; Burnham & Anderson 2004). This is the industry standard for identifying models that are essentially ‘equally good’ at explaining the data. Models with a difference in AIC (ΔAIC) of 2 to 4 from the top model are generally considered to have ‘limited support’.

6. RESULTS AND DISCUSSION

6.1 Caribou Distribution relative to the Project

During spring migration in the three years surveyed (2020-2022), caribou GPS collar locations were provided to Agnico Eagle. These data indicated when caribou were approaching the Project site. Viewsheds or road surveys were conducted as required by Agnico Eagle environment technicians to trigger management actions. These data informed the decision to begin dedicated behaviour surveys for caribou as they approached the site. Through the summer, surveys were conducted opportunistically as caribou were observed. A final set of dedicated surveys was conducted in the fall during peak fall migration.

Survey locations by season are presented in Figure 6.1-1. During spring migration (March to May), calving/ summer (June to August) and fall migration (September to December), scattered groups of caribou from the Lorillard herd were observed passing through or near the study area, with the highest numbers of caribou observed in May. During spring migration in 2020, most surveys were conducted on the WTHR, as this was where the caribou were observed. In contrast, the 2021 spring season saw more caribou along the AWAR. In 2022, more surveys were conducted along the WTHR in all seasons. During summer and during fall migration in 2020, caribou were observed more frequently in the southern portion of the study area along the AWAR, but these trends were not clearly visible in 2021 or 2022.

6.2 Caribou Behaviour Field Surveys

In total, 104 behaviour surveys were conducted in 2022 when groups of caribou were near the Project (Table 6.2-1), including 63 surveys in spring migration, 18 surveys in calving and summer, 23 surveys in fall migration, and one in winter. This is compared to the 134 total surveys completed in 2021, including 114 surveys in spring migration, 15 surveys in calving and summer, and five surveys in fall migration. In 2020, there were 116 total surveys completed, including 71 surveys in spring migration, 31 surveys in calving and summer, and 14 surveys in fall migration. In 2021 the survey effort was concentrated during spring migration, and fewer surveys were completed in summer and fall. In 2022 greater emphasis was put on completing surveys during fall migration. Surveys were conducted opportunistically whenever caribou were encountered during reconnaissance drives, primarily along the AWAR and WTHR.

Overall, the survey methodology worked well for the Project location and circumstances, and the survey results were generally consistent between years. All reported results use the combined data from 2020 to 2022, unless otherwise stated. General observations on survey methodology and results included:

- Surveys were well distributed across a range of group sizes (Table 6.2-1). Surveyors reported that the addition of a reconnaissance survey and random selection of survey group assisted with a relatively even distribution of survey intensity across group sizes.
- Of the 354 surveys, more than half recorded at least one disturbance during the survey (Table 6.2-1). Most of these disturbances were haul trucks and light trucks travelling between Whale Tail Mine and Meadowbank Mine. On the AWAR, the disturbances were sometimes ATVs travelling north from Baker Lake. Mine traffic was suspended for both roads during periods when groups of caribou were near the road.
- In total, 57% of disturbances were from heavy vehicles (including haul trucks, tractor trailers, fuel trucks, and graders), 33% were from light trucks, 5% were from ATVs, 3% were from blasts, and 2% were from helicopters.
- The methodology allowed for the estimation of baseline behaviour, response to disturbance, and return to baseline behaviour. Few, if any, surveys ended before caribou returned to baseline behaviour. When they did not, it was typically due to caribou disappearing from field of vision or

because disturbances occurred toward the end of the 30-minute survey. Thus, 30 minutes appears to be an appropriate survey length.

- One source of uncertainty was consistently estimating distance. Hence, the average distance of each group of caribou was categorized into blocks of 0-50 m, 50-100 m, etc. Though distance has been estimated with a rangefinder since 2021, the data were still binned into distance intervals to allow the two years of data to be analysed together.

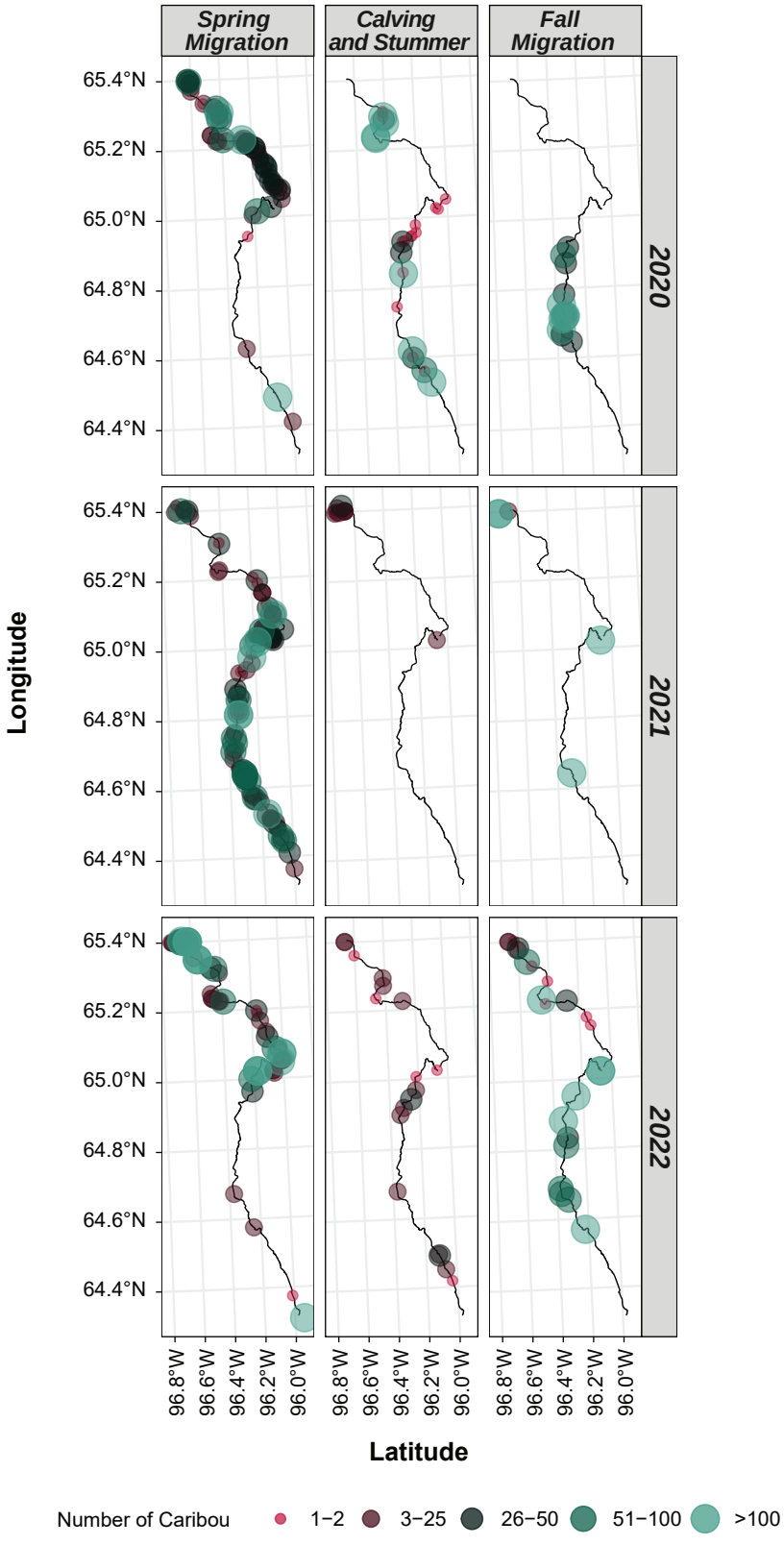


Figure 6.1-1: Locations of Behaviour Surveys by Date

- In 2020, only 16% of surveys were conducted on caribou within 300 m from the road at the start of the survey. In 2021, an effort was made to increase the number of surveys on caribou within 300 m of the road, and this resulted in an increase to 43% of surveys. In 2022, half of surveys were within 300m of the road.
- Most caribou behaviours were calm, generally foraging, and not moving quickly (non-response). The one exception was smaller groups who moved more than larger groups – more walking and trotting. Consequently, caribou were observed crossing the road in only 4% of surveys in 2020, in 4% of surveys in 2021, and in 7% of surveys in 2022. This occurred primarily in small groups of less than 25 individuals. In total, 11 crossings occurred during road closures, three during speed restrictions, and four when the road was open.
- During spring migration when caribou move east towards their calving grounds, 79% of caribou were observed on the west (upstream) side of the Project infrastructure (Table 6.2-2). This was highly consistent across all years of surveying. During summer and fall migration, caribou move west towards their overwintering grounds. In 2020 and 2022, 68% and 63% of caribou were observed on the east (upstream) side of the Project infrastructure, respectively. In summer and fall of 2021 the opposite trend was true (Table 6.2-2). This inconsistency may reflect the smaller sample size in the later seasons in 2021.

Table 6.2-1: Meadowbank Complex Caribou Behaviour Surveys Data Summary, 2020 to 2022

Caribou Group Size	Total Surveys (All Years)	Total # 2020	Surveys with Disturbance 2020	Surveys with Road Crossing 2020	Total # 2021	Surveys with Disturbance 2021	Surveys with Road Crossing 2021	Total # 2022	Surveys with Disturbance 2022	Surveys with Road Crossing 2022
1-2	67	28	15	1	23	15	0	16	10	1
3-25	142	35	22	1	63	35	2	44	28	3
26-50	60	28	13	2	21	9	0	11	4	0
51-100	38	9	5	0	17	9	0	12	3	1
>100	47	16	13	1	10	6	4	21	5	2
Total	**354**	**116**	**68**	**5**	**134**	**74**	**6**	**104**	**50**	**7**

Notes:
Grey shading is used to visually group survey years.

Table 6.2-2: Summary of Spatial Distribution of Surveys

Season	Surveys of Caribou on East Side of the Project Infrastructure 2020	Surveys of Caribou on West Side of the Project Infrastructure 2020	Surveys of Caribou on East Side of the Project Infrastructure 2021	Surveys of Caribou on West Side of the Project Infrastructure 2021	Surveys of Caribou on East Side of the Project Infrastructure 2022	Surveys of Caribou on West Side of the Project Infrastructure 2022
Spring Migration	12	46	23	89	13	47
Calving/ Summer	11	7	3	12	15	12
Fall Migration	10	3	1	4	16	6
Total	**33**	**56**	**27**	**105**	**45**	**56**

Notes:
Side of the road data was not recorded in 27 surveys in 2020. It was recorded in all surveys in 2021.
The "upstream" side of the road is based on the dominant direction of travel and is indicated with grey shading.
Caribou observed on both sides of the road at the start of the survey are not included in this table.

6.3 Exploratory Analysis Results

The exploratory analysis was conducted to determine if there were any trends or interactions in the following variables: road crossing group size, distance to infrastructure (AWAR, WTHR and mine site), weather and timing, road closure status, side of the road (east or west), number of disturbances, and response time following disturbances. Finally, the results of the 18 convoy surveys conducted in 2021 and 2022 are explored in Section 6.3.8.

6.3.1 Comparing Road Crossings with Group Size and Distance to Infrastructure

6.3.1.1 Road Crossing

Plotting the data did not show a clear relationship between caribou group size and the observation of road crossings. Although in 2020, four of the five observed road crossing events occurred in groups smaller than 25 individuals, the trend was less apparent in 2021 and 2022 when observations of road crossings included both large and small groups. There was also no clear relationship between caribou distance from road and the observation of road crossings, meaning that caribou located closer to the road were not more likely to cross the road than caribou positioned further away (Figure 6.3-1a).

6.3.1.2 Group Size and Distance to Infrastructure

Plotting the caribou group size against the distance of caribou groups to the road at the start of the survey revealed that small groups (less than 50 individuals) were observed at all distances within the study area (Figure 6.3-1a). Note that distance to the road and distance to the observer/surveyor are considered equivalent in this analysis.

In 2021 and 2022, effort was taken to increase the sample size of caribou (and specifically large groups of caribou) within 300 m of the road at the start of the survey. Despite this there is still a slight trend for larger groups to be observed further from the road at the start of the survey (Figure 6.3-1b). Only five groups larger than 100 individuals were recorded within 100 m of the road at the start of the survey, three in 2022 and two in 2021.

This may be indicative of a trend that caribou tend to avoid areas within 100 to 300 m of the road, or may be a by-product of observability bias, where smaller groups are more difficult to spot at distances greater than

300 m away from the road. Regardless of the mechanism, these trends highlight a potential source of error and were considered in the statistical analyses so that the results were not biased (see Section 6.4.1).

6.3.2 Comparing Behaviour Type with Group Size and Distance to Infrastructure

Average proportions of each behaviour type by group size and by distance to road are presented in Figure 6.3-2. When analyzed by group size, the results suggest that the average proportion of the response behaviours of “Alert” and “Trotting” remain stable as group size increases. The largest proportion of alert or trotting behaviours was observed in groups of one to two individuals. No group size had more than 10% alert or trotting, when averaged across observations with and without disturbances (Figure 6.3-2a).

When analyzed by distance to road, the results suggest that the proportion of response behaviours is relatively stable for groups within 1,000 m of the road and lower in groups further than 1,000 m from the road, but the difference is very small – at most one or two percent lower (Figure 6.3-2b). As with group size, no distance category had surveys with more than 10% of caribou with alert or trotting behaviour.

Overall, no clear differences in behaviour can be visually distinguished among group sizes or distances to the road. These relationships are examined in greater detail in the statistical analysis.

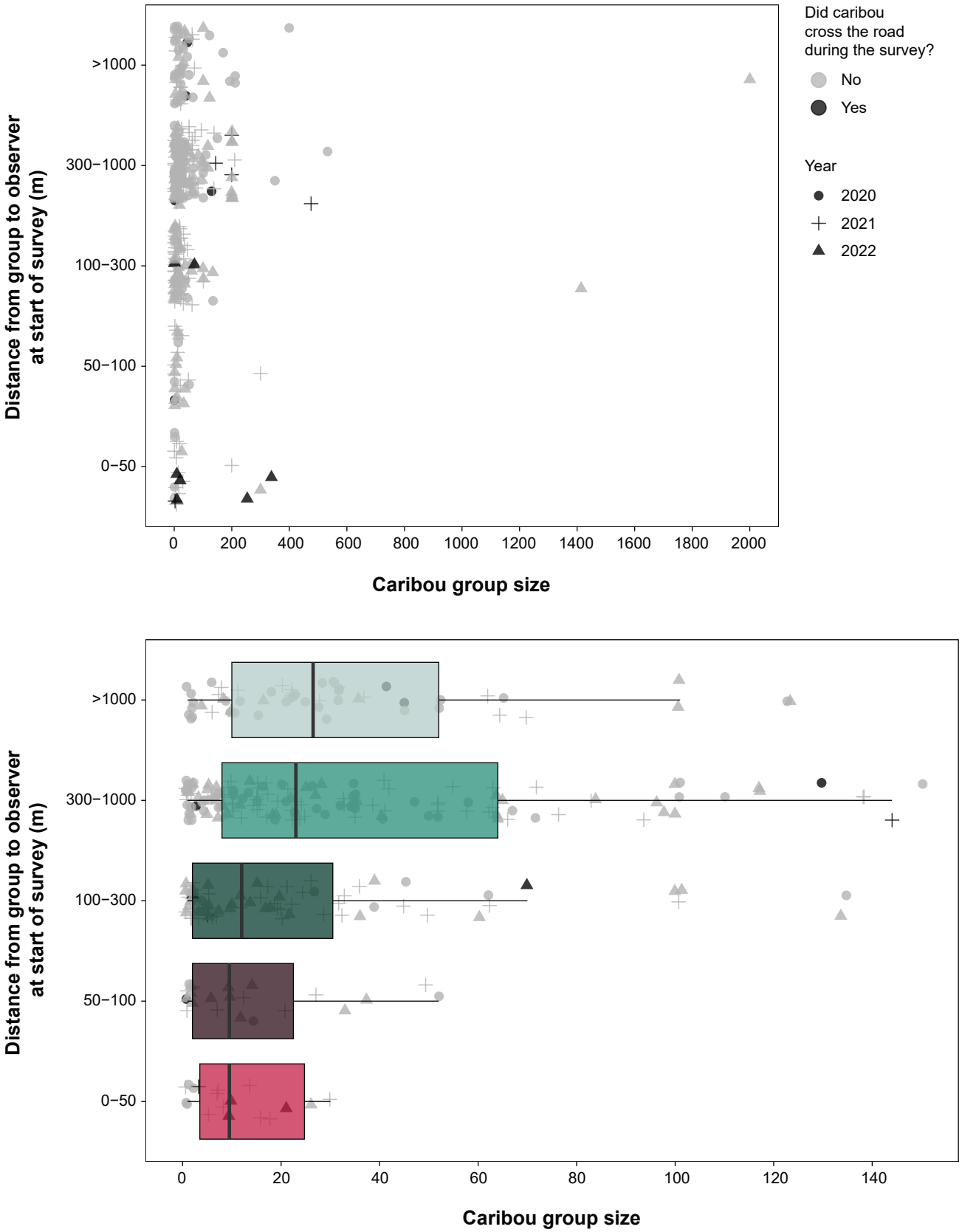


Figure 6.3-1: Caribou Group Size versus Distance from the Caribou to the Road

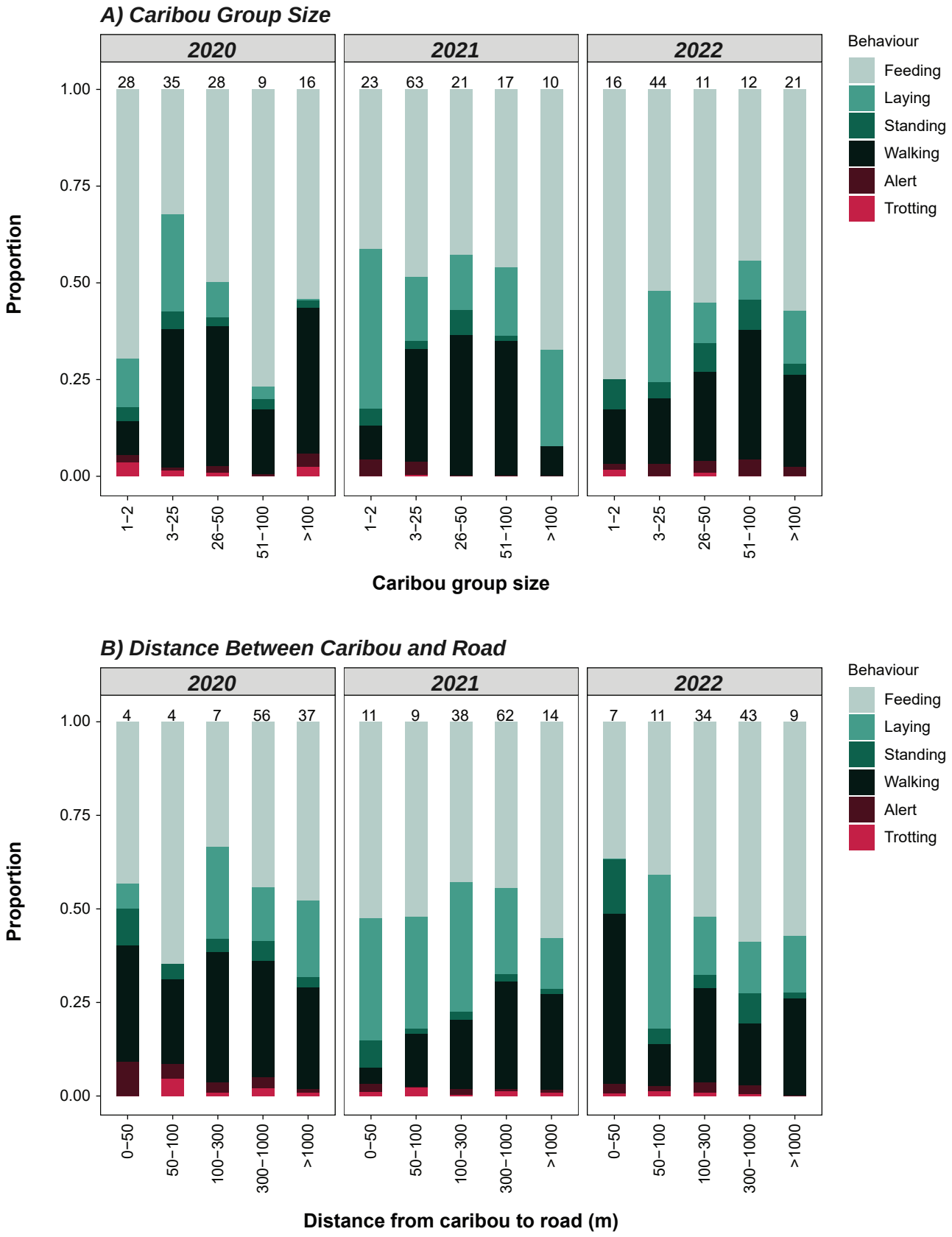


Figure 6.3-2: Average Proportion of Each Behaviour Type Observed

6.3.3 Behaviour Type and Environmental/Temporal Variables

Figure 6.3-3 shows the relationship between 1) the proportion of response behaviours and 2) environmental and temporal variables: temperature, wind speed, and date. This comparison was included to exclude the possibility that environmental factors such as heat or high winds were influencing caribou behaviour during the survey. No trend is visible in the data and trend lines fit to the weather data are nearly flat with wide confidence intervals, suggesting that the weather conditions observed during the surveys do not have a substantial effect on behaviour. It should be noted that surveyors typically did not go out in extreme weather events and therefore variability in weather conditions was low. Date was also not associated with caribou behaviour.

6.3.4 Road Closure Status

An additional comparison was added in 2021 to explore the effect of the road closure status on average caribou behaviour. During caribou active months, the road may be open, closed, or open with speed restrictions. During peak caribou migration the road is closed, with some allowances for essential traffic in convoys.

Surveyors were out collecting data when the road was open and when it was closed, as caribou surveys were considered an essential activity. As a result, there are relatively even numbers of surveys from when the road was open vs. when it was closed (Figure 6.3-4). Although it was expected that the level of response behaviours would be higher on average when the road was open due to an increase in traffic, this difference is not visually apparent. The level of response behaviour (averaged across all observations with and without disturbances) is low (<10%) both when the road is closed and when the road is open.

It should be noted that convoy surveys were included in the summary figure, and these always occurred during road closures. However, this accounts for only 11% of surveys during road closures, so cannot entirely explain the differences observed in Figure 6.3-4. This relationship is further explored in the statistical analysis.

6.3.5 Season and Side of the Road (Upstream/Downstream)

The movement pattern for caribou in the Project area is variable based on the season. During spring migration, the dominant direction of travel is west to east, whereas in summer and during fall migration it is east to west. It was hypothesized that behaviour may vary depending on whether the caribou had crossed the road already (“downstream”) or whether they were anticipating doing so (“upstream”).

One hypothesis is that caribou are hesitating to cross the road but that once they cross the road, they move away quickly. If this were the case, the prediction would be that groups of caribou would be observed close to the road on the upstream side with fewer groups or groups further away on the downstream side. This predicted distribution was not observed. Instead, groups of caribou were observed near the road on both sides of the road. Figure 6.3-5 compares the distance to the road at the start of the survey with the location relative to the road (east or west). In spring migration, a greater number of surveys were recorded on caribou on the west side of the road, which is upstream for that season. This may be an indication that caribou tend to gather before crossing the road.

While differences in response behaviour (running/alert) do not appear to vary with the side of the road the observations are from, one trend that does stand out is that there appears to be a higher proportion of walking behaviour on the upstream side of the road. This is explored further in the statistical analysis.

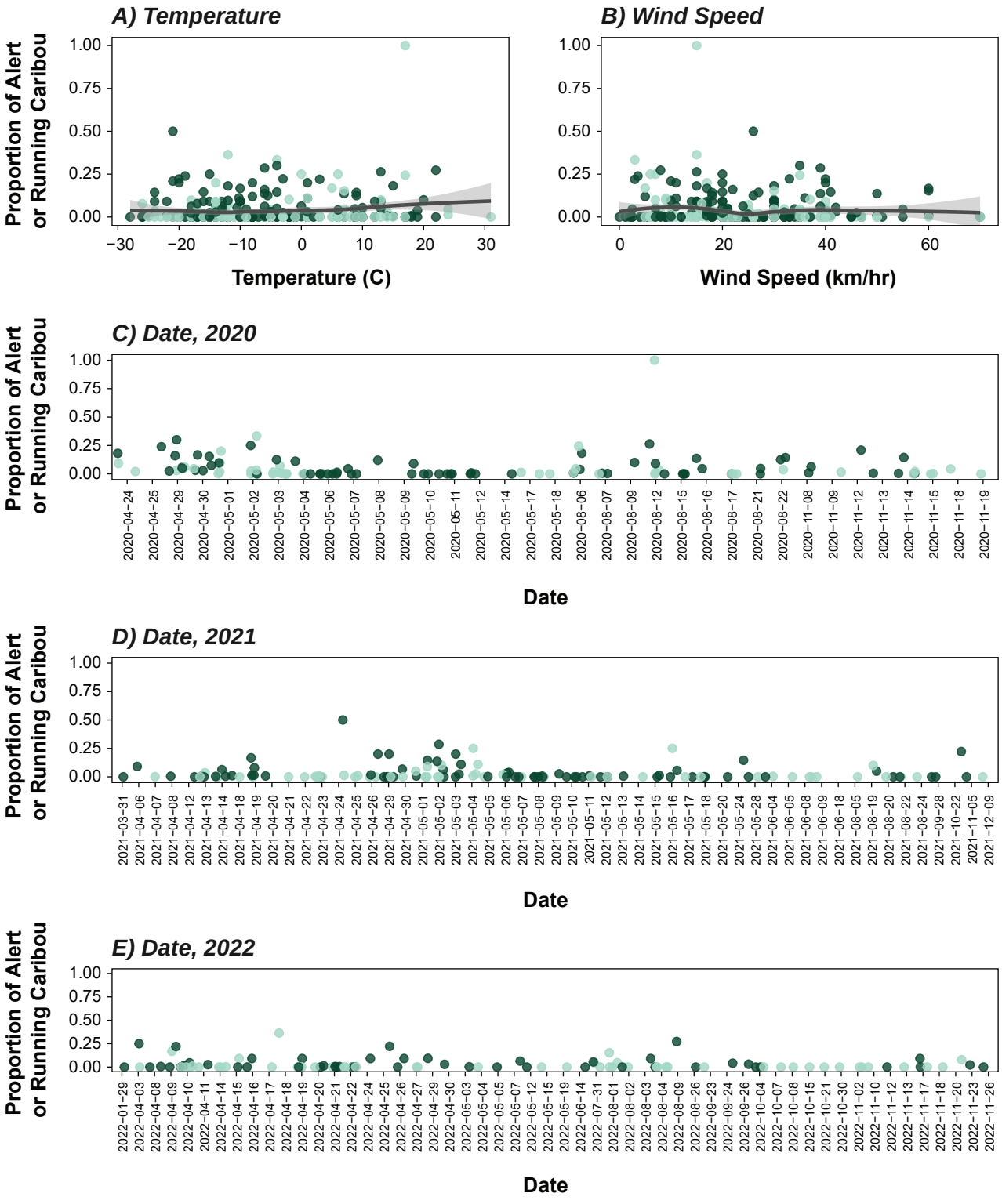


Figure 6.3-3: Proportion of Alert or Running Caribou by Temperature, Wind Speed and Date

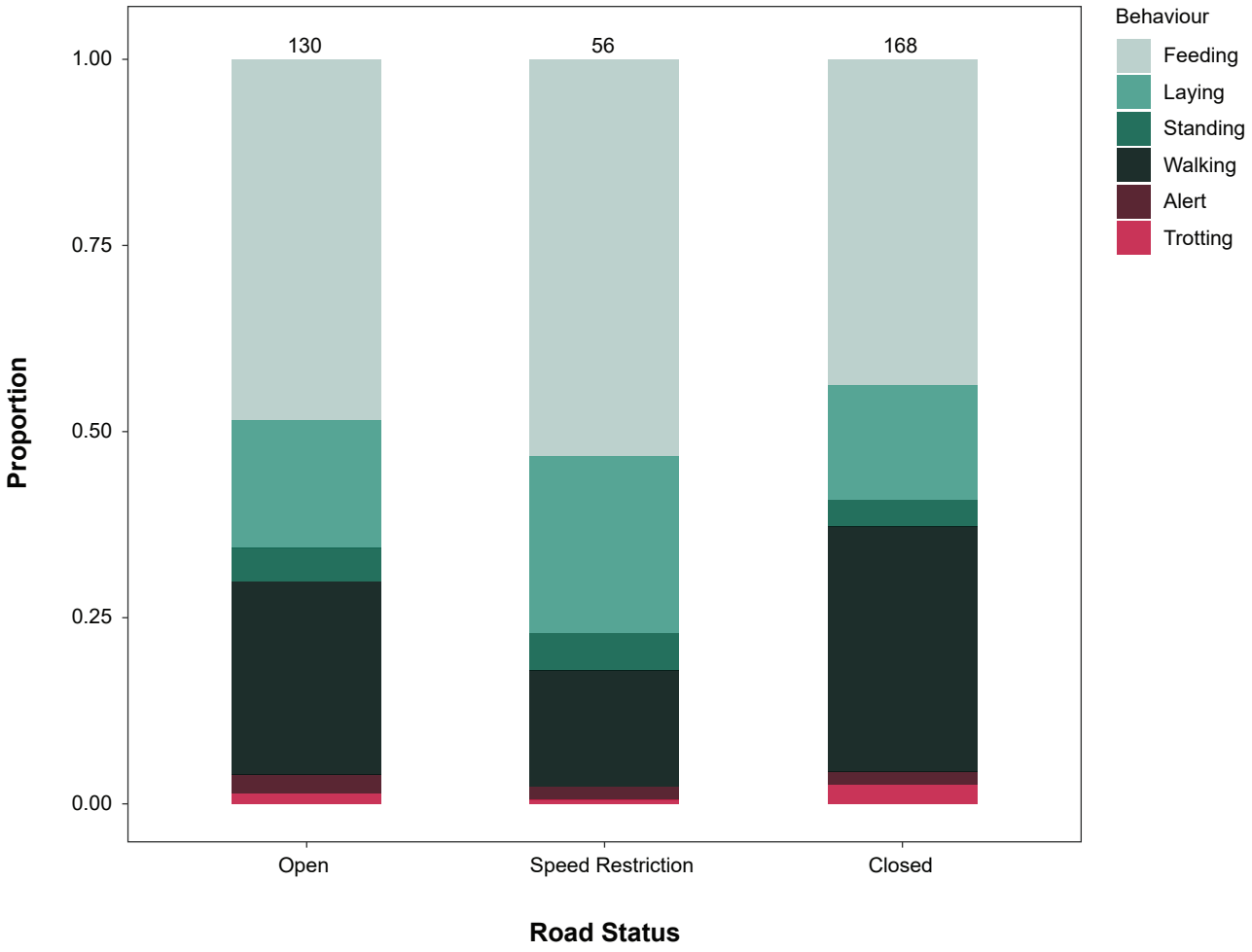


Figure 6.3-4: Average Proportion of Each Behaviour Type by Road Status

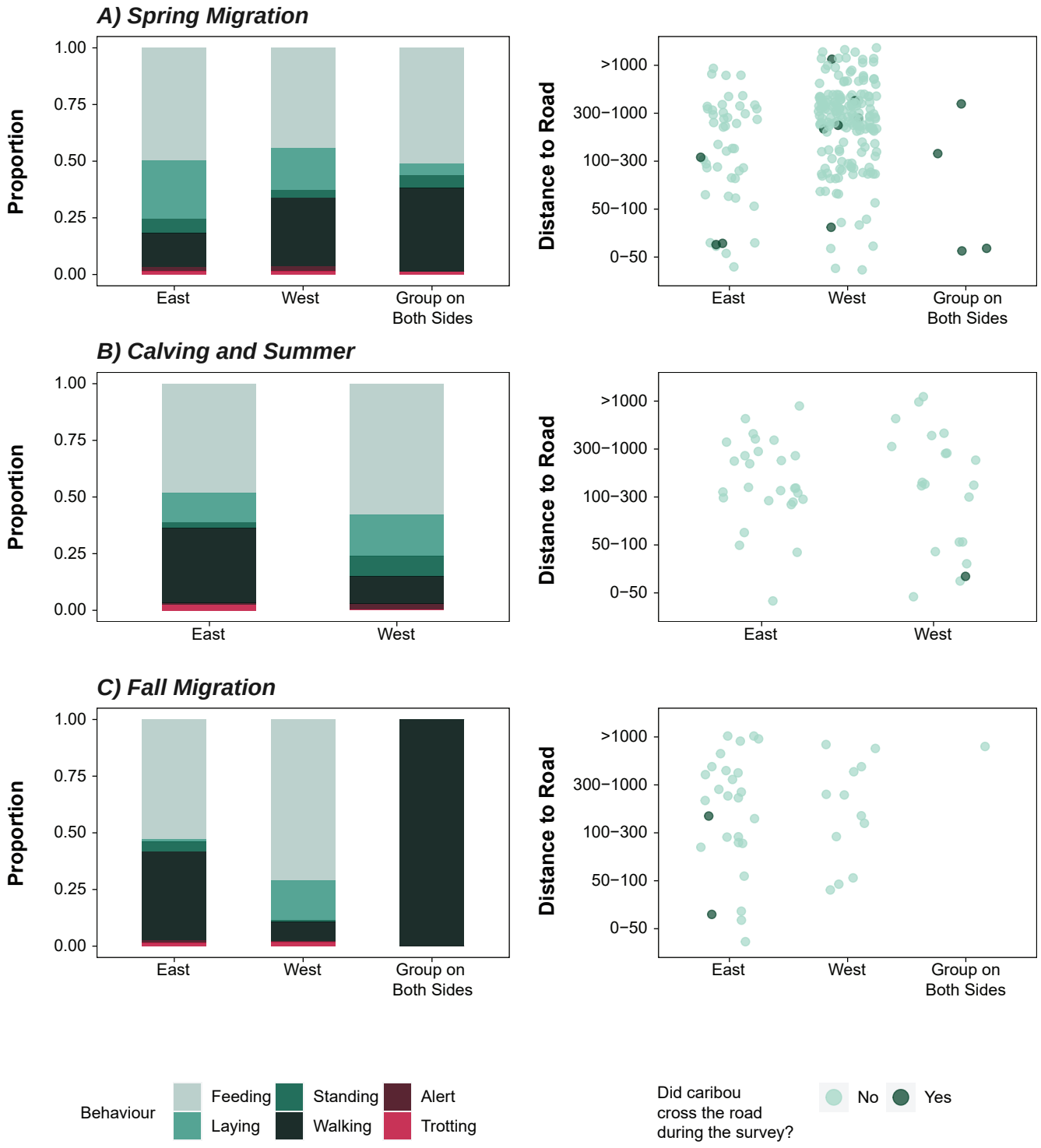


Figure 6.3-5: Average Proportion of Each Behaviour Type Observed on East and West Side of Road

6.3.6 Number of Disturbances

When duration of response (i.e., time taken for caribou to return to a baseline condition following a disturbance) is compared with the proportion of response behaviours, it appears that surveys with a higher proportion of caribou responding to the disturbance tend to take longer to recover to a baseline condition (Figure 6.3-6 panel a). Interestingly, it appears that surveys with multiple disturbances don't consistently produce a larger response or a longer one. Although the long-lasting full-group responses are in surveys with multiple disturbances, there are surveys with multiple disturbances that don't have large reactions or longer-lasting response durations.

Figure 6.3-6 (panel b) shows a density plot for the proportion of response behaviours in three subsets of surveys, those with no disturbances, those with one disturbance, and those with multiple disturbances. The results suggest a slightly higher proportion of alert or running caribou in surveys when one or more disturbances occurred. Surveys with multiple disturbances do not appear to have a greater overall response than surveys with one disturbance. It should be noted that this figure is an average proportion of response behaviours across the entire 30-minute survey, so in some instances the proportion of response behaviours may have been obscured by the large number of intervals with no response behaviour.

6.3.7 Response to Disturbances

Summarizing data over the entire 30-minute survey is useful for broad comparisons but has the disadvantage that response behaviour can be washed out in a relatively uneventful survey. To examine the response to disturbances within a survey, the proportion of response behaviours was plotted by three-minute interval for each survey, as shown for a subset of surveys in Figure 6.3-7. See Appendix C for plots of all surveys. In Figure 6.3-7, the response behaviours of “alert” and “trotting or running” are combined to create the total proportion of responding caribou in any given time interval and plotted over time within the 30-minute survey. Disturbances are denoted with a vertical bar. A spike in response behaviours in the interval during a disturbance or immediately following a disturbance suggests that the caribou are responding to the disturbance.

The results show that in the absence of disturbances, an average of 0-10% of caribou typically exhibit response behaviours at any given time. Figure 6.3-7 and Appendix C suggest that following many of the disturbance events, there was commonly a spike in the proportion of response behaviours to 60-90% of caribou in the group. The proportion of caribou with response behaviours returned to pre-disturbance levels quickly, often within two intervals (6 minutes). For example, when a truck passed, most caribou would look up (which is classified as a response behaviour) and then return to feeding or laying down (a pre-disturbance behaviour).

There was some variability in the proportion of response behaviours. During some surveys, there was a spike in response behaviours when no vehicle or other obvious disturbance was observed. In some surveys a vehicle passed by (a disturbance), but there was no increase in response behaviours observed in the caribou group on the subsequent time period.

6.3.8 Convoy Surveys

The results of the 90-minute convoy surveys from 2022 are shown in Figure 6.3-8 and from 2021 in Figure 6.3-9. The response behaviours of “alert” and “trotting or running” are combined to create the total proportion of responding caribou in each time interval and plotted over time within the 90-minute survey in dark green. The proportion of walking behaviour in each time interval is plotted in light green. Surveyors were not always able to keep track of a group of caribou for the entire 90 minute duration, so the start and end time of the survey is denoted by vertical grey bars. The time interval in which the convoy passed closest to the caribou group is denoted by a vertical red bar. Missing data within the survey indicates that the caribou were out of sight for those time intervals.

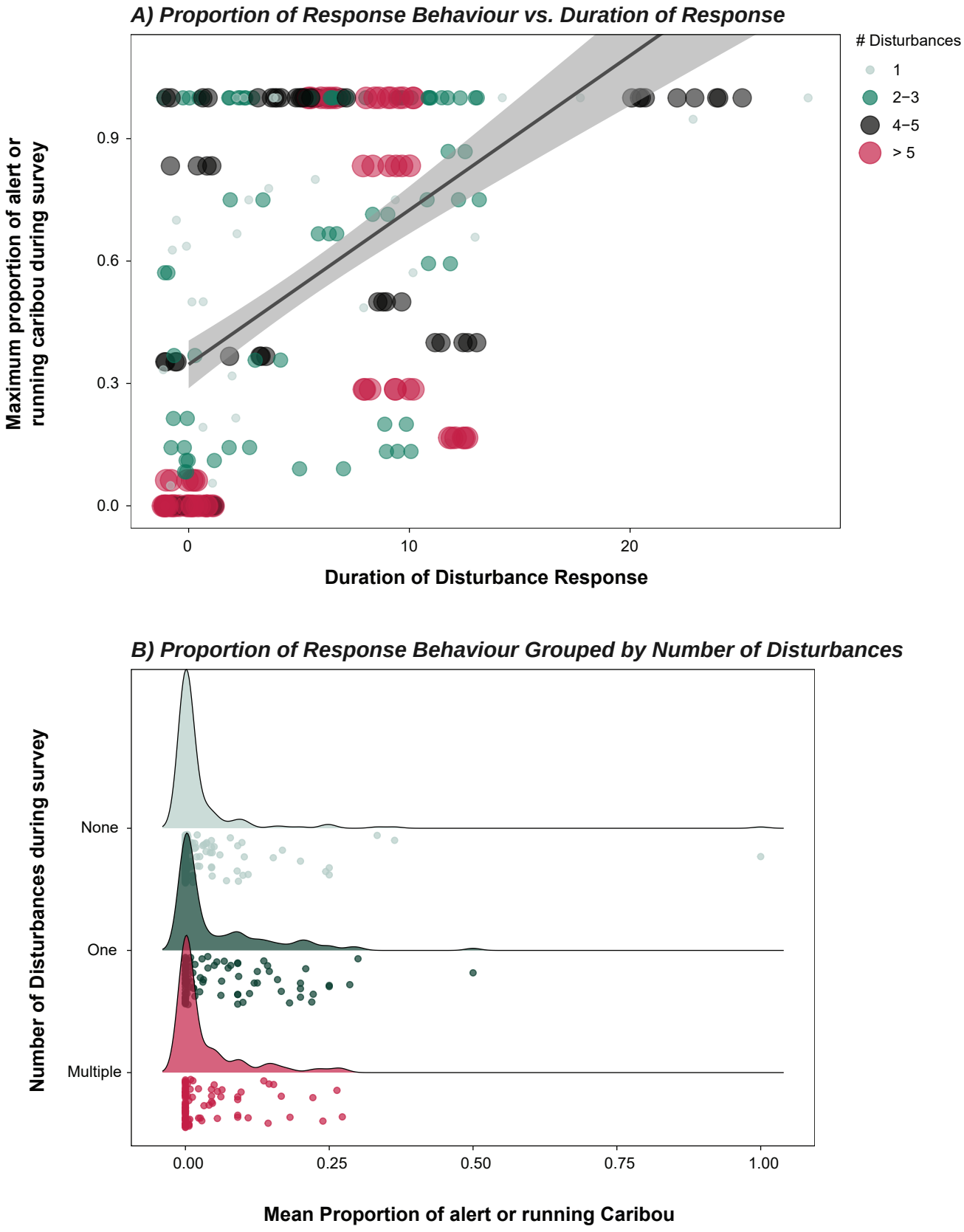
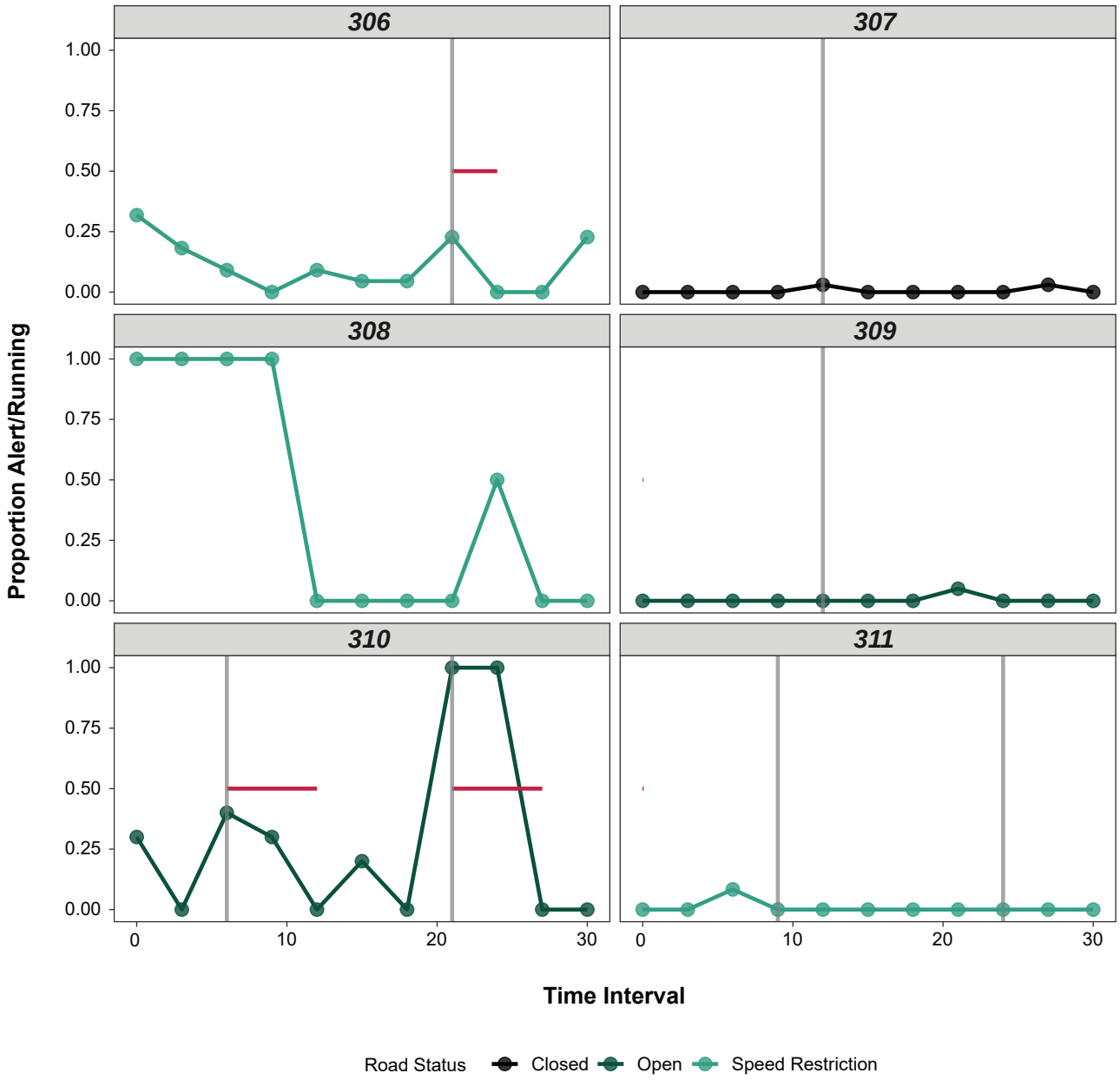


Figure 6.3-6: Comparison of Response Behaviours by Number of Disturbances



Note: See Appendix C for all surveys from 2020, 2021, and 2022.

Figure 6.3-7: Proportion of Response Behaviour during Each Survey – Example Subset

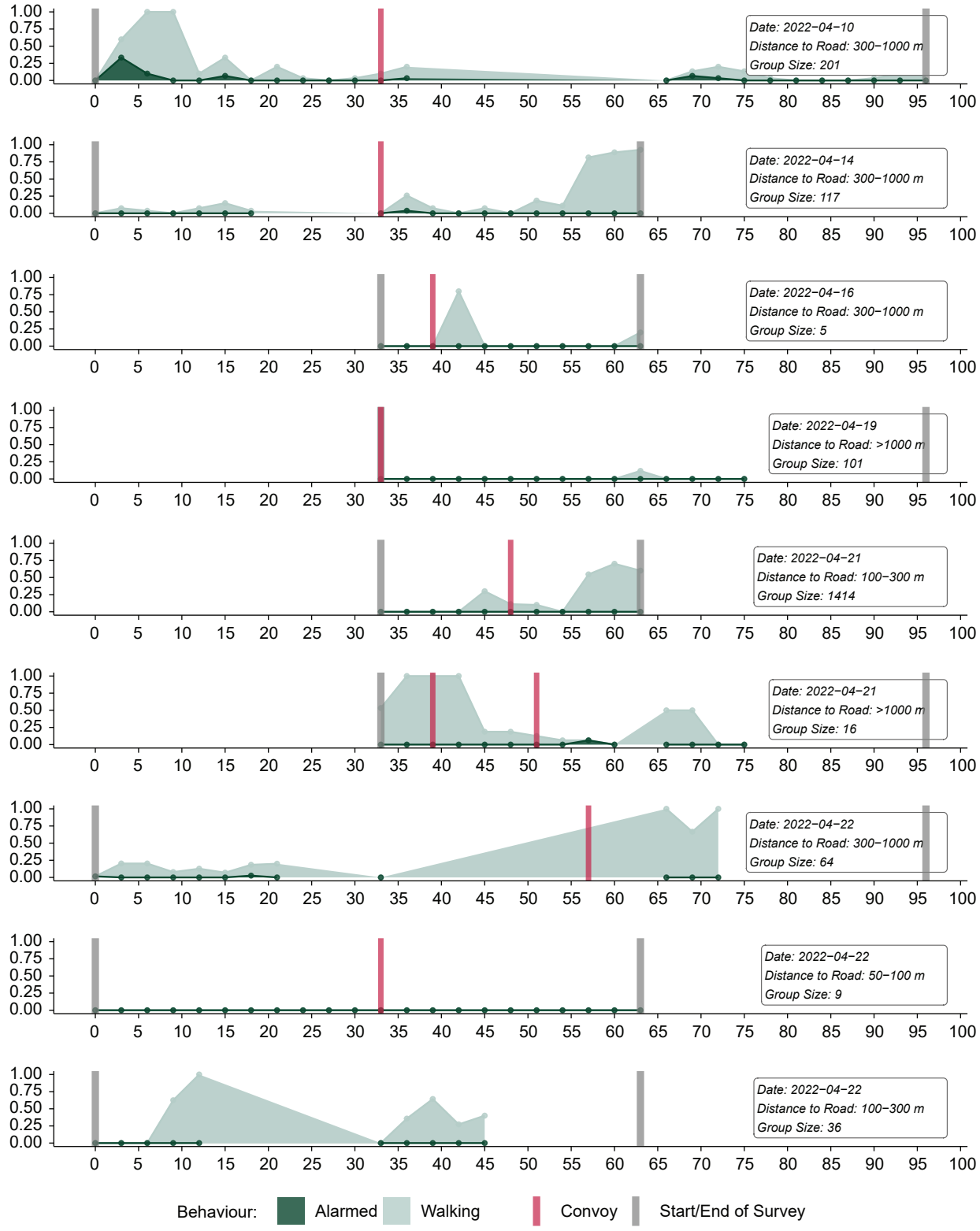


Figure 6.3-8: Proportion of Alert, Running and Walking Caribou during 90-minute Convoy Surveys, 2022

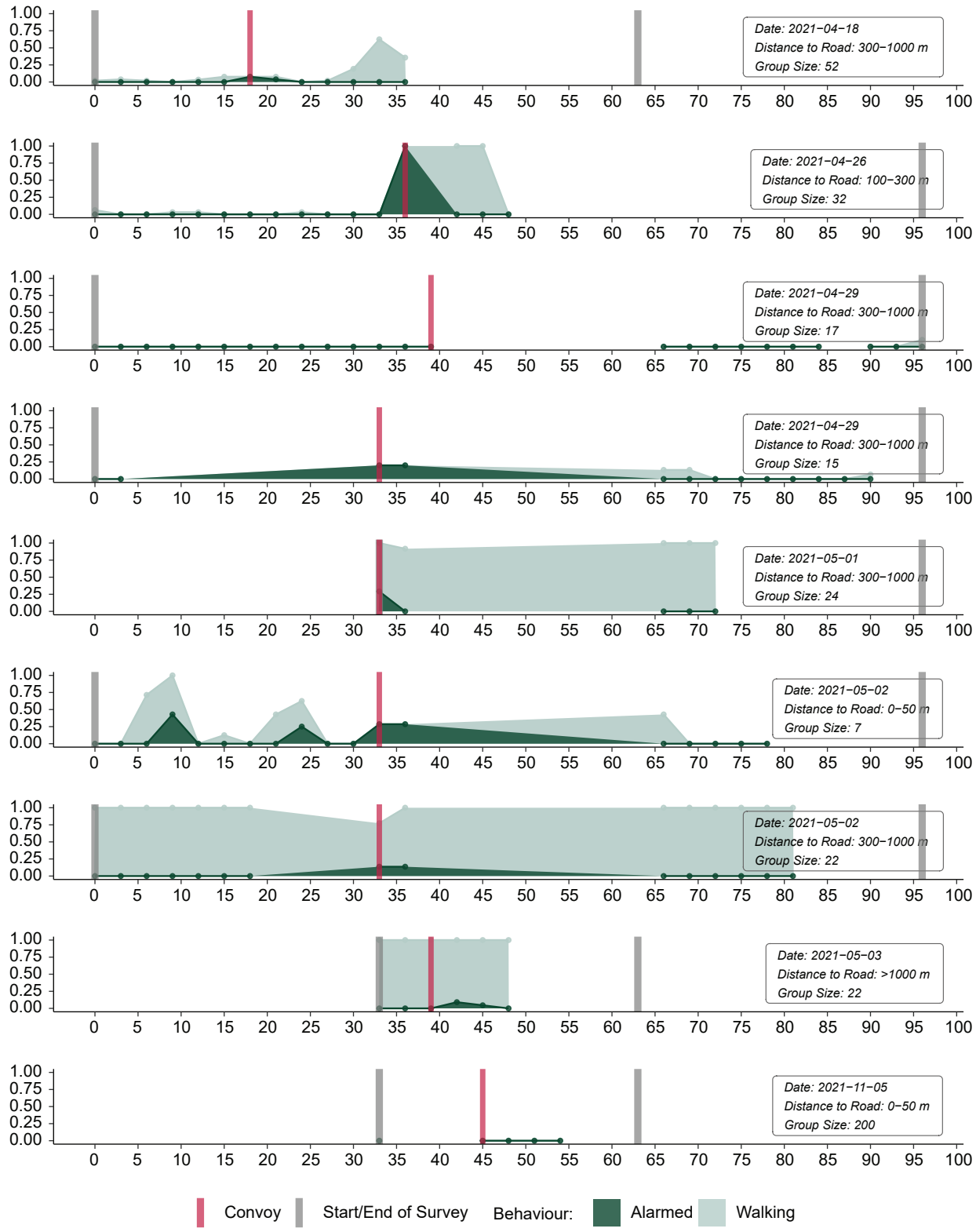


Figure 6.3-9: Proportion of Alert, Running and Walking Caribou during 90-minute Convoy Surveys, 2021

The results indicate that in 2021 the passing convoy typically resulted in a spike of response behaviours, consistent with the results seen for other vehicle types (see Figure 6.3-7). The proportion of responding caribou appeared to return to a baseline amount within 15 minutes, but the result was variable. This may indicate a slightly longer duration of response than with other vehicle types. In 2022, convoys rarely resulted in response behaviours, but did result in an apparent increase in walking.

Overall, the proportion of walking caribou appeared to increase following the convoy in some cases, but in cases where the caribou were walking before the disturbance occurred, the proportion of walking caribou *decreased* following the convoy. This may indicate that walking is more variable as a response behaviour than alert or trotting behaviour.

6.3.9 Direction of Caribou Travel

Following the 2021 analysis there was a suggestion from the TAG to incorporate the direction caribou travelled relative to the road, i.e., if caribou were walking parallel to the road or perpendicular. Walking parallel to a potential threat is a known behaviour in some cervid species. Inclusion of this variable in combination with whether caribou were upstream or downstream of the dominant direction of travel was suggested to help determine if caribou were walking as a response to a disturbance or not. In response to this suggestion, a field for direction of travel was added for the 2022 survey season. Note that the suggestion was made after spring migration 2022, so data are only available for surveys in summer and fall of 2022, resulting in 41 entries for direction of travel.

Of the 41 surveys with this information, 18 groups were recorded as travelling parallel to the road (44%), four were travelling perpendicular to the road (10%), and 19 were stationary for much of the survey (46%). Of those travelling parallel to the road, all but one were recorded upstream of the dominant direction of travel (94%). However, it should be noted that most surveys completed during this time period were of caribou on the upstream side of the road, regardless of direction of travel. 63% of stationary caribou groups were also recorded on the upstream side of the road. Caribou moving perpendicular to the road were recorded equally on the upstream and downstream side of the road. These results point to a trend that caribou may travel parallel to the road before crossing it, but the small sample size makes it challenging to form conclusions.

6.4 Statistical Analysis Results

6.4.1 Model Formulation

As distance to road and caribou group size were identified as being potentially correlated during the exploratory analysis, a Chi-square test was conducted between the two variables to determine if they were too closely related to be included in a model together. A Chi-square ($\chi 2$) statistic is a test that measures how a model compares to actual observed data and can be used to test for the correlation between two categorical variables. The resulting Chi-square statistic was not significant ($p=0.237$), indicating that group size was not statistically associated with distance from the road. As a result, it was determined to be acceptable to model both variables together.

Initial model results suggested that group size was not a good predictor for response behaviour, regardless of how models were parameterized. In addition, a potential issue was identified that smaller groups of caribou would naturally have greater variability in values, and this could bias the results. For example, a group of two caribou is far more likely to have 100% of caribou responding to a disturbance than a group of 50 caribou. As a result, it was deemed necessary to include group size in models as an “offset”, which is a statistical term for a variable that is used to denote the exposure period. It is typically used for situations where some surveys are longer than others, but in this case can be applied to the problem of unequal sample size. All final models presented here use an offset for group size.

All models included survey ID as a random effect because the time intervals within each survey are not independent from each other. The final models had many parameters and with the addition of the random effect it was difficult to attain model convergence. As a result, model variables that had little or no explanatory power and were not variables of interest (such as wind speed) were dropped from the final model sets. An optimizer was also added to the model to run many iterations of the model, increasing the likelihood of convergence.

Three response (dependent) variables were tested in three separate model sets: proportion of response behaviour (alert or running), proportion of walking and response behaviour, and duration of response following a disturbance.

The estimates and significance levels for the best-fitting model that used response behaviour as the dependent variable are presented in Table 6.4-1, for the best-fitting model that used walking behaviour as the dependent variable in Table 6.4-2, and for the best-fitting model that used duration of response as the response variable in Table 6.4-3.

Table 6.4-1: Summary of Model Coefficients and Significance Levels for Response Behaviour Model

Variable	Estimate	Standard Error	P-value	Significant
(Intercept)	-9.03	0.64	0.000	***
Distance from caribou to observer location (300-1000 m)	-0.05	0.66	0.940	
Distance from caribou to observer location (100-300 m)	0.31	0.75	0.684	
Distance from caribou to observer location (50-100 m)	1.77	0.73	0.016	*
Distance from caribou to observer location (0-50 m)	0.74	0.88	0.399	
Disturbance during interval (Yes)	1.86	0.41	0.000	***
Disturbance one interval prior (Yes)	0.64	0.47	0.172	
Disturbance two intervals prior (Yes)	-0.39	0.60	0.514	
Temperature (°C)	0.88	0.18	0.000	***
Road Status (Closed)	0.66	0.41	0.109	

Note:

Statistically significant p-values <0.05 are indicated with a single asterisk. Highly significant values ($p < 0.001$) are indicated with three asterisks. Near significant values ($0.09 > p > 0.05$) are indicated with a dot.

Table 6.4-2: Summary of Model Coefficients and Significance Levels for Walking Model

Variable	Estimate	Standard Error	P-value	Significant
(Intercept)	-4.52	0.83	0.000	***
Distance from caribou to observer location (300-1000 m)	0.03	0.58	0.965	
Distance from caribou to observer location (100-300 m)	-0.29	0.66	0.657	
Distance from caribou to observer location (50-100 m)	0.00	0.86	0.995	
Distance from caribou to observer location (0-50 m)	-0.57	0.96	0.554	
Disturbance during interval (Yes)	0.07	0.26	0.777	
Disturbance one interval prior (Yes)	0.26	0.25	0.295	

Variable	Estimate	Standard Error	P-value	Significant
Disturbance two intervals prior (Yes)	0.06	0.25	0.799	
Temperature (°C)	0.99	0.29	0.001	***
Road Status (Closed)	-0.46	0.41	0.263	
Season (Calving and Summer)	0.20	1.02	0.843	
Season (Fall Migration)	0.85	0.84	0.307	
Side of Road (West)	0.23	0.64	0.719	
Interaction (Calving and Summer * West)	-1.43	1.20	0.233	
Interaction (Fall Migration * West)	-3.05	1.44	0.034	*

Note:

Statistically significant p-values <0.05 are indicated with a single asterisk. Highly significant values (p < 0.001) are indicated with three asterisks. Near significant values (0.09 > p > 0.05) are indicated with a dot.

Table 6.4-3: Summary of Model Coefficients and Significance Levels for Duration of Response Model

Variable	Estimate	Standard Error	P-value	Significant
(Intercept)	3.84	2.50	0.128	
Distance from caribou to observer location (300-1000 m)	3.00	2.79	0.285	
Distance from caribou to observer location (100-300 m)	0.87	2.22	0.696	
Distance from caribou to observer location (50-100 m)	2.19	1.99	0.275	
Distance from caribou to observer location (0-50 m)	2.23	2.33	0.342	
Caribou group size	0.00	0.00	0.668	
Temperature (°C)	0.06	0.08	0.467	
Road Status (Closed)	-2.39	1.29	0.068	·
Season (Calving and Summer)	1.43	2.94	0.628	
Season (Fall Migration)	1.65	2.25	0.464	
Side of Road (West)	2.04	1.41	0.152	
Interaction (Calving and Summer * West)	-2.64	3.47	0.448	
Interaction (Fall Migration * West)	-2.90	3.41	0.397	

Note:

Statistically significant p-values <0.05 are indicated with a single asterisk. Highly significant values (p < 0.001) are indicated with three asterisks. Near significant values (0.09 > p > 0.05) are indicated with a dot.

The statistics presented include the variable estimate, which can be interpreted as the expected effect on the dependent variable as the independent variable increases. For example, in Table 6.4-1 the positive estimate for temperature suggests that as the temperature increases, the proportion of caribou with response behaviours also increases. However, estimates should always be considered in tandem with the standard error; if the standard error is larger than the estimate, the estimate is meaningless.
The p-value statistic indicates whether the model is a “statistically significant” predictor of the dependent variable, regardless of how large the estimate is. A p-value of less than 0.05 suggests that the variable is

an important determinant of the response, as it indicates there was less than 5% probability that the results occurred by chance. A statistically significant result provides support for an underlying effect, but should always be taken with a grain of salt, as some effects can obscure others. To minimize the risk, variables are tested for correlation, but there are always limits when a system is complex. For example, warmer temperatures are observed at the end of spring migration, which is also when convoys are occurring, which may explain the higher proportion of response behaviours in warmer temperatures.

6.4.2 Effect of Distance to Infrastructure

The results suggest that there is a differential effect of distance to the road on response behaviour, as caribou were less likely to be exhibiting response behaviours further from the road (Table 6.4-1). The effect was only significant for caribou within 50-100 m (estimate: 1.77±0.73, p-value = 0.016), meaning caribou within 100 m of the road are significantly more likely to exhibit response behaviours than caribou more than 1,000 m away. In the response model, no other distance categories were significantly different from the base category of >1,000 m from the road. The effect of distance was not significant for any distance category in the walking model or duration of response model (Tables 6.4-2 and 6.4-3), which suggests that a link between distance to road and response could not be detected in these models. For the duration of response model this may be explained by the smaller sample size.

6.4.3 Effect of Disturbances

The occurrence of disturbances resulted in a statistically significant increase in the proportion of response behaviour (Table 6.4-1; estimate: 0.07±0.26, p-value = 0.001), but was not important for the proportion of walking behaviour (Table 6.4-2). This may be because the amount of variability in caribou walking is much higher than caribou alert or running. Caribou are more likely to be walking as both a baseline behaviour and a response behaviour, and therefore the effect of disturbances is more difficult to detect in the modelling process. Of note is that the occurrence of disturbances in the interval before and two intervals before was never a significant predictor of behaviour, regardless of model set and how models were parameterized. This may indicate that disturbances tend to only affect behaviour in the 3-minute interval during which they occurred.

6.4.4 Effect of Road Closure Status

Interestingly, road closure status was not a significantly important predictor of behaviour (Tables 6.4-1 to 6.4-3). The models suggest that caribou respond similarly to disturbances regardless of whether the road is open or closed (see Figure 6.3-4). The average proportion of response behaviours was 3% both when the road was open and when the road was closed. This may be because the analysis included convoy surveys, which occurred during road closures and had the potential to bias the results. There are typically fewer disturbances during road closures. It may also be simply because the other variables in the model are better at explaining the variation observed in the data.

6.4.5 Effect of Season and Side of the Road (Upstream/Downstream)

Season and side of the road were not significant in the response behaviour model or the duration of response models, but they were important predictors in models that included walking as a response (Table 6.4-2). Model results indicate that caribou are walking less on the west side of the road in fall migration than in spring migration (estimate: -3.05±1.44, p-value = 0.03). Since west is upstream of the typical direction of movement in spring, and downstream in fall, another way to interpret this result is that caribou tend to be walking more on the upstream side of the road. In this study, similar numbers of surveys were conducted on the upstream and downstream sides of the road (See Table 6.2-2).

However, an analysis conducted by the GN on the 2019 road survey data from Agnico Eagle found that most observations of caribou groups were made on the upstream side of the road (GN, Feb 2021 presentation to the TAG). In that presentation, the GN hypothesized that caribou are walking alongside and parallel to the road on the upstream side before crossing, which would be consistent with caribou hesitating to cross the road. More surveys in fall would allow for greater confidence in these results.

6.4.6 Statistical Analysis Summary

The results of the statistical analysis provided support for the key hypothesis that caribou tend to respond to disturbances, particularly when they are close to the road. However, the analysis also found that disturbances did not have a detectable effect on caribou behaviour after three to six minutes.
An interesting finding from this analysis included that behaviour was not significantly different when the road was open vs. when it was closed.

The proportion of caribou responding when walking was included was not linked to disturbances, which suggests that walking is not a consistent response behaviour. However, caribou were significantly more likely to be walking on the upstream side of the road. The results suggest that walking behaviour should not be excluded from analyses. The inclusion of a separate model set for walking behaviour allows for the detection of trends that are not apparent with the alert/running behaviour models.

These results should be treated with caution due to the high number of variables and the variability in the behaviours observed. Nevertheless, it should be noted that the results from this analysis are remarkably similar to results from previous years, suggesting that the effects are stable year to year. When years of data collection are analysed independently (unreported here for brevity), the same factors are significant with similar magnitudes of effect. These results are also consistent with other surveys recorded on barren-ground caribou during the post-calving and early summer periods, which suggest that caribou behavioural responses to all-season haul roads tend to taper off beyond approximately 500 m (Curatolo et al. 1987; Johnson and Lawhead 1989; Dyer et al. 2001). However, zone of influence estimates are highly variable in the literature and this method of data collection is not designed to estimate it, particularly given the observability bias noted in Section 6.3-1. In addition, responses to roads and infrastructure have previously been linked to increased harvest from roadways (Plante et al. 2018; Russell and Gunn 2019), a factor which was not included in this analysis.

7. SUMMARY

The behaviour monitoring data from 2022 were combined with data from 2021 and 2020, to determine if caribou activity budgets change with distance from the mine, and to document caribou response to stressors. All results outlined in this report use all three years, unless otherwise stated. The program and combined data resulted in several key findings:

- The standard monitoring protocols adapted from the GNWT ENR worked well at the Project site.
- 104 surveys were conducted in 2022, compared to 134 in 2021 and 116 in 2020; 63 surveys occurred during spring migration from March to May; 18 occurred during calving and summer from June to August; and 23 occurred during fall migration from September to December.
- Caribou mostly exhibited the non-response behaviours of standing, laying, feeding, and walking.
- Observations were well distributed across a range of caribou group sizes from 1 to 2 individuals to >1,000.
- Larger groups of caribou tended to be recorded further from the road. Only five groups larger than 100 individuals were recorded within 100 m of the road at the start of the survey, two in 2021 and three in 2022.
- Caribou group size was not linked to response behaviour or walking behaviour in statistical analyses.
- Statistical analysis indicated that there is a trend for caribou at greater distance from the road (>1,000 m) to have a lower proportion of response behaviours (alert and running) than caribou within 100 m of the road.
- Approximately 54% of the surveys included a disturbance event; typically, haul traffic and light trucks from the mine, and occasionally all-terrain vehicles (ATVs) from Baker Lake on the AWAR for travel and harvesting.
- Following a disturbance event, the proportion of response behaviours in a group of caribou was significantly higher, but generally returned to baseline behaviours within one or two sampling intervals (i.e., three or six minutes).
- In response to comments from the KivIA, the behaviour of “walking” was investigated for whether it may be an “alert” behaviour instead of a non-response behaviour, however, disturbances did not statistically affect the proportion of caribou walking.
- Surveyors conducted special 90-minute surveys during convoys to assess whether the response to convoys was similar to that of other vehicles. Caribou responded similarly to convoys but possibly for longer than for other vehicles. More convoy surveys are needed to analyse the data statistically.
- During periods when large groups of caribou are present, the AWAR and Haul Roads are closed following a decision tree in the Meadowbank Mine TEMP, reducing the potential to record interactions between vehicles and caribou. Road closure status did not affect behaviour in the statistical analysis, possibly due to it having less explanatory power than the other variables included.
- Groups of caribou were observed on both the east and west sides of the road in all seasons, but were more commonly observed on the west side during spring migration and the east side during fall migration (a.k.a. upstream of the dominant direction of travel). Statistical analysis found that side of road and season did not affect response behaviour (alert/running), but that caribou were significantly more likely to be walking on the upstream side of the road. The dominant behaviour on the downstream side was feeding or laying down.

Based on commitments in the Terrestrial Ecosystem Management Plan (TEMP), the overall objective of the caribou behaviour monitoring program was to determine if caribou activity budgets changed with distance from the mine, and to document caribou response to stressors. The primary hypothesis of this study was that caribou closer to the road would demonstrate a stronger response to vehicle disturbances. Overall, the results of the statistical analysis provided support for this hypothesis, as caribou tended to respond to disturbances, particularly when close to the road. However, the analysis also found that disturbances did not have a detectable effect on caribou behaviour after three to six minutes post-disturbance, suggesting that caribou behaviour returns to baseline relatively quickly following a disturbance. The updates applied to the survey protocol in 2021 and 2022 used feedback from the first year of data and analysis, which were helpful in improving the overall quality and accuracy of the data. Interestingly, even with these changes, the trends in the results were highly consistent between the three years of data. This increases the confidence that trends are repeatable year to year.

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APPENDIX A DETAILED METHODS FOR CARIBOU BEHAVIOUR SURVEYS

AGNICO EAGLE

Meadowbank Gold Mine

Caribou Behaviour Monitoring

February 2022

Project No.: 0656774

The business of sustainability

ERM

CONTENTS

1. INTRODUCTION

Agnico Eagle Mines Ltd. (Agnico Eagle) would like to determine whether caribou behaviour changes in response to mine activities. The purpose of caribou behaviour surveys is to provide information to characterize the effects of the physical road and mine-related activities on caribou behaviour, including the All Weather Access Road (AWAR) and Haul Road.

The planned monitoring program is designed to collect data on caribou behaviour using standardized, scientifically-defensible methods. The data will be used to monitor Project effects.

1.1 Objectives

Following discussions with the Kivalliq Inuit Association and Government of Nunavut during the spring of 2021, the objectives of the behaviour monitoring program for caribou have been updated to the following:

- Evaluate the baseline behaviour of caribou (behaviour in the absence of disturbance);
- Evaluate the response of caribou to disturbances;
- Compare the behaviour of caribou between the following categories, if there is sufficient data:
    1) in large vs. small groups,
    2) near vs. far from the road,
    3) when the road is open vs. closed,
    4) east vs. west of the road, (upstream and downstream), and
    5) spring migration vs. summer and fall periods.

2. STUDY AREA

The study area for behaviour monitoring is anywhere that caribou may interact with the mine, including the All Weather Access Road (AWAR), the Meadowbank Mine site, Whale Tail site and the Haul Road connecting Meadowbank to Whale Tail.

3. STANDARD OPERATING PROCEDURES

The purpose of caribou behaviour surveys is to provide information to characterize the effects of the physical road and mine-related activities on caribou behaviour, including the All Weather Access Road (AWAR) and Haul Road. The overall method for the surveys is to identify caribou groups visible from the road, to select some groups for observation, and to record the behaviour of individuals in groups of different sizes including their behaviour without any disturbance and responses to both mine-related activities and natural factors.

Notes to guide the work include:

- Systematic surveys will be conducted along all Project roads during spring, summer and fall periods.
- The survey team will consist of a driver/observer and a second observer when available.

Surveys should be performed:

- During spring, summer and fall when caribou may be in the Project area,
- Of caribou at various distances from the road and group sizes, and
- If surveying effects of a convoy, conduct two surveys, one at least an hour before convoy deployment so that a pre-disturbance measurement can be made, and a second survey during the convoy passing by caribou.

3.1 General Field Data

For each survey day, the appropriate general field data will be recorded onto field data sheets supplied in Appendix A and B. A new data sheet will be used for each survey, including additional sheets as necessary to record all observations. General information includes:

- Survey date and start and end times.
- Field personnel (full names on the data sheet header and initials thereafter).
- Weather conditions during and prior to sampling (e.g., snow in the last 24 hours, current wind conditions).
- Site description: provide location and description (GPS coordinates, road name and distance marker).
- Photographs or video (if possible):
    - Take a photo of the caribou every time an observation is recorded so that the observations can be verified by a biologist.
    - For any photographs taken, record the picture IDs in the comments field on the field data sheet.
    - Write descriptions of any photos taken for specific reasons.
- General observations/notes of the environment/sampling procedures.
- Any deviation from the SOPs outlined below.

Note: When in doubt take pictures and make field notes explaining the situation, your response or consequent changes in methods. It is better to have more data/notes than not enough when interpreting the results later on.

3.2 General Equipment List

- A GPS unit with waypoints of road km markings.
- Field data sheets (Appendix A and B), clipboard, pencils, or iPad with data form.
- A timer capable of alarm setting for repeat time intervals (i.e., can be set to go off every three minutes, like a smart phone).
- Binoculars or spotting scope.
- Compass (or use compass function on GPS unit).
- Portable weather station (temperature and wind speed).
- Camera.
- Rangefinder.

3.3 Field Methods

3.3.1 Group Selection

The survey day will begin with a reconnaissance survey to determine how many caribou groups are present near the road, how large they are, and where they are. This will be accomplished by driving from the mine site along the road and noting relevant information about the groups and their sizes along the way (using the standard, tablet-based road survey form). Observers will preferentially choose groups to survey to across group sizes and distances from the road. Ideally, caribou would be sampled in an even distribution across these variables and along the AWAR and Haul Road. However, the nature of caribou and field sampling mean that observers may need to survey what caribou are available, rather than what is “ideal”.

Allow approximately one hour to survey each group. If the length of the survey day permits all groups to be surveyed then they should all be surveyed. If there are more groups to survey than the time in the day, then do the following:

1. Look at how many of each group size (bullet list below) have been surveyed to date. If one of them is under-represented and there is a group of that size on the road, then go survey that group. If there is more than one group of that size, choose it randomly using the procedure in step 4.
    - 1 or 2 caribou
    - 3 to 25 caribou
    - 26 to 50 caribou
    - >50 caribou
2. During 2020, few groups of caribou within 300 m of the road were observed or sampled. Preferentially choose groups of caribou within 300 m of the road, with a soft target of approximately 1/3 of samples in this area.
3. If any Project-tolerant caribou are observed (e.g., caribou observed near the road or mine site for more than 72 hours in summer and 48 hours in other seasons; TEMP 2020), then select these animals for sampling. In Appendix A data sheet, record that the group is Project tolerant in the notes field.
4. If there are multiple groups available, choose groups to fill in an even distribution of group sizes and distances from roads.

Record all caribou groups observed during the reconnaissance survey in the standard, tablet-based survey form and submit that data along with the results of behaviour monitoring.

3.3.2 Selection of an Observation Site

Find a safe parking location and follow site safety protocols. The observation location may be the vehicle itself or a safe location off the road. If observers exit the vehicle, the observation location should be chosen where observer activity is not likely to influence caribou behaviour and where the observer can remain comfortable for a period of approximately 45 minutes without needing to move. Ideally, the vehicle should be stopped a minimum of ~250-300 m from the caribou – adapt this distance as needed. If the animals are staring at the truck or moving away, then the truck is too close.

3.3.3 Data Recording

Allow 15 minutes between arrival and the time at which behavioural observations begin. This is to allow animals to return to behaviour that may have been interrupted by the arrival of observers. In the time before recording behaviour, fill in the top portion of the form with location, weather, and group size information.

After 15 minutes, begin recording data in the form in Appendix A. The start time to record is the time that observations begin.

3.3.3.1 Location

Location: Collect a waypoint of the location from which the observations will be made. Note the waypoint number and the UTM coordinates on the data sheet.

Road Status: If observing caribou on a road, record whether the AWAR or Haul Road are open or closed.

Distance from observer to caribou: Estimate the distance to the group using a laser rangefinder and, using a compass or the GPS unit compass feature, record the bearing (0° to 360°) to the group being observed. If the group of caribou is large and spread over a considerable distance from the road, estimate the distance to nearby caribou and the caribou furthest away that will be sampled. If some caribou in the group are too far away to sample, then do not include them in the distance estimate.

Distance from road to caribou: If caribou are closer to the road than to the observer, as is the case when the observer vehicle is stopped at a distance, visually estimate the distance from the road to the group.

East vs. West: Note if the group is on the east or west side of the road. At the end of the 30 minute observation period return to the top of the form and record (Y or N) if the group crossed the road during the survey period. If monitoring at the mine site or Whale Tail, leave this section blank.

Direction of Travel: Note if caribou are moving parallel to the road, perpendicular to the road, or are stationary.

3.3.3.2 Weather Conditions

Use the portable weather station to record:

- Air temperature;
- Wind speed;
- Wind direction;
- Precipitation; and
- Humidity (if the weather station has this function).

3.3.3.3 Road Structure

At the location of the caribou group, record the road characteristics:

- Height of the road above the tundra (m);
- Slope of the road side (with of the slope in m);
- Approximate height of snow bank (m); and
- Any structures, such as bridges, present.

3.3.3.4 Caribou Behaviour

Individuals in the group being observed will be categorized when the survey starts and at three minute intervals. Standardized behaviour categories will be used (Section 3.3.4). The standardization of behaviour is necessary for clarity and data analysis. If the observed behaviour does not fit within any of the categories then observers have the option of noting other behaviour in the comments field. However, this should be used only rarely as most behaviour should fit in the primary categories listed below.
If noting a new/different behaviour, please take a photo or video of the caribou.

The data to record at each three-minute interval are the numbers of individuals in the group exhibiting each behaviour at that time. Do not attempt to characterize the behaviour that occurred during the interval. If the group is too large to be counted in each interval, choose an identifiable subset of the group, count the individuals exhibiting each behaviour at each time interval, and add a comment that a subset of the group was sampled. For clarity, observers should record zero values for behaviours not observed.

Indicate the total group size at the top of the data form, not the size of the subset whose behaviour was recorded. Count the number of caribou up to 100 animals, and then record group size in categories above 100; 100-200 animals, etc. (see Appendix A).

Practically, the easiest way to do this is to have the observer scan across the group of caribou from Left to Right, calling out the behaviour of each animal, while the recorder adds tick marks to the data sheet. When complete, count up the tick marks.

Sex: Note the sex of the group. This can be difficult in large groups, so record in the following categories: mostly males, mostly females, mostly females with calves, juveniles, or mixed group.

3.3.3.5 Disturbance Events

Caribou behaviour is expected to vary in response to some disturbance events. The bottom of the data form should be used to record any potential disturbance events evident to the observer regardless of whether caribou respond to them. The main categories of events are included in the data sheet:

- Light truck;
- Haul truck;
- Road maintenance vehicle (e.g., grader);
- ATV or skidoo;
- Aircraft; and
- Predator (note species).

Record the number and approximate speed of the vehicle (regular driving speed, or moving slowly, ~10 km/h, past caribou).

Record the time of the disturbance event (0:00 to 30:00 of the survey), indicate which type of disturbance was observed in the appropriate column. Record any additional comments and records of photographs taken in the final column.

Record whether the vehicle stopped when approaching caribou or continued to drive slowly. If possible, coordinate with passing vehicles on the road to have some vehicles stop for 10 minutes, and others drive by slowly.

3.3.4 Behaviour Classification

With the exception of Alert behaviour, the primary behaviour categories and their definitions follow classifications from the Government of Northwest Territories (GNWT 2017). The categories appear as columns on the data form, with descriptions on the form. The behaviour categories are:

- **Feeding** – standing or walking posture, with the muzzle touching or nearly touching the ground; can be ingesting food or not; head down or moving from side to side.
- **Lying down** – bedded on the ground, either upright or lying on its side, in a resting or ruminating position.
- **Standing** – stationary in an upright, standing posture with head elevated above the ground, and usually above the knees; if cow is nursing, if possible record the time spend nursing.
- **Alert** – head up scanning horizon or focused on a source of disturbance (e.g., vehicle, predator, human).
- **Walking** – similar to standing posture but moving at a slow gait (<5 km/h).
- **Trotting/running** – similar to standing posture but moving rapidly in symmetrical or asymmetrical gait.

Other behaviours that may be observed (record in comments field on form) are:

- **Nursing** – calf is suckling cow.
- **Sparring** – two males in contact.
- **Insect response behavior** – twitching, stamping, tossing head.

In the comments, record if any animals are moving towards the road, parallel or away from the road.

4. DATA MANAGEMENT

Please scan all data sheets at the end of the day. Data from behaviour surveys should be entered into Excel. Data from group selection surveys (standard tablet data form) and behaviour surveys should be delivered at the end of each month to ERM for QA/QC.

5. CLOSURE

This SOP has been produced for Agnico Eagle Meadowbank Division by ERM Canada. Please contact the authors with any questions.

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Meadowbank Gold Mine: Caribou Behaviour Monitoring Data Sheet

Date:	Time (24 hr [00:00 to 24:00]) Start:		End:
Observers:			
Location Waypoint number:	UTM Easting:	UTM Northing:	Road name and distance marker:
Distance from caribou to observer location (use rangefinder):	Bearing:		Distance from caribou to road (if different):
Is group location East or West of the Road at start of survey? Circle one: **E W**	Did the group cross the road during the survey? Circle one: **Y N**		
Caribou group size: Exact count (up to 100): _____ Estimated size for larger groups. Circle one: **101-200 201-500 501-1000 >1000**			
Record sex of group (mostly males, females, females with calves, mostly juveniles, or mixed group):			
Record direction of travel as parallel, perpendicular, or stationary relative to road:			

Temperature: ___°C Wind speed: _____km/h Wind direction:_____° Humidity:_____% Days since last snow or wind event: _____

Weather observations:

Road: Open? Closed? Road Height: Road Side Width: Structures/snowbank Present:

Observation time from start of survey	Number of animals exhibiting each behaviour type						Comments and photo numbers (Note if any caribou crossed road or travelled along road)
	Feeding	Lying Down	Standing	Walking	Alert	Trotting or running	
0 minutes							
3 minutes							
6 minutes							
9 minutes							
12 minutes							
15 minutes							
18 minutes							
21 minutes							
24 minutes							
27 minutes							
30 minutes							

Observed disturbance events

(record time from start of survey and check type of disturbance. Record whether vehicle stopped (s) or drove slowly (d) past caribou)

Time from start of survey	Light truck	Haul Truck	Road maintenance vehicle (e.g., grader)	ATV	Aircraft	Predator (note species)	Comments and photo numbers. Note other disturbances here

Categories and Definitions of Behaviour[1]:

- **Feeding** – standing or walking posture, with the muzzle touching or nearly touching the ground; can be ingesting food or not; head down or moving from side to side.
- **Lying down** – bedded on the ground, either upright or lying on its side, in a resting or ruminating position.
- **Standing** – stationary in an upright, standing posture with head elevated above the ground, and usually above the knees; if cow is nursing, if possible record the time spend nursing.
- **Alert** – head up scanning horizon or focused on a source of disturbance (e.g., vehicle, predator, human).
- **Walking** – similar to standing posture but moving at a slow gait (<5 km/h).
- **Trotting/running** – similar to standing posture but moving rapidly in symmetrical or asymmetrical gait.

Other behaviours that may be observed (record in comments field on form) are:

- **Nursing** – calf is suckling cow.
- **Sparring** – two males in contact.
- **Insect response behavior** – twitching, stamping, tossing head.

[1] Primary source: GNWT-ENR 2017 caribou behaviour monitoring field protocols, courtesy of GNWT Yellowknife, NT.

APPENDIX B DATA FROM CARIBOU BEHAVIOUR SURVEYS

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Observers	Waypoint	Longitude	Latitude	Reconnaissance Survey	Project Tolerant Info	Road Name and Distance Marker	Distance from Caribou to Observer Location (m)	Distance from Caribou to Road (if different)	Bearing	Is Group East or West of Survey?	Did the Group Cross the Road during the Survey?	Estimated Size (for larger group)	Caribou Group Size (exact count or estimate)	Size of Subset (Surveyed)	Dominant Group Sex	Temperature (°C)	Wind Speed (km/h)	Wind Direction	Days since Last Snow or Wind Event
251	29-Jan-22	11:30	13:00	Laurence Archambault and Rowan Woodall	-	-96.66656352	65.40179525	No	No	Amaruq KM NA	100-300	N/A	30	East	No	3 to 25	10	10	Mixed group	-28	40	SW	0
252	03-Apr-22	14:30	14:30	Rowan Woodall, Kathleen Newberry	-	-96.42279832	65.22691481	No	No	Amaruq KM NA	300-1000	N/A	200	West	NA	3 to 25	5	5	Mixed group	-15	20	NW	2
253	03-Apr-22	14:30	14:30	Rowan Woodall, Kathleen Newberry	-	-96.42279832	65.22691481	No	No	Amaruq KM NA	300-1000	N/A	200	West	NA	3 to 25	5	5	Mixed group	-15	20	NW	2
254	08-Apr-22	9:41	10:13	Rowan Woodall and Kathleen Newberry	-	-96.41099866	65.22742551	Yes	No	Haul Road KM 147	100-300	N/A	150	West	No	3 to 25	5	5	Mixed group	-8	8	NW	0
255	08-Apr-22	14:35	15:09	Rowan Woodall, Kathleen Newberry	-	-96.64636867	65.40520371	No	No	Haul Road KM 179	100-300	N/A	10	West	No	3 to 25	15	15	Mixed group	-6	8	NW	0
256	09-Apr-22	9:12	9:54	Derek	-	-96.21807032	64.96501827	Yes	No	AWAR KM 88	300-1000	N/A	290	West	No	26-50	27	27	Mixed group	5	5	S	1
257	09-Apr-22	11:48	12:18	Rowan Woodall and Kathleen Newberry	-	-96.05441453	65.0850301	No	No	Haul Road KM 118	300-1000	N/A	345	West	No	51-100	100	21	Mixed group	-8	23	SE	0
258	09-Apr-22	12:58	13:30	Derek Nateela	-	-96.24825645	64.57509425	Yes	No	AWAR KM 35	300-1000	N/A	240	West	No	3 to 25	7	7	Mostly females	3	3	S	1
259	10-Apr-22	6:19	6:50	Kathleen Newberry	-	-96.39080148	65.2258375	No	No	Haul Road KM 144	100-300	N/A	190	West	No	51-100	60	60	Mixed group	-5	20	NE	0
260	10-Apr-22	7:57	8:37	Kathleen Newberry	-	-96.55598517	65.34892665	No	No	Haul Road KM 167	300-1000	N/A	30	West	No	>100	-	30	Mixed group	-13	21	NE	0
261	10-Apr-22	8:55	8:55	Kathleen Newberry	-	-96.55598822	65.3489138	No	No	Haul Road KM 170	300-1000	N/A	180	West	NA	>100	-	30	Mixed group	-5	20	NW	0
262	10-Apr-22	9:02	9:45	Kathleen Newberry	-	-96.55599925	65.34888885	Yes	No	Haul Road KM 170	300-1000	N/A	180	West	No	>100	-	30	Mixed group	-13	20	NW	0
263	10-Apr-22	16:50	18:15	Rowan Woodall	-	-96.62162428	65.40070639	No	No	Haul Road KM 177	300-1000	N/A	260	West	No	>100	-	20	Mixed group	-18	22	NE	0
264	10-Apr-22	16:50	18:15	Rowan Woodall	-	-96.62162428	65.40070639	No	No	Haul Road KM 177	300-1000	N/A	260	West	No	>100	-	20	Mixed group	-18	22	NE	0
265	10-Apr-22	16:50	18:15	Rowan Woodall	-	-96.62162428	65.40070639	No	No	Haul Road KM 177	300-1000	N/A	260	West	No	>100	-	20	Mixed group	-18	22	NE	0
266	11-Apr-22	12:03	9:36	Derek	-	-96.62130363	65.4004251	No	No	Haul Road KM 170	300-1000	N/A	180	West	No	>100	-	350	Mixed group	-12	40	N	1
267	11-Apr-22	17:01	18:19	Eric Leonard / Kathleen Newberry	-	-96.64805819	65.40517327	No	No	Haul Road KM 179	300-1000	N/A	300	West	No	3 to 25	8	8	Mixed group	-15	46	N	0
268	14-Apr-22	10:42	11:15	OlivierJean & Jean-Francois Dufour	-	-96.58105519	65.35406488	Yes	No	Haul Road KM 170	100-300	N/A	210	West	No	3 to 25	17	17	Mixed group	-16	20	NW	4
269	14-Apr-22	12:13	13:23	OlivierJean & Jean-Francois Dufour	-	-96.00818333	65.07064323	Yes	No	Haul Road KM 115	300-1000	N/A	270	West	No	>100	117	27	Mixed group	-16	20	W	5
270	14-Apr-22	16:51	13:56	OlivierJean & Jean-Francois Dufour	-	-96.00815872	65.07064774	Yes	No	Haul Road KM 115	300-1000	N/A	270	West	No	>100	117	27	Mixed group	-16	20	NW	5
271	15-Apr-22	9:29	10:16	Felix Quessy Savard Olivier Gagnon	-	-96.61996667	65.40013333	Yes	No	Haul Road KM 175	300-1000	N/A	0	West	No	26-50	35	35	Mixed group	-14	20	NW	2
272	15-Apr-22	17:48	18:30	Eric Leonard	-	-96.72225442	65.39873212	No	No	Amaruq KM NA	100-300	N/A	350	East	No	3 to 25	5	5	Mixed group	-15	24	NW	5
273	16-Apr-22	10:07	10:41	Eric Leonard	-	-96.45447958	65.23166853	No	No	Haul Road KM 149	300-1000	N/A	10	East	No	3 to 25	5	5	Mixed group	-26	18	NW	5
274	16-Apr-22	17:44	18:28	Laurence Archambault	-	-96.66499301	65.40275111	No	No	Amaruq KM NA	50-100	N/A	15	West	No	3 to 25	14	14	Mixed group	-24	18	NW	0
275	17-Apr-22	12:39	13:10	Sylvain singaqti Olivier Gagnon	-	-95.99750195	65.05240395	No	No	Haul Road KM 114	300-1000	N/A	90	East	No	3 to 25	12	12	Mixed group	-15	30	NW	5
276	18-Apr-22	14:09	14:57	Sylvain Singaqti	-	-95.93920505	64.30977479	No	No	AWAR KM 95	100-300	N/A	0	West	No	>100	134	130	Mixed group	-12	15	NW	1
277	19-Apr-22	8:02	8:34	OJ OG	-	-96.16722208	65.19602827	Yes	No	Haul Road KM 154	100-300	N/A	40	West	No	1 to 2	2	2	Mostly males	-10	14	N	7

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Weather Observations	Road Open or Closed	Road Height	Road Side Width	Structures Present	Feeding_0	Lying Down_0	Standing_0	Walking_0	Alert_0	Trotting/Running_0	Feeding_3	Lying Down_3	Standing_3	Walking_3	Alert_3	Trotting/Running_3	Feeding_6	Lying Down_6	Standing_6	Walking_6	Alert_6	Trotting/Running_6	Feeding_9	Lying Down_9	Standing_9	Walking_9	Alert_9	Trotting/Running_9	Feeding_12	Lying Down_12	Standing_12	Walking_12	Alert_12	Trotting/Running_12
251	29-Jan-22	11:30	13:00	Precipitation: None	Open	100	2000	NA	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0
252	03-Apr-22	14:30	14:30	Precipitation: 0	Open	100	400	Electrical panel, 5kv line, Nag pile	4	0	0	0	0	0	4	0	1	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	4	0	1	0	0	0
253	03-Apr-22	14:30	14:30	Precipitation: 0	Open	100	400	Electrical panel, 5kv line, Nag pile	3	0	0	0	1	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
254	08-Apr-22	9:41	10:13	Precipitation: None	Open	200	400	None	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0
255	08-Apr-22	14:35	15:09	Precipitation: 0 Foggy	Open	200	500	Flags	13	2	0	0	0	0	13	2	0	0	0	0	12	2	0	1	0	0	11	3	0	1	0	0	11	4	0	0	0	0
256	09-Apr-22	9:12	9:54	Precipitation: Snowing Snowing	Open	100	1000	No	0	1	26	26	27	0	0	0	27	27	27	0	0	0	27	27	27	0	20	0	27	27	27	0	37	5	4	33	15	4
257	09-Apr-22	11:48	12:18	Precipitation: Light snow	Open	200	400	None	20	0	0	0	0	0	20	0	0	0	0	0	19	0	0	1	0	0	18	0	0	2	0	0	10	0	0	10	0	0
258	09-Apr-22	12:58	13:30	Precipitation: White Snowing	Open	0	1200	No	0	7	0	0	7	0	0	0	7	0	7	0	7	0	7	7	7	0	7	0	0	7	7	0	0	0	0	7	7	0
259	10-Apr-22	6:19	6:50	Precipitation: 0	Closed	100	600	None	50	1	6	3	0	0	52	1	4	3	0	0	44	6	3	7	0	0	46	7	3	4	0	0	50	7	1	2	0	0
260	10-Apr-22	7:57	8:37	Precipitation: 0	Closed	200	400	None	30	0	0	0	0	0	12	0	0	8	10	0	0	0	0	27	3	0	0	0	0	30	0	0	27	0	0	3	0	0
261	10-Apr-22	8:55	8:55	Precipitation: Light snow Light snow	Closed	100	500	LHT parked	27	0	0	3	0	0	23	0	1	5	1	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
262	10-Apr-22	9:02	9:45	Precipitation: Light snow Light snow	Closed	100	500	LHT parked	30	0	0	0	0	0	26	0	0	2	2	0	24	0	0	5	1	0	26	0	0	4	0	0	23	6	0	1	0	0
263	10-Apr-22	16:50	18:15	Precipitation: Yes, light snow	Closed	100	400	NA	16	4	0	0	0	0	16	4	0	0	0	0	16	4	0	0	0	0	16	4	0	0	0	0	16	4	0	0	0	0
264	10-Apr-22	16:50	18:15	Precipitation: Yes, light snow	Closed	100	400	NA	7	13	0	0	0	0	6	13	1	0	0	0	7	13	0	0	0	0	4	16	0	0	0	0	0	20	0	0	0	0
265	10-Apr-22	16:50	18:15	Precipitation: Yes, light snow	Closed	100	400	NA	7	13	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
266	11-Apr-22	12:03	9:36	Precipitation: 0 Nada	Closed	0	2000	Nada	11	19	11	0	0	0	3	19	7	1	0	0	6	19	5	2	0	0	8	20	8	2	0	0	5	25	5	2	0	0
267	11-Apr-22	17:01	18:19	Precipitation: None Gusting wind, blowing snow	Closed	200	1000	NA	3	3	0	0	0	0	3	3	0	0	0	0	14	0	0	0	0	0	11	0	3	0	0	0	11	0	1	1	0	0
268	14-Apr-22	10:42	11:15	Precipitation: 0	Closed	0	1000	None	13	0	1	1	0	0	12	0	0	3	0	0	8	0	0	7	0	0	14	0	0	2	0	0	16	0	0	0	0	0
269	14-Apr-22	12:13	13:23	Precipitation: 0	Closed	0	1500	Vault garage	27	0	0	0	0	0	25	0	0	2	0	0	26	0	0	1	0	0	27	0	0	0	0	0	25	0	0	2	0	0
270	14-Apr-22	16:51	13:56	Precipitation: 0	Closed	0	1500	Vault garage	27	0	0	0	0	0	20	0	0	6	1	0	25	0	0	2	0	0	27	0	0	0	0	0	24	0	1	2	0	0
271	15-Apr-22	9:29	10:16	Precipitation: O Sunny	Closed	100	1500	NA	0	0	0	35	0	0	0	0	0	0	0	35	35	0	0	0	0	0	35	0	0	0	0	0	35	0	0	0	0	0
272	15-Apr-22	17:48	18:30	Precipitation: 0 Sunny & clear	Open	21000	1000	No	1	3	1	0	0	0	2	3	0	0	0	0	2	3	0	0	0	0	2	3	0	0	0	0	2	3	0	0	0	0
273	16-Apr-22	10:07	10:41	Precipitation: 0 Sunny & clear	Closed	300	1000	No	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	1	0	4	0	0	0	1	4	0	0	0
274	16-Apr-22	17:44	18:28	Precipitation: None Sunny	Open	0	2000	Dyno plant	0	14	0	0	0	0	0	14	0	0	0	0	0	14	0	0	0	0	0	14	0	0	0	0	0	14	0	0	0	0
275	17-Apr-22	12:39	13:10	Precipitation: Snow	Open	300	1000	NA	12	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	0
276	18-Apr-22	14:09	14:57	Precipitation: Clear Sunny	Closed	200	3000	0	52	39	0	43	134	0	51	0	34	49	134	0	51	0	34	49	134	0	133	0	0	1	134	0	134	0	0	0	134	0
277	19-Apr-22	8:02	8:34	Precipitation: 0	Open	0	1500	None	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	1	1	0	0	0	0

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Feeding_15	Lying Down_15	Standing_15	Walking_15	Alert_15	Trotting/Running_15	Feeding_18	Lying Down_18	Standing_18	Walking_18	Alert_18	Trotting/Running_18	Feeding_21	Lying Down_21	Standing_21	Walking_21	Alert_21	Trotting/Running_21	Feeding_24	Lying Down_24	Standing_24	Walking_24	Alert_24	Trotting/Running_24	Feeding_27	Lying Down_27	Standing_27	Walking_27	Alert_27	Trotting/Running_27	Feeding_30	Lying Down_30	Standing_30	Walking_30	Alert_30	Trotting/Running_30	Disturbance 0	Disturbance 3	Disturbance 6	Disturbance 9	Disturbance 12
251	29-Jan-22	11:30	13:00	0	8	2	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	NA	Heavy Equipment	NA	NA	Blast
252	03-Apr-22	14:30	14:30	4	0	0	1	0	0	3	0	1	0	0	0	1	0	0	1	0	0	0	0	2	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
253	03-Apr-22	14:30	14:30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Blast	NA	NA	NA	NA
254	08-Apr-22	9:41	10:13	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	NA	NA	Heavy Equipment	NA	NA
255	08-Apr-22	14:35	15:09	10	4	0	1	0	0	10	3	0	1	1	0	10	5	0	0	0	0	9	6	0	0	0	0	9	6	0	0	0	0	5	10	0	0	0	0	NA	NA	Blast	NA	Light Truck
256	09-Apr-22	9:12	9:54	37	0	9	28	10	0	37	0	37	30	10	0	28	0	9	29	0	0	0	0	0	12	0	0	30	5	22	10	5	0	5	0	5	29	5	0	NA	NA	NA	NA	NA
257	09-Apr-22	11:48	12:18	6	0	1	13	0	0	6	0	0	14	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Heavy Equipment	Heavy Equipment	NA	NA
258	09-Apr-22	12:58	13:30	7	0	7	0	7	0	7	1	6	0	0	0	5	2	5	0	0	0	7	0	7	1	0	0	7	0	7	0	0	0	7	0	7	2	0	0	NA	Light Truck	NA	NA	NA
259	10-Apr-22	6:19	6:50	52	8	0	0	0	0	49	9	1	1	0	0	45	10	5	0	0	0	38	17	2	3	0	0	39	18	1	0	2	0	38	20	1	1	0	0	NA	NA	NA	NA	NA
260	10-Apr-22	7:57	8:37	20	0	0	8	2	0	30	0	0	0	0	0	24	0	0	6	0	0	29	0	0	1	0	0	30	0	0	0	0	0	29	0	0	1	0	0	NA	Maintenance Vehicle	NA	Maintenance Vehicle	Heavy Equipment
261	10-Apr-22	8:55	8:55	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Light Truck	NA	NA	NA	NA
262	10-Apr-22	9:02	9:45	23	7	0	0	0	0	23	7	0	0	0	0	22	7	1	0	0	0	22	7	0	1	0	0	20	7	0	3	0	0	18	7	0	5	0	0	NA	NA	NA	NA	NA
263	10-Apr-22	16:50	18:15	14	6	0	0	0	0	14	6	0	0	0	0	11	9	0	0	0	0	14	6	0	0	0	0	15	4	0	1	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
264	10-Apr-22	16:50	18:15	0	20	0	0	0	0	0	20	0	0	0	0	0	20	0	0	0	0	0	20	0	0	0	0	0	20	0	0	0	0	0	20	0	0	0	0	NA	NA	NA	NA	NA
265	10-Apr-22	16:50	18:15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
266	11-Apr-22	12:03	9:36	2	28	0	0	0	0	1	29	1	0	0	0	0	30	0	0	0	0	0	30	0	0	0	0	1	29	1	0	0	0	0	30	0	0	0	0	NA	NA	NA	NA	NA
267	11-Apr-22	17:01	18:19	14	0	0	0	0	0	14	0	0	0	0	0	12	0	0	2	0	0	7	0	0	7	0	0	4	0	0	7	3	0	4	0	0	9	1	0	Maintenance Vehicle	NA	NA	NA	NA
268	14-Apr-22	10:42	11:15	14	0	0	2	0	0	11	0	0	6	0	0	8	0	2	7	0	0	6	0	0	10	0	0	16	0	0	1	0	0	14	0	0	3	0	0	NA	NA	NA	NA	NA
269	14-Apr-22	12:13	13:23	22	0	1	4	0	0	26	0	0	1	0	0	0	NA	NA	NA	NA	NA	0	NA	NA	NA	NA	NA	0	NA	NA	NA	NA	NA	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
270	14-Apr-22	16:51	13:56	26	0	1	0	0	0	22	0	0	5	0	0	24	0	0	3	0	0	5	0	0	22	0	0	3	0	0	24	0	0	2	0	0	25	0	0	NA	NA	NA	NA	NA
271	15-Apr-22	9:29	10:16	0	0	0	35	0	0	35	0	0	0	0	0	35	0	0	0	0	0	35	0	0	0	0	0	35	0	0	0	0	0	20	0	0	15	0	0	NA	NA	NA	NA	NA
272	15-Apr-22	17:48	18:30	2	3	0	0	0	0	5	0	0	0	0	0	0	0	0	5	0	0	4	0	1	0	0	0	3	0	2	5	0	0	5	0	6	0	0	0	NA	NA	NA	NA	Light Truck
273	16-Apr-22	10:07	10:41	4	1	0	0	0	0	4	1	0	0	0	0	4	1	0	0	0	0	4	1	0	0	0	0	4	1	0	0	0	0	3	1	0	1	0	0	NA	NA	Convoy	NA	NA
274	16-Apr-22	17:44	18:28	0	14	0	0	0	0	0	14	0	0	0	0	0	14	0	0	0	0	0	0	0	0	14	0	0	5	0	9	0	0	0	5	0	9	0	0	NA	NA	NA	NA	NA
275	17-Apr-22	12:39	13:10	12	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	0	11	0	1	0	0	0	NA	NA	NA	NA	NA
276	18-Apr-22	14:09	14:57	132	0	0	2	134	0	132	0	0	2	134	0	132	0	0	2	134	0	134	0	0	0	0	0	134	0	0	0	0	0	134	0	0	0	0	0	NA	NA	NA	NA	NA
277	19-Apr-22	8:02	8:34	1	1	0	0	0	0	1	1	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	Heavy Equipment	Heavy Equipment	Light Truck	NA	NA

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Disturbance 15	Disturbance 18	Disturbance 21	Disturbance 24	Disturbance 27	Disturbance 30	Survey Type
251	29-Jan-22	11:30	13:00	NA	NA	NA	Heavy Equipment	Heavy Equipment	NA	07- During the blast, Behavior
252	03-Apr-22	14:30	14:30	NA	NA	NA	NA	NA	NA	03- Pre-disturbance, Behavior
253	03-Apr-22	14:30	14:30	NA	NA	NA	NA	NA	NA	07- During the blast, Behavior
254	08-Apr-22	9:41	10:13	Heavy Equipment	NA	NA	NA	Heavy Equipment	Heavy Equipment	01- Behavior
255	08-Apr-22	14:35	15:09	NA	NA	NA	NA	NA	Heavy Equipment	01- Behavior
256	09-Apr-22	9:12	9:54	NA	NA	NA	NA	NA	NA	01- Behavior
257	09-Apr-22	11:48	12:18	NA	NA	NA	NA	NA	NA	01- Behavior
258	09-Apr-22	12:58	13:30	NA	NA	NA	NA	NA	NA	01- Behavior
259	10-Apr-22	6:19	6:50	NA	NA	NA	NA	NA	NA	01- Behavior
260	10-Apr-22	7:57	8:37	Maintenance Vehicle	Maintenance Vehicle	Maintenance Vehicle	Maintenance Vehicle	Maintenance Vehicle	Maintenance Vehicle	03- Pre-disturbance, Behavior
261	10-Apr-22	8:55	8:55	NA	NA	NA	NA	NA	NA	05- During the convoy, Behavior
262	10-Apr-22	9:02	9:45	NA	NA	NA	NA	NA	NA	09-Post-disturbance, Behavior
263	10-Apr-22	16:50	18:15	NA	NA	NA	NA	NA	NA	03- Pre-disturbance, Behavior
264	10-Apr-22	16:50	18:15	NA	Blast	NA	NA	NA	NA	07- During the blast, Behavior
265	10-Apr-22	16:50	18:15	NA	NA	NA	NA	NA	NA	09-Post-disturbance, Behavior
266	11-Apr-22	12:03	9:36	NA	NA	NA	NA	NA	NA	03- Pre-disturbance, Behavior
267	11-Apr-22	17:01	18:19	NA	NA	Blast	NA	NA	NA	03- Pre-disturbance, Behavior
268	14-Apr-22	10:42	11:15	NA	NA	NA	NA	NA	NA	01- Behavior
269	14-Apr-22	12:13	13:23	NA	NA	NA	NA	NA	NA	01- Behavior
270	14-Apr-22	16:51	13:56	NA	NA	NA	NA	NA	NA	05- During the convoy, Behavior
271	15-Apr-22	9:29	10:16	NA	NA	NA	NA	NA	NA	01- Behavior
272	15-Apr-22	17:48	18:30	Blast	NA	NA	Light Truck	NA	NA	03- Pre-disturbance, Behavior
273	16-Apr-22	10:07	10:41	NA	NA	NA	NA	NA	NA	03- Pre-disturbance, Behavior
274	16-Apr-22	17:44	18:28	NA	NA	NA	Blast	NA	NA	03- Pre-disturbance, Behavior
275	17-Apr-22	12:39	13:10	NA	NA	NA	NA	NA	NA	01- Behavior
276	18-Apr-22	14:09	14:57	NA	NA	NA	NA	NA	NA	01- Behavior
277	19-Apr-22	8:02	8:34	Heavy Equipment	NA	NA	Heavy Equipment	Heavy Equipment	NA	01- Behavior

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Observers	Waypoint	Longitude	Latitude	Reconnaissance Survey	Project Tolerant Info	Road Name and Distance Marker	Distance from Caribou to Observer Location (m)	Distance from Caribou to Road (if different)	Bearing	Is Group East or West of Survey?	Did the Group Cross the Road during the Survey?	Estimated Size (for larger group)	Caribou Group Size (exact count or estimate)	Size of Subset (Surveyed)	Dominant Group Sex	Temperature (°C)	Wind Speed (km/h)	Wind Direction	Days since Last Snow or Wind Event
278	19-Apr-22	12:55	13:32	Sylvain, Felix Quessy	-	-96.1775229	65.0229587	No	No	AWAR KM 93	>1000	N/A	350	West	No	>100	123	123	Mixed group	-14	4	SW	5
279	19-Apr-22	16:23	17:00	Olivier Jean & Louis Dubois	-	-96.1775229	65.0229587	Yes	No	AWAR KM 93	>1000	N/A	0	West	No	>100	-	27	Mixed group	-19	14	NW	7
280	19-Apr-22	17:00	17:12	Olivier Jean & Louis Dubois	-	-96.1775229	65.0229587	Yes	No	AWAR KM 93	>1000	N/A	0	West	No	>100	-	27	Mixed group	-19	14	NW	7
281	19-Apr-22	17:01	17:38	Eric Leonard	-	-96.71779491	65.39996374	No	No	Amaruq KM NA	300-1000	N/A	300	East	No	3 to 25	14	2	Mixed group	-17	0	SW	0
282	20-Apr-22	12:38	13:10	Eric Leonard	-	-96.46698867	65.23545963	No	No	Haul Road KM 150	300-1000	N/A	0	East	No	3 to 25	9	9	Mixed group	-18	12	SE	5
283	20-Apr-22	15:13	15:45	Olivier Gagnon	-	-96.2218667	65.00080517	Yes	No	AWAR KM 93	300-1000	N/A	70	East	No	51-100	84	84	Mixed group	-10	23	NW	0
284	20-Apr-22	15:45	16:18	Felix Quessy Olivier Jean	-	-96.16783321	65.19605901	Yes	No	Haul Road KM 112	300-1000	N/A	90	West	No	26-50	40	5	Mixed group	-21	20	NW	1
285	21-Apr-22	8:44	9:48	Eric Leonard	-	-96.66024895	65.40331874	Yes	No	Haul Road KM 179	100-300	N/A	280	West	No	>100	1414	14	Mixed group	-26	15	NW	10
286	21-Apr-22	8:54	9:24	Olivier Gagnon Jean-François dufour	-	-96.16213528	65.18777647	Yes	No	Haul Road KM 130	100-300	N/A	70	East	Yes	1 to 2	2	2	Mostly females	-10	15	NW	1
287	21-Apr-22	9:43	10:30	Olivier Gagnon Jean-François Dufour	-	-96.14534518	65.16726192	Yes	No	Haul Road KM 128	>1000	N/A	230	West	No	3 to 25	16	14	Mixed group	-15	20	NW	1
288	21-Apr-22	10:29	10:59	Olivier Gagnon	-	-96.10862188	65.13459033	No	No	Haul Road KM 125	300-1000	N/A	230	West	No	3 to 25	22	22	Mixed group	-10	20	NW	1
289	21-Apr-22	11:05	11:36	Laurence Archambault and Kevin Martee	-	-96.03030695	65.08290752	Yes	No	Haul Road KM 116	300-1000	N/A	350	West	No	3 to 25	18	18	Mixed group	-25	25	NW	0
290	22-Apr-22	9:08	9:35	Laurence Archambault	-	-96.6666292	65.40146278	Yes	No	Haul Road KM 176	300-1000	N/A	280	West	No	51-100	64	64	Mixed group	-21	6	W	3
291	22-Apr-22	9:08	9:35	Laurence Archambault	-	-96.6666292	65.40146278	Yes	No	Haul Road KM 176	300-1000	N/A	280	West	No	51-100	64	64	Mixed group	-21	6	W	3
292	22-Apr-22	9:08	9:35	Laurence Archambault	-	-96.6666292	65.40146278	Yes	No	Haul Road KM 176	300-1000	N/A	280	West	No	51-100	64	64	Mixed group	-21	6	W	3
293	22-Apr-22	11:07	11:48	SS - JFD	-	-96.01874685	65.04848845	No	No	Haul Road KM 111	0-50	N/A	140	Both	Yes	>100	254	21	Mixed group	-19	30	NE	1
294	22-Apr-22	12:24	12:58	Olivier Gagnon	-	-96.37124923	64.67301787	Yes	No	AWAR KM 50	100-300	N/A	140	East	No	3 to 25	12	12	Mixed group	-10	30	NW	2
295	22-Apr-22	12:54	13:28	Sylvain Singaqti - Jeff Dufour	-	-96.01030432	65.05025773	Yes	No	Haul Road KM 111	50-100	N/A	130	East	No	3 to 25	9	9	Mixed group	-18	20	NW	1
296	22-Apr-22	13:13	13:42	Laurence Archambault	-	-96.46933344	65.32378424	No	No	Haul Road KM 163	100-300	N/A	270	West	No	26-50	36	36	Mixed group	17	6	W	3
297	22-Apr-22	13:29	14:00	Sylvain Singaqti - Jeff Dufour	-	-96.0108904	65.0500978	Yes	No	Haul Road KM 111	50-100	N/A	140	East	No	3 to 25	10	10	Mixed group	-18	20	NW	1
298	22-Apr-22	14:16	14:30	Laurence Archambault	-	-96.41310714	65.30780425	No	No	Haul Road KM 163	100-300	N/A	280	West	No	3 to 25	14	14	Mixed group	-24	6	W	3
299	24-Apr-22	17:57	18:39	Eric Leonard	-	-96.73041957	65.40066369	No	NA	Amaruq KM NA	300-1000	N/A	0	West	No	3 to 25	7	7	Mixed group	-22	20	NW	9
300	25-Apr-22	17:20	11:12	Derek	-	-96.47426557	65.24868438	No	No	Haul Road KM 152	0-50	N/A	50	East	Yes	3 to 25	9	9	Mostly females	-20	40	N	1
301	26-Apr-22	9:10	9:10	Rowan Woodall and Kevin Martee	-	-96.4426762	65.32069197	No	No	Haul Road KM 163	300-1000	N/A	330	West	NA	51-100	98	23	Mixed group	-10	7	NW	9
302	26-Apr-22	14:30	15:18	Felix Quessy Sylvain	-	-96.03198672	65.04550132	No	No	Haul Road KM 111	300-1000	N/A	0	West	No	1 to 2	2	2	Mixed group	-10	15	NW	5
303	27-Apr-22	6:17	6:50	Rowan Woodall	-	-96.46796033	65.23631017	No	No	Haul Road KM 151	0-50	N/A	120	Both	Yes	3 to 25	10	10	Mixed group	-10	15	NW	10
304	27-Apr-22	16:42	17:18	Alex Blanchette	-	-96.10247426	65.11987074	Yes	No	Haul Road KM 125	>1000	N/A	0	West	No	26-50	36	36	Mixed group	-3	15	NE	7

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Weather Observations	Road Open or Closed	Road Height	Road Side Width	Structures Present	Feeding_0	Lying Down_0	Standing_0	Walking_0	Alert_0	Trotting/Running_0	Feeding_3	Lying Down_3	Standing_3	Walking_3	Alert_3	Trotting/Running_3	Feeding_6	Lying Down_6	Standing_6	Walking_6	Alert_6	Trotting/Running_6	Feeding_9	Lying Down_9	Standing_9	Walking_9	Alert_9	Trotting/Running_9	Feeding_12	Lying Down_12	Standing_12	Walking_12	Alert_12	Trotting/Running_12
278	19-Apr-22	12:55	13:32	Precipitation: 0 Sunny	Closed	800	1000	No	80	0	23	20	0	0	100	0	0	23	0	0	100	0	23	0	0	0	123	0	0	0	0	0	123	0	0	0	0	0
279	19-Apr-22	16:23	17:00	Precipitation: 0	Closed	0	1500	None	17	10	0	0	0	0	17	10	0	0	0	0	17	10	0	0	0	0	15	6	0	0	0	0	20	0	0	0	0	0
280	19-Apr-22	17:00	17:12	Precipitation: 0	Closed	0	1500	None	14	0	0	0	0	0	14	0	0	0	0	0	2	0	0	0	0	0	7	0	0	0	0	0	0	NA	NA	NA	NA	NA
281	19-Apr-22	17:01	17:38	Precipitation: O Overcast	NA	0	1000	Surface drill nearby	12	0	0	1	0	0	12	0	0	2	0	0	14	0	0	0	0	0	14	0	0	0	0	0	12	0	1	1	0	0
282	20-Apr-22	12:38	13:10	Precipitation: 0 Overcast	Open	300	1000	None	7	0	0	0	0	0	2	0	4	0	0	0	4	0	1	0	0	0	NA	NA	NA	NA	NA	NA	1	0	0	8	0	0
283	20-Apr-22	15:13	15:45	Precipitation: Snow	Open	300	800	NA	42	10	30	0	0	0	60	0	24	0	0	0	42	20	22	0	0	0	60	10	14	0	0	0	84	0	0	0	0	0
284	20-Apr-22	15:45	16:18	Precipitation: 0 Sunny	Open	200	1600	No	5	0	0	2	0	0	6	0	0	1	0	0	5	0	2	0	0	0	6	0	0	1	0	0	7	0	0	0	0	0
285	21-Apr-22	8:44	9:48	Precipitation: 0 Overcast, foggy	Closed	300	1000	No	13	1	0	0	0	0	8	2	0	0	0	0	7	2	0	0	0	0	6	1	0	0	0	0	6	1	0	3	0	0
286	21-Apr-22	8:54	9:24	Precipitation: Snow	Closed	200	1500	NA	0	0	0	2	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0
287	21-Apr-22	9:43	10:30	Precipitation: Snow	Closed	100	1600	NA	7	0	0	8	0	0	0	0	0	16	0	0	0	0	0	16	0	0	0	0	0	16	0	0	13	0	0	3	0	0
288	21-Apr-22	10:29	10:59	Precipitation: Snow	Closed	200	1600	NA	11	0	0	11	0	0	11	0	0	11	0	0	1	0	2	0	0	0	16	0	0	0	0	0	NA	NA	NA	NA	NA	NA
289	21-Apr-22	11:05	11:36	Precipitation: 0 Sunny	Closed	100	2000	None	7	0	0	10	1	0	10	0	2	6	0	0	1	0	0	3	0	0	5	0	0	3	0	0	12	0	2	0	0	0
290	22-Apr-22	9:08	9:35	Precipitation: 0 Sunny	Closed	0	2000	None	25	34	4	0	1	0	45	6	0	13	0	0	30	21	0	13	0	0	25	22	0	4	0	0	13	28	0	6	0	0
291	22-Apr-22	9:08	9:35	Precipitation: 0 Sunny	Closed	0	2000	None	30	34	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
292	22-Apr-22	9:08	9:35	Precipitation: 0 Sunny	Closed	0	2000	None	0	0	0	67	0	0	5	0	0	10	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
293	22-Apr-22	11:07	11:48	Precipitation: None Sunny	Closed	200	2000	None	9	0	0	12	0	0	21	0	0	0	0	0	21	0	0	0	0	0	21	0	0	0	0	0	21	0	0	0	0	0
294	22-Apr-22	12:24	12:58	Precipitation: 0	Open	200	1000	NA	0	12	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0
295	22-Apr-22	12:54	13:28	Precipitation: 0 Sunny	Closed	400	2500	None	0	8	2	0	0	0	0	7	3	0	0	0	0	9	1	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0
296	22-Apr-22	13:13	13:42	Precipitation: 0 Sunny	Closed	0	2000	No	34	1	4	0	0	0	24	10	5	0	0	0	34	5	0	0	0	0	1	5	0	10	0	0	0	0	0	16	0	0
297	22-Apr-22	13:29	14:00	Precipitation: 0 Sunny	Closed	300	2500	None	0	9	1	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0
298	22-Apr-22	14:16	14:30	Precipitation: 0	Closed	0	2000	None	14	0	0	0	0	0	9	0	0	5	0	0	5	0	0	9	0	0	8	0	0	3	0	0	6	0	0	4	0	0
299	24-Apr-22	17:57	18:39	Precipitation: O	Open	0	0	NA	7	0	0	0	0	0	7	0	0	0	0	0	7	0	0	0	0	0	7	0	0	0	0	0	7	0	0	0	0	0
300	25-Apr-22	17:20	11:12	Precipitation: 0 Nada	Closed	100	1500	Nada	0	0	9	9	9	0	3	0	9	1	2	0	9	0	9	1	0	0	9	0	9	0	0	0	9	0	9	9	0	0
301	26-Apr-22	9:10	9:10	Precipitation: None	Open	100	400	NA	0	0	0	25	0	0	20	0	0	5	0	0	25	0	0	0	0	0	19	0	0	0	0	0	10	0	0	0	0	0
302	26-Apr-22	14:30	15:18	Precipitation: 0 Sunny	Closed	100	3000	No	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	2	0	0	0	0	0
303	27-Apr-22	6:17	6:50	Precipitation: 0	Closed	200	400	None	6	0	0	4	0	0	0	0	3	7	0	0	0	0	10	0	0	0	0	0	7	3	0	0	0	0	8	2	0	0
304	27-Apr-22	16:42	17:18	Precipitation: None	Closed	100	1500	NA	36	0	0	0	0	0	36	0	0	0	0	0	36	0	0	0	0	0	0	0	0	36	0	0	0	0	0	36	0	0

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Feeding_15	Lying Down_15	Standing_15	Walking_15	Alert_15	Trotting/Running_15	Feeding_18	Lying Down_18	Standing_18	Walking_18	Alert_18	Trotting/Running_18	Feeding_21	Lying Down_21	Standing_21	Walking_21	Alert_21	Trotting/Running_21	Feeding_24	Lying Down_24	Standing_24	Walking_24	Alert_24	Trotting/Running_24	Feeding_27	Lying Down_27	Standing_27	Walking_27	Alert_27	Trotting/Running_27	Feeding_30	Lying Down_30	Standing_30	Walking_30	Alert_30	Trotting/Running_30	Disturbance 0	Disturbance 3	Disturbance 6	Disturbance 9	Disturbance 12
278	19-Apr-22	12:55	13:32	103	16	0	4	0	0	103	16	0	4	0	0	100	16	0	7	0	0	113	0	10	0	0	0	123	0	0	0	0	0	63	0	60	0	0	0	NA	NA	NA	NA	NA
279	19-Apr-22	16:23	17:00	17	0	0	0	0	0	15	3	0	0	0	0	14	6	0	0	0	0	14	4	0	0	0	0	15	2	0	0	0	0	15	0	0	2	0	0	NA	NA	NA	NA	NA
280	19-Apr-22	17:00	17:12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
281	19-Apr-22	17:01	17:38	12	0	2	0	0	0	12	0	0	21	0	0	8	0	0	6	0	0	10	0	0	4	0	0	13	0	0	1	0	0	12	0	1	1	0	0	NA	NA	NA	NA	NA
282	20-Apr-22	12:38	13:10	3	0	0	6	0	0	7	0	0	2	0	0	9	0	0	0	0	0	9	0	0	0	0	0	9	0	0	0	0	0	9	0	0	0	0	0	Heavy Equipment	NA	NA	NA	Light Truck
283	20-Apr-22	15:13	15:45	42	0	42	0	0	0	40	15	24	5	0	0	84	0	0	0	0	0	24	0	60	0	0	0	34	0	50	0	0	0	84	0	0	0	0	0	NA	NA	NA	NA	NA
284	20-Apr-22	15:45	16:18	7	0	0	0	0	0	6	0	0	0	1	0	3	0	0	3	0	0	3	0	0	4	0	0	7	0	0	0	0	0	5	0	0	2	0	0	NA	NA	NA	NA	NA
285	21-Apr-22	8:44	9:48	7	1	0	1	0	0	9	0	0	1	0	0	9	0	1	0	0	0	5	0	0	6	0	0	3	0	0	7	0	0	4	0	0	6	0	0	NA	NA	NA	NA	NA
286	21-Apr-22	8:54	9:24	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	NA	NA	NA	NA	NA
287	21-Apr-22	9:43	10:30	13	0	0	3	0	0	14	0	0	2	0	0	15	0	0	1	0	0	15	0	0	0	1	0	16	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	Convoy	NA	NA
288	21-Apr-22	10:29	10:59	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Heavy Equipment
289	21-Apr-22	11:05	11:36	12	0	1	4	0	0	14	0	0	0	0	0	16	0	1	0	0	0	16	0	1	0	0	0	12	0	0	0	0	0	17	4	0	0	0	0	NA	Light Truck	NA	NA	NA
290	22-Apr-22	9:08	9:35	7	33	0	3	0	0	5	26	0	6	1	0	7	13	0	5	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
291	22-Apr-22	9:08	9:35	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
292	22-Apr-22	9:08	9:35	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
293	22-Apr-22	11:07	11:48	24	0	0	0	0	0	24	0	0	0	0	0	24	0	0	0	0	0	24	0	0	0	0	0	24	0	0	0	0	0	24	0	0	0	0	0	NA	Convoy	Convoy	NA	NA
294	22-Apr-22	12:24	12:58	0	12	0	0	0	0	12	0	0	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	12	0	0	0	0	0	12	0	0	0	0	0	NA	NA	NA	NA	NA
295	22-Apr-22	12:54	13:28	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	NA	NA	NA	NA	NA
296	22-Apr-22	13:13	13:42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
297	22-Apr-22	13:29	14:00	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	Convoy	NA	NA	NA	NA
298	22-Apr-22	14:16	14:30	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
299	24-Apr-22	17:57	18:39	6	0	0	0	1	0	4	0	0	0	3	0	6	0	0	1	0	0	0	0	0	7	0	0	0	0	0	4	3	0	0	0	7	0	0	0	NA	NA	NA	NA	NA
300	25-Apr-22	17:20	11:12	0	0	9	9	9	0	0	0	9	9	9	0	0	0	9	9	9	9	9	0	9	0	9	0	9	0	9	0	0	0	0	0	9	9	9	7	NA	NA	NA	NA	NA
301	26-Apr-22	9:10	9:10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Heavy Equipment	NA	NA
302	26-Apr-22	14:30	15:18	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	NA	NA	NA	NA	NA
303	27-Apr-22	6:17	6:50	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	NA	NA	NA	NA	NA
304	27-Apr-22	16:42	17:18	26	0	0	10	0	0	33	3	0	0	0	0	33	3	0	0	0	0	32	4	0	0	0	0	36	0	0	0	0	0	36	0	0	0	0	0	NA	NA	NA	NA	NA

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Disturbance 15	Disturbance 18	Disturbance 21	Disturbance 24	Disturbance 27	Disturbance 30	Survey Type
278	19-Apr-22	12:55	13:32	NA	NA	NA	NA	NA	NA	01- Behavior
279	19-Apr-22	16:23	17:00	NA	NA	NA	NA	NA	NA	05- During the convoy, Behavior
280	19-Apr-22	17:00	17:12	NA	NA	NA	NA	NA	NA	09-Post-disturbance, Behavior
281	19-Apr-22	17:01	17:38	NA	NA	Heavy Equipment	NA	NA	NA	01- Behavior
282	20-Apr-22	12:38	13:10	NA	NA	Heavy Equipment	NA	NA	NA	01- Behavior
283	20-Apr-22	15:13	15:45	NA	NA	NA	NA	NA	NA	01- Behavior
284	20-Apr-22	15:45	16:18	NA	Heavy Equipment	NA	NA	NA	NA	01- Behavior
285	21-Apr-22	8:44	9:48	Convoy	NA	NA	NA	NA	NA	05- During the convoy, Behavior
286	21-Apr-22	8:54	9:24	NA	NA	NA	NA	NA	NA	01- Behavior
287	21-Apr-22	9:43	10:30	NA	Convoy	NA	NA	NA	NA	05- During the convoy, Behavior
288	21-Apr-22	10:29	10:59	NA	NA	NA	NA	NA	NA	05- During the convoy, Behavior
289	21-Apr-22	11:05	11:36	NA	NA	NA	NA	NA	NA	01- Behavior
290	22-Apr-22	9:08	9:35	NA	NA	NA	NA	NA	NA	03- Pre-disturbance, Behavior
291	22-Apr-22	9:08	9:35	NA	NA	NA	Convoy	NA	NA	05- During the convoy, Behavior
292	22-Apr-22	9:08	9:35	NA	NA	NA	NA	NA	NA	09-Post-disturbance, Behavior
293	22-Apr-22	11:07	11:48	NA	NA	NA	NA	NA	NA	01- Behavior
294	22-Apr-22	12:24	12:58	NA	NA	NA	NA	NA	NA	01- Behavior
295	22-Apr-22	12:54	13:28	NA	NA	NA	NA	NA	NA	05- During the convoy, Behavior
296	22-Apr-22	13:13	13:42	NA	NA	NA	NA	NA	NA	03- Pre-disturbance, Behavior
297	22-Apr-22	13:29	14:00	NA	NA	NA	NA	NA	NA	05- During the convoy, Behavior
298	22-Apr-22	14:16	14:30	NA	NA	NA	NA	NA	NA	03- Pre-disturbance, Behavior
299	24-Apr-22	17:57	18:39	NA	Blast	NA	NA	NA	NA	03- Pre-disturbance, Behavior
300	25-Apr-22	17:20	11:12	NA	NA	NA	Heavy Equipment	Convoy	NA	01- Behavior
301	26-Apr-22	9:10	9:10	NA	NA	NA	NA	NA	NA	01- Behavior
302	26-Apr-22	14:30	15:18	NA	NA	Aircraft	NA	NA	NA	01- Behavior
303	27-Apr-22	6:17	6:50	NA	NA	NA	NA	NA	NA	01- Behavior
304	27-Apr-22	16:42	17:18	NA	NA	NA	NA	NA	NA	01- Behavior

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Observers	Waypoint	Longitude	Latitude	Reconnaissance Survey	Project Tolerant Info	Road Name and Distance Marker	Distance from Caribou to Observer Location (m)	Distance from Caribou to Road (if different)	Bearing	Is Group East or West of Survey?	Did the Group Cross the Road during the Survey?	Estimated Size (for larger group)	Caribou Group Size (exact count or estimate)	Size of Subset (Surveyed)	Dominant Group Sex	Temperature (°C)	Wind Speed (km/h)	Wind Direction	Days since Last Snow or Wind Event
305	29-Apr-22	10:41	11:18	Derek, Nicolas	-	-96.01128518	64.37485252	No	No	AWAR KM 6	100-300	N/A	270	West	No	1 to 2	2	2	Mixed group	-10	30	N	1
306	30-Apr-22	17:25	18:30	Rowan Woodall	-	-96.6665196	65.40176043	No	No	Amaruq KM 143	100-300	N/A	0	West	No	3 to 25	22	22	Mixed group	-14	30	N	2
307	03-May-22	17:45	18:30	Rowan Woodall, Kathleen Newberry	-	-96.66657043	65.40144073	No	No	Haul Road KM 179	50-100	N/A	150	West	No	26-50	33	33	Mixed group	-6	10	SE	5
308	04-May-22	15:52	16:34	Alex	-	-96.07110259	65.02313573	Yes	No	Meadowbank KM NA	0-50	N/A	340	East	Yes	3 to 25	21	2	Mixed group	-5	15	NW	4
309	05-May-22	17:35	18:26	Eric Leonard	-	-96.69641467	65.3965103	No	No	Amaruq KM NA	100-300	N/A	350	West	No	3 to 25	20	20	Mixed group	-10	40	SE	0
310	07-May-22	17:35	18:15	Kathleen Newberry	-	-96.67888128	65.4064376	No	No	Amaruq KM NA	100-300	N/A	150	East	No	3 to 25	10	10	Mostly females	0	30	NW	0
311	12-May-22	13:53	14:29	Louis Dubois - Jeff Dufour	-	-96.07045145	65.02217493	No	No	AWAR KM 104	50-100	N/A	180	West	No	3 to 25	12	12	Mixed group	-2	20	NW	1
312	15-May-22	8:23	8:58	NB JL	-	-96.06439261	65.01537464	Yes	No	Haul Road KM 110	100-300	N/A	180	West	No	3 to 25	18	2	Mixed group	3	15	NW	5
313	19-May-22	15:23	20:56	Jeff Dufour	-	-96.07320868	65.02135715	Yes	No	AWAR KM 102	100-300	N/A	270	West	No	1 to 2	2	2	Mixed group	-1	40	N	4
314	14-Jun-22	17:37	18:23	Eric Leonard	-	-96.66535915	65.40063477	No	No	Amaruq KM NA	300-1000	N/A	0	West	No	3 to 25	19	19	Mixed group	22	26	W	13
315	31-Jul-22	14:33	15:10	JL NB	-	-96.21997249	64.9685522	No	No	AWAR KM 89	>1000	N/A	300	East	No	3 to 25	10	10	Mixed group	8	40	NW	0
316	31-Jul-22	15:17	15:56	Nadine Blatter Nadine Lachance	-	-96.25471629	64.94287273	Yes	No	AWAR KM 83	100-300	N/A	180	East	No	26-50	39	11	Mixed group	10	35	NW	0
317	31-Jul-22	16:08	16:34	Alex Blanchette	-	-96.37312945	64.67993164	Yes	No	AWAR KM 52	300-1000	N/A	90	East	No	3 to 25	25	10	Mixed group	10	20	E	0
318	01-Aug-22	13:44	13:44	Derek	-	-96.07187382	64.45126741	Yes	No	AWAR KM 20	100-300	N/A	250	West	NA	3 to 25	4	4	Mostly males	7	30	NW	1
319	01-Aug-22	14:02	14:32	Derek	-	-96.11026198	64.49172435	Yes	No	AWAR KM 22	50-100	N/A	150	East	No	26-50	37	37	Mixed group	7	30	NW	1
320	01-Aug-22	14:48	15:24	Jeff Dufour	-	-96.07127169	65.02307129	No	No	AWAR KM 94	100-300	N/A	250	West	No	1 to 2	2	2	Mixed group	6	50	NW	1
321	01-Aug-22	15:27	15:56	Jeff Dufour	-	-96.21503702	65.00689697	No	No	AWAR KM 93	50-100	N/A	100	East	No	1 to 2	1	2	Mostly males	6	50	NW	1
322	02-Aug-22	11:02	11:36	NB DN	-	-96.28574723	65.22579001	Yes	No	Haul Road KM 139	300-1000	N/A	300	East	No	3 to 25	5	5	Mostly males	10	35	N	0
323	02-Aug-22	17:21	17:39	Jeff Dufour	-	-96.11446368	64.49468994	No	No	AWAR KM 20	100-300	N/A	90	East	No	3 to 25	7	7	Mixed group	9	26	N	1
324	03-Aug-22	11:24	11:54	Jeff Dufour	-	-96.03292981	64.41809082	No	No	AWAR KM 12	50-100	N/A	85	East	No	1 to 2	2	2	Mixed group	12	17	N	1
325	04-Aug-22	10:30	10:48	JL NB	-	-96.41428886	65.29302979	No	No	Haul Road KM 159	100-300	N/A	270	East	No	3 to 25	3	3	Mixed group	10	26	NW	0
326	04-Aug-22	11:03	11:16	JL NB	-	-96.41397755	65.27142334	No	No	Haul Road KM 150	>1000	N/A	310	East	No	3 to 25	8	8	Mixed group	10	26	NW	0
327	04-Aug-22	11:23	11:31	Jeff Dufour	-	-96.30641191	64.91906738	No	No	AWAR KM 79	100-300	N/A	90	East	No	3 to 25	5	5	Mixed group	9	26	NW	1
328	04-Aug-22	11:33	12:04	JL	-	-96.46695149	65.2355957	No	No	Haul Road KM 140	100-300	N/A	310	East	No	1 to 2	1	3	Mixed group	10	26	NW	0
329	04-Aug-22	13:01	13:16	Jeff Dufour	-	-96.3323938	64.89910889	No	No	AWAR KM 32	100-300	N/A	100	East	No	3 to 25	5	5	Mixed group	13	26	NW	0
330	09-Aug-22	11:34	12:18	Jaden Vieveen Sylvain Singaqti	-	-96.60400718	65.36114502	Yes	No	Haul Road KM 171	100-300	N/A	0	East	No	1 to 2	1	1	Mostly males	22	8	S	7
331	26-Aug-22	16:57	18:18	Eric Leonard	-	-96.66638557	65.4017334	No	No	Amaruq KM NA	300-1000	N/A	0	East	No	3 to 25	3	3	Mostly males	10	4	NE	4

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Weather Observations	Road Open or Closed	Road Height	Road Side Width	Structures Present	Feeding_0	Lying Down_0	Standing_0	Walking_0	Alert_0	Trotting/Running_0	Feeding_3	Lying Down_3	Standing_3	Walking_3	Alert_3	Trotting/Running_3	Feeding_6	Lying Down_6	Standing_6	Walking_6	Alert_6	Trotting/Running_6	Feeding_9	Lying Down_9	Standing_9	Walking_9	Alert_9	Trotting/Running_9	Feeding_12	Lying Down_12	Standing_12	Walking_12	Alert_12	Trotting/Running_12
305	29-Apr-22	10:41	11:18	Precipitation: Nada Nada	Open	0	800	Nada	0	0	2	2	2	2	0	0	2	2	2	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	2	0	0
306	30-Apr-22	17:25	18:30	Precipitation: None	Open	200	600	IVR WRSF	15	0	0	7	0	0	18	0	0	4	0	0	20	0	0	2	0	0	22	0	0	0	0	0	20	0	0	2	0	0
307	03-May-22	17:45	18:30	Precipitation: 0	Closed	200	700	Pad K on East side of road	0	32	1	0	0	0	1	31	1	0	0	0	1	32	0	0	0	0	2	30	1	0	0	0	1	30	1	0	1	0
308	04-May-22	15:52	16:34	Precipitation: None Few	Closed	100	1200	Airport	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	2	0	0	0
309	05-May-22	17:35	18:26	Precipitation: 0 Windy, poor visibility	Open	100	1000	Vent raise storage pile nearby	5	15	0	0	0	0	14	6	0	0	0	0	14	6	0	0	0	0	12	8	0	0	0	0	12	8	0	0	0	0
310	07-May-22	17:35	18:15	Precipitation: In the morning	Open	300	1000	IVR WRSF, IVR att. Pond, IVR dike, Road 35, PAD K, Fuel farm.	7	0	0	3	0	0	10	0	0	0	0	0	5	0	1	4	0	0	7	0	0	3	0	0	10	0	0	0	0	0
311	12-May-22	13:53	14:29	Precipitation: None Cloudy	Open	200	2000	None	12	0	0	0	0	0	8	0	0	0	0	0	11	0	0	1	0	0	12	0	0	0	0	0	9	1	0	0	0	0
312	15-May-22	8:23	8:58	Precipitation: 0 Sunny	Open	0	800	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0
313	19-May-22	15:23	20:56	Precipitation: 0	Open	300	2000	NA	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0
314	14-Jun-22	17:37	18:23	Precipitation: 0 Sun and cloud	Open	0	1000	No	0	7	5	6	0	0	0	7	5	7	0	0	0	8	6	5	0	0	0	9	8	2	0	0	0	9	9	1	0	0
315	31-Jul-22	14:33	15:10	Precipitation: 0 Windy and cloudy	Closed	100	700	NA	0	8	2	0	0	0	0	9	1	0	0	0	0	10	0	0	0	0	2	8	0	0	0	0	3	7	0	0	0	0
316	31-Jul-22	15:17	15:56	Precipitation: 0 Cloudy and windy	Closed	-100	600	0	11	0	0	0	0	0	8	0	0	3	0	0	11	0	0	0	0	0	11	0	0	0	0	0	11	0	0	0	0	0
317	31-Jul-22	16:08	16:34	Precipitation: Light rain	Closed	500	1000	NA	10	0	0	0	0	0	10	0	0	0	0	0	7	0	0	3	0	0	2	0	0	2	0	6	0	0	0	10	0	0
318	01-Aug-22	13:44	13:44	Precipitation: Rain	Closed	100	1200	Zero	4	0	4	4	4	0	4	0	4	4	0	0	4	0	4	4	0	0	0	0	4	4	0	0	0	0	4	4	4	0
319	01-Aug-22	14:02	14:32	Precipitation: Rain Rain windy	Closed	100	1200	Zero	15	6	24	24	0	7	24	6	24	24	4	6	27	3	27	27	4	3	27	3	27	27	0	0	6	0	30	30	2	1
320	01-Aug-22	14:48	15:24	Precipitation: Light rain	Closed	100	1500	NA	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0
321	01-Aug-22	15:27	15:56	Precipitation: Light rain	Closed	200	1500	NA	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
322	02-Aug-22	11:02	11:36	Precipitation: 10% Cloudy and rainy	Open	100	600	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0
323	02-Aug-22	17:21	17:39	Precipitation: Light rain	Open	400	1500	NA	0	0	0	7	0	0	0	0	0	7	0	0	7	0	0	0	0	0	2	0	0	5	0	0	7	0	0	0	0	0
324	03-Aug-22	11:24	11:54	Precipitation: Periods of light rain	Open	100	1500	NA	2	0	0	0	0	0	2	0	0	0	0	0	1	0	0	1	0	0	2	0	0	0	0	0	2	0	0	4	0	0
325	04-Aug-22	10:30	10:48	Precipitation: Small rain during the survey Rainy	Open	200	800	NA	3	0	0	0	0	0	2	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
326	04-Aug-22	11:03	11:16	Precipitation: Rainy On and off rain	Open	100	700	NA	7	0	0	1	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	8	0	0	NA	NA	NA	NA	NA	NA
327	04-Aug-22	11:23	11:31	Precipitation: Light rain intermitant	Open	200	1500	NA	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	0	0
328	04-Aug-22	11:33	12:04	Precipitation: Rainy	Open	300	600	NA	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
329	04-Aug-22	13:01	13:16	Precipitation: None	Open	200	1500	NA	4	0	0	1	0	0	4	0	0	1	0	0	0	0	0	5	0	0	2	0	0	1	0	0	2	0	0	0	0	0
330	09-Aug-22	11:34	12:18	Precipitation: Sunny Sunny	Open	200	2500	Long haul truck	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
331	26-Aug-22	16:57	18:18	Precipitation: 0 Clear skies	Open	200	500	Seaman's	3	0	0	0	0	0	3	0	0	0	0	0	3	0	0	0	0	0	2	0	1	0	0	0	3	0	0	0	0	0

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Feeding_15	Lying Down_15	Standing_15	Walking_15	Alert_15	Trotting/Running_15	Feeding_18	Lying Down_18	Standing_18	Walking_18	Alert_18	Trotting/Running_18	Feeding_21	Lying Down_21	Standing_21	Walking_21	Alert_21	Trotting/Running_21	Feeding_24	Lying Down_24	Standing_24	Walking_24	Alert_24	Trotting/Running_24	Feeding_27	Lying Down_27	Standing_27	Walking_27	Alert_27	Trotting/Running_27	Feeding_30	Lying Down_30	Standing_30	Walking_30	Alert_30	Trotting/Running_30	Disturbance 0	Disturbance 3	Disturbance 6	Disturbance 9	Disturbance 12
305	29-Apr-22	10:41	11:18	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Light Truck	NA	NA	NA	NA
306	30-Apr-22	17:25	18:30	21	0	0	1	0	0	21	0	0	0	1	0	16	1	0	0	5	0	21	1	0	0	0	0	21	1	0	0	0	0	16	1	0	4	1	0	NA	NA	NA	NA	NA
307	03-May-22	17:45	18:30	4	29	0	0	0	0	7	26	0	0	0	0	6	27	0	0	0	0	6	27	0	0	0	0	5	27	0	1	0	0	6	27	0	0	0	0	NA	NA	NA	NA	Blast
308	04-May-22	15:52	16:34	0	0	2	0	0	0	2	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	1	0	1	0	0	0	2	0	0	0	0	0	NA	NA	NA	NA	NA
309	05-May-22	17:35	18:26	13	7	0	0	0	0	15	5	0	0	0	0	15	4	0	1	0	0	14	6	0	0	0	0	14	6	0	0	0	0	16	4	0	0	0	0	NA	NA	NA	NA	Blast
310	07-May-22	17:35	18:15	8	0	0	0	2	0	5	0	0	0	0	0	0	0	0	5	5	0	0	0	0	10	0	0	10	0	0	0	0	0	10	0	0	0	0	0	NA	NA	Heavy Equipment	NA	NA
311	12-May-22	13:53	14:29	7	2	0	0	0	0	2	5	0	0	0	0	2	5	0	0	0	0	3	5	0	0	0	0	3	6	0	0	0	0	0	8	0	0	0	0	NA	NA	NA	Aircraft	NA
312	15-May-22	8:23	8:58	2	0	0	0	0	0	1	0	1	0	0	0	1	0	0	1	0	0	0	0	0	2	0	0	1	0	0	1	0	0	2	0	0	0	0	0	NA	NA	NA	NA	NA
313	19-May-22	15:23	20:56	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	3	0	0	0	0	0	3	0	0	0	0	0	NA	NA	NA	NA	NA
314	14-Jun-22	17:37	18:23	0	9	10	0	0	0	0	9	10	0	0	0	0	9	10	0	0	0	0	9	10	0	0	0	0	9	10	0	0	0	0	9	10	0	0	0	NA	NA	NA	NA	NA
315	31-Jul-22	14:33	15:10	2	8	0	0	0	0	4	6	0	0	0	0	2	8	0	0	0	0	0	5	0	3	0	0	3	5	0	0	0	0	3	5	0	0	0	0	NA	NA	NA	NA	NA
316	31-Jul-22	15:17	15:56	11	0	0	0	0	0	8	0	0	3	0	0	10	0	0	1	0	0	11	0	0	0	0	0	11	0	0	0	0	0	1	0	0	0	0	1	NA	NA	NA	NA	NA
317	31-Jul-22	16:08	16:34	10	0	0	0	0	0	10	0	0	0	0	0	7	0	0	3	0	0	9	0	0	1	0	0	5	0	0	5	0	0	5	0	3	2	0	0	NA	NA	NA	NA	Heavy Equipment
318	01-Aug-22	13:44	13:44	0	0	4	4	4	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
319	01-Aug-22	14:02	14:32	10	0	19	19	2	4	19	0	19	0	0	0	19	0	19	3	0	1	19	0	19	19	0	0	19	1	18	18	0	0	19	0	19	18	2	1	NA	NA	NA	NA	NA
320	01-Aug-22	14:48	15:24	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	NA
321	01-Aug-22	15:27	15:56	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	NA	NA	NA	NA	NA
322	02-Aug-22	11:02	11:36	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	NA	NA	NA	NA	NA
323	02-Aug-22	17:21	17:39	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Aircraft	NA	NA	NA	NA
324	03-Aug-22	11:24	11:54	0	0	0	6	0	0	2	0	0	4	0	0	6	0	0	0	0	0	0	0	0	0	0	0	3	3	0	0	3	0	0	0	0	0	3	0	0	NA	NA	NA	Convoy	Heavy Equipment
325	04-Aug-22	10:30	10:48	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Heavy Equipment	NA	NA	NA
326	04-Aug-22	11:03	11:16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
327	04-Aug-22	11:23	11:31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
328	04-Aug-22	11:33	12:04	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	NA	NA	NA	NA	NA
329	04-Aug-22	13:01	13:16	1	0	0	1	0	0	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
330	09-Aug-22	11:34	12:18	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	Heavy Equipment	NA	NA	NA	NA
331	26-Aug-22	16:57	18:18	3	0	0	0	0	0	3	0	0	0	0	0	3	0	0	0	0	0	1	1	0	1	0	0	1	1	0	0	0	0	0	0	0	2	0	0	NA	Heavy Equipment	NA	NA	NA

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Disturbance 15	Disturbance 18	Disturbance 21	Disturbance 24	Disturbance 27	Disturbance 30	Survey Type
305	29-Apr-22	10:41	11:18	NA	NA	NA	NA	NA	NA	01- Behavior
306	30-Apr-22	17:25	18:30	NA	NA	Blast	NA	NA	NA	03- Pre-disturbance, Behavior
307	03-May-22	17:45	18:30	NA	NA	NA	NA	NA	NA	03- Pre-disturbance, Behavior
308	04-May-22	15:52	16:34	NA	NA	NA	NA	NA	NA	01- Behavior
309	05-May-22	17:35	18:26	NA	NA	NA	NA	NA	NA	03- Pre-disturbance, Behavior
310	07-May-22	17:35	18:15	NA	NA	Blast	NA	NA	NA	03- Pre-disturbance, Behavior
311	12-May-22	13:53	14:29	NA	NA	NA	Light Truck	NA	NA	01- Behavior
312	15-May-22	8:23	8:58	NA	NA	NA	NA	NA	NA	01- Behavior
313	19-May-22	15:23	20:56	NA	NA	NA	NA	NA	NA	01- Behavior
314	14-Jun-22	17:37	18:23	Blast	Aircraft	NA	NA	NA	NA	03- Pre-disturbance, Behavior
315	31-Jul-22	14:33	15:10	NA	NA	NA	NA	NA	NA	01- Behavior
316	31-Jul-22	15:17	15:56	NA	NA	NA	NA	NA	NA	01- Behavior
317	31-Jul-22	16:08	16:34	NA	NA	NA	NA	NA	NA	01- Behavior
318	01-Aug-22	13:44	13:44	NA	NA	NA	NA	NA	NA	01- Behavior
319	01-Aug-22	14:02	14:32	NA	NA	NA	NA	NA	NA	01- Behavior
320	01-Aug-22	14:48	15:24	NA	NA	NA	NA	NA	NA	01- Behavior
321	01-Aug-22	15:27	15:56	NA	NA	NA	NA	NA	NA	01- Behavior
322	02-Aug-22	11:02	11:36	NA	NA	NA	NA	NA	NA	01- Behavior
323	02-Aug-22	17:21	17:39	NA	NA	NA	NA	NA	NA	01- Behavior
324	03-Aug-22	11:24	11:54	NA	NA	NA	NA	NA	NA	01- Behavior
325	04-Aug-22	10:30	10:48	NA	NA	NA	NA	NA	NA	01- Behavior
326	04-Aug-22	11:03	11:16	NA	NA	NA	NA	NA	NA	01- Behavior
327	04-Aug-22	11:23	11:31	NA	NA	NA	NA	NA	NA	01- Behavior
328	04-Aug-22	11:33	12:04	NA	NA	NA	NA	NA	NA	01- Behavior
329	04-Aug-22	13:01	13:16	NA	NA	NA	NA	NA	NA	01- Behavior
330	09-Aug-22	11:34	12:18	Heavy Equipment	NA	NA	Heavy Equipment	NA	Convoy	01- Behavior
331	26-Aug-22	16:57	18:18	Blast	NA	Aircraft	NA	NA	NA	03- Pre-disturbance, Behavior

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Observers	Waypoint	Longitude	Latitude	Reconnaissance Survey	Project Tolerant Info	Road Name and Distance Marker	Distance from Caribou to Observer Location (m)	Distance from Caribou to Road (if different)	Bearing	Is Group East or West of Survey?	Did the Group Cross the Road during the Survey?	Estimated Size (for larger group)	Caribou Group Size (exact count or estimate)	Size of Subset (Surveyed)	Dominant Group Sex	Temperature (°C)	Wind Speed (km/h)	Wind Direction	Days since Last Snow or Wind Event
332	23-Sep-22	17:03	17:03	Kathleen Newberry	-	-96.66656473	65.40142822	No	No	Amaruq KM NA	>1000	N/A	220	West	NA	3 to 25	4	4	Mostly males	3	40	SE	0
333	24-Sep-22	13:33	14:10	Louis D. Kristel B.	-	-96.60239446	65.37713623	No	No	Haul Road KM 174	100-300	N/A	50	West	No	3 to 25	5	5	Mixed group	6	17	NE	1
334	26-Sep-22	16:41	18:20	Eric Thomson	-	-96.66652281	65.40167236	No	No	Amaruq KM NA	50-100	N/A	70	East	No	3 to 25	6	6	Mixed group	1	17	NW	0
335	04-Oct-22	11:23	11:44	Laurence Archambault and Kevin Martee	-	-96.15263675	65.17785645	No	No	Haul Road KM 130	50-100	N/A	100	West	No	1 to 2	2	2	Mostly males	-1	45	NW	0
336	04-Oct-22	11:50	12:22	Laurence Archambault and Kevin Martee	-	-96.12624195	65.15405273	No	No	Haul Road KM 127	300-1000	N/A	100	West	No	1 to 2	1	1	Mostly males	-1	45	NW	0
337	04-Oct-22	13:17	13:53	Sylvain Singaqti, Felix Quessy Savard	-	-96.31526122	64.83380127	Yes	No	AWAR KM 70	0-50	N/A	0	East	No	26-50	26	26	Mixed group	-1	40	NW	1
338	07-Oct-22	15:11	15:40	Alex B. Keven M.	-	-96.54359678	65.34234619	No	No	Haul Road KM 170	100-300	N/A	60	East	Yes	51-100	70	50	Mixed group	-3	50	W	1
339	08-Oct-22	16:23	16:42	Alex B and Kevin M	-	-96.51214547	65.32971191	No	No	Haul Road KM 166	100-300	N/A	90	East	No	1 to 2	1	1	Mostly males	10	20	NW	1
340	15-Oct-22	6:24	16:20	Alex Blanchette	-	-96.45447958	65.23166853	No	No	Haul Road KM 149	0-50	N/A	270	East	No	>100	300	50	Mixed group	-3	30	N	1
341	21-Oct-22	16:36	17:15	Derek Nateela	-	-96.07329015	65.02130127	Yes	No	AWAR KM 41	300-1000	N/A	40	East	No	>100	199	60	Mixed group	-3	20	NW	1
342	30-Oct-22	11:04	11:37	Felix Quessy Savard	-	-96.0733803	65.02130127	No	No	AWAR KM 59	100-300	N/A	90	East	No	>100	-	60	Mixed group	-16	5	NW	1
343	02-Nov-22	11:31	14:57	Alex B	-	-96.24680327	64.95233154	Yes	No	AWAR KM 87	300-1000	N/A	270	East	No	>100	-	26	Mixed group	-20	20	E	3
344	02-Nov-22	14:36	15:12	Sylvain Singaqti	-	-96.33951885	64.88262939	Yes	Yes	AWAR KM 81	0-50	N/A	0	East	Yes	>100	338	338	Mixed group	-18	20	NW	1
345	10-Nov-22	14:38	15:03	Alex Blanchette	-	-96.37631797	64.68786621	No	No	AWAR KM 51	300-1000	N/A	270	East	No	51-100	65	51	Mixed group	-25	20	NE	5
346	12-Nov-22	9:25	9:48	Rowan Woodall and Kathleen Newberry	-	-96.60230621	65.38238525	No	No	Haul Road KM 176	300-1000	N/A	60	East	No	26-50	35	10	Mixed group	-16	30	SW	0
347	13-Nov-22	12:41	13:22	Alex and Guillaume	-	-96.22280262	64.56903076	Yes	No	AWAR KM 32	>1000	N/A	0	Both	No	>100	2000	51	Mixed group	-9	30	NW	1
348	17-Nov-22	10:20	10:53	Kathleen Newberry	-	-96.40893205	65.28430176	No	Yes	Haul Road KM 158	50-100	N/A	250	West	No	1 to 2	2	2	Mostly males	-17	20	NW	1
349	17-Nov-22	11:10	11:40	Kathleen Newberry	-	-96.42852262	65.2199707	No	Yes	Haul Road KM 147	300-1000	N/A	140	East	No	1 to 2	2	2	Mostly males	-16	20	NW	1
350	17-Nov-22	14:07	14:44	Eric Thomson	-	-96.37146238	64.67333984	Yes	No	AWAR KM 48	100-300	N/A	0	East	No	51-100	100	50	Mixed group	-16	20	NE	0
351	18-Nov-22	13:32	14:03	Eric Thomson	-	-96.32609672	64.65606689	Yes	No	AWAR KM 49	300-1000	N/A	0	East	No	51-100	100	5	Mixed group	-22	36	NW	0
352	20-Nov-22	10:25	10:51	Derek	-	-96.3273194	64.8112793	No	No	AWAR KM 66	300-1000	N/A	45	East	No	51-100	96	96	Mostly females	-26	16	NE	1
353	23-Nov-22	9:26	9:43	Eric Leonard, Kathleen Newberry	-	-96.28306214	65.22668457	No	No	Haul Road KM 139	300-1000	N/A	60	East	No	26-50	28	28	Mixed group	-18	20	E	2
354	26-Nov-22	9:20	9:53	Laurence Archambault and Kevin Martee	-	-96.62858355	65.40332031	No	No	Haul Road KM 177	100-300	N/A	270	West	No	1 to 2	1	1	Juveniles	-15	18	NW	0

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Weather Observations	Road Open or Closed	Road Height	Road Side Width	Structures Present	Feeding_0	Lying Down_0	Standing_0	Walking_0	Alert_0	Trotting/Running_0	Feeding_3	Lying Down_3	Standing_3	Walking_3	Alert_3	Trotting/Running_3	Feeding_6	Lying Down_6	Standing_6	Walking_6	Alert_6	Trotting/Running_6	Feeding_9	Lying Down_9	Standing_9	Walking_9	Alert_9	Trotting/Running_9	Feeding_12	Lying Down_12	Standing_12	Walking_12	Alert_12	Trotting/Running_12
332	23-Sep-22	17:03	17:03	Precipitation: None	Open	300	1500	Berm	4	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
333	24-Sep-22	13:33	14:10	Precipitation: None	Open	100	1400	Flag	4	0	1	0	0	0	3	2	0	0	1	0	3	3	0	0	1	0	1	4	0	1	1	0	3	4	0	0	0	0
334	26-Sep-22	16:41	18:20	Precipitation: 0 Overcast	Open	200	1000	0	3	0	0	3	0	0	3	0	0	1	1	1	6	0	0	0	0	0	5	0	0	1	0	0	6	0	0	0	0	0
335	04-Oct-22	11:23	11:44	Precipitation: 0 Cloudy	Open	200	1500	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0
336	04-Oct-22	11:50	12:22	Precipitation: 0 Cloudy	Open	100	1500	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0
337	04-Oct-22	13:17	13:53	Precipitation: Windy Cloudy, windy	Closed	100	700	O	10	0	0	16	0	0	20	0	0	6	0	0	26	0	0	0	0	0	49	0	0	0	0	0	39	0	0	10	0	0
338	07-Oct-22	15:11	15:40	Precipitation: None Overcaste	Open	200	1500	NA	13	0	0	12	0	0	0	0	0	25	0	0	0	0	0	25	0	0	0	0	0	25	0	0	0	0	0	25	0	0
339	08-Oct-22	16:23	16:42	Precipitation: Light rain Fog	Closed	200	1000	NA	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0
340	15-Oct-22	6:24	16:20	Precipitation: 0	Closed	200	1000	NA	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0
341	21-Oct-22	16:36	17:15	Precipitation: Cloudy	Closed	200	1200	No	40	10	10	0	0	0	45	8	7	0	0	0	8	2	27	23	0	0	1	0	59	59	0	0	0	0	60	60	0	0
342	30-Oct-22	11:04	11:37	Precipitation: 0 Cloudy	Open	2000	700	No	0	0	0	60	0	0	0	0	5	55	0	0	0	0	0	60	0	0	0	0	60	0	0	0	0	0	0	60	0	0
343	02-Nov-22	11:31	14:57	Precipitation: None Overcast	Closed	200	700	No	22	4	0	0	0	0	22	4	0	0	0	0	26	0	0	0	0	0	19	0	0	7	0	0	12	0	0	13	0	0
344	02-Nov-22	14:36	15:12	Precipitation: Clear Sunny with a bit of clouds	Closed	100	3000	0	0	0	0	338	0	0	0	0	0	338	0	0	0	0	0	338	0	0	0	0	0	338	0	0	0	0	1	337	0	0
345	10-Nov-22	14:38	15:03	Precipitation: None	Open	0	1000	NA	51	0	0	0	0	0	43	0	8	0	0	0	51	0	0	0	0	0	37	0	8	6	0	0	46	0	0	5	0	0
346	12-Nov-22	9:25	9:48	Precipitation: None	Open	100	500	NA	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	10	0	0	0	0	0	35	0	0	0	0	0
347	13-Nov-22	12:41	13:22	Precipitation: None	Closed	100	800	Road	0	0	0	51	0	0	0	0	0	51	0	0	0	0	0	51	0	0	0	0	0	51	0	0	0	0	0	51	0	0
348	17-Nov-22	10:20	10:53	Precipitation: 0	Open	200	700	None	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0
349	17-Nov-22	11:10	11:40	Precipitation: 0	Open	100	800	No	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0
350	17-Nov-22	14:07	14:44	Precipitation: 0 N/A	Closed	300	1000	No	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0
351	18-Nov-22	13:32	14:03	Precipitation: 0	Closed	0	1000	0	3	0	2	0	0	0	2	0	3	0	0	0	4	0	1	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0
352	20-Nov-22	10:25	10:51	Precipitation: Shitty Shitty	Closed	0	1200	Nada	0	0	0	96	96	0	0	0	0	96	0	0	0	0	0	96	0	0	0	0	0	96	0	0	0	0	0	88	0	8
353	23-Nov-22	9:26	9:43	Precipitation: 0	Open	200	800	Bridge	26	2	1	0	0	0	25	2	0	2	0	0	25	4	0	0	0	0	25	4	0	0	0	0	21	4	0	0	4	0
354	26-Nov-22	9:20	9:53	Precipitation: None Cloudy	Open	100	2000	Tire stop near	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Feeding_15	Lying Down_15	Standing_15	Walking_15	Alert_15	Trotting/Running_15	Feeding_18	Lying Down_18	Standing_18	Walking_18	Alert_18	Trotting/Running_18	Feeding_21	Lying Down_21	Standing_21	Walking_21	Alert_21	Trotting/Running_21	Feeding_24	Lying Down_24	Standing_24	Walking_24	Alert_24	Trotting/Running_24	Feeding_27	Lying Down_27	Standing_27	Walking_27	Alert_27	Trotting/Running_27	Feeding_30	Lying Down_30	Standing_30	Walking_30	Alert_30	Trotting/Running_30	Disturbance 0	Disturbance 3	Disturbance 6	Disturbance 9	Disturbance 12
332	23-Sep-22	17:03	17:03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
333	24-Sep-22	13:33	14:10	2	5	0	0	0	0	1	6	0	0	0	0	1	6	0	0	0	0	1	6	0	0	0	0	1	6	0	0	0	0	0	7	0	0	0	0	NA	Heavy Equipment	Heavy Equipment	Heavy Equipment	NA
334	26-Sep-22	16:41	18:20	6	0	0	0	0	0	6	0	0	0	0	0	6	0	0	0	0	0	6	0	0	0	0	0	6	0	0	0	0	0	6	0	0	0	0	0	NA	NA	NA	NA	NA
335	04-Oct-22	11:23	11:44	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Heavy Equipment	NA	NA	NA
336	04-Oct-22	11:50	12:22	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	Light Truck	NA	NA	NA	Heavy Equipment
337	04-Oct-22	13:17	13:53	47	0	0	2	0	0	49	0	0	0	0	0	49	0	0	0	0	0	47	0	0	2	0	0	43	0	0	6	0	0	45	4	0	0	0	0	NA	NA	NA	NA	NA
338	07-Oct-22	15:11	15:40	0	0	0	25	0	0	0	0	0	25	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
339	08-Oct-22	16:23	16:42	0	0	0	1	0	0	0	0	0	1	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
340	15-Oct-22	6:24	16:20	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0	34	0	11	5	0	0	35	0	15	0	0	0	40	0	10	0	0	0	NA	NA	NA	NA	NA
341	21-Oct-22	16:36	17:15	50	0	10	10	0	0	0	0	60	0	0	0	60	0	60	0	0	0	60	0	60	0	0	0	60	0	60	0	0	0	60	0	60	0	0	0	NA	NA	NA	NA	NA
342	30-Oct-22	11:04	11:37	0	0	0	60	0	0	0	0	0	40	0	0	0	0	0	20	0	0	0	0	0	60	0	0	0	0	0	60	0	0	0	0	0	60	0	0	NA	NA	NA	NA	NA
343	02-Nov-22	11:31	14:57	0	0	0	26	0	0	26	0	0	0	0	0	26	0	0	0	0	0	26	0	0	0	0	0	26	0	0	0	0	0	26	0	0	0	0	0	NA	NA	NA	NA	NA
344	02-Nov-22	14:36	15:12	0	0	0	338	0	0	0	0	0	338	0	0	0	0	0	338	0	0	0	0	0	338	0	0	0	0	0	338	0	0	0	0	0	338	0	0	NA	NA	NA	NA	NA
345	10-Nov-22	14:38	15:03	42	0	7	2	0	0	0	0	0	17	0	0	0	0	3	22	0	0	40	0	0	11	0	0	11	0	0	40	0	0	6	0	0	45	0	0	NA	NA	NA	NA	NA
346	12-Nov-22	9:25	9:48	35	0	0	0	0	0	33	0	0	2	0	0	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Heavy Equipment	Heavy Equipment	NA	Heavy Equipment
347	13-Nov-22	12:41	13:22	0	0	0	51	0	0	0	0	0	51	0	0	0	0	0	51	0	0	0	0	0	51	0	0	0	0	0	51	0	0	0	0	0	51	0	0	NA	NA	NA	NA	NA
348	17-Nov-22	10:20	10:53	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	NA	Heavy Equipment	Heavy Equipment	NA	NA
349	17-Nov-22	11:10	11:40	0	0	0	0	1	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	0	0	NA	Heavy Equipment	NA	NA	Heavy Equipment
350	17-Nov-22	14:07	14:44	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0	0	0	0	50	0	0	15	0	5	30	0	0	17	0	8	25	0	0	NA	NA	NA	NA	NA
351	18-Nov-22	13:32	14:03	3	0	2	0	0	0	1	0	0	4	0	0	0	0	0	5	0	0	0	0	2	3	0	0	1	0	3	1	0	0	5	0	0	0	0	0	NA	NA	NA	NA	NA
352	20-Nov-22	10:25	10:51	0	0	2	90	0	4	0	0	0	96	0	0	0	0	0	96	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
353	23-Nov-22	9:26	9:43	0	0	0	29	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Heavy Equipment	NA	Light Truck
354	26-Nov-22	9:20	9:53	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	Heavy Equipment	Heavy Equipment	Heavy Equipment	NA	Heavy Equipment

Appendix B: Caribou Behaviour Monitoring Data Sheet

Survey ID	Date	Time Start	Time End	Disturbance 15	Disturbance 18	Disturbance 21	Disturbance 24	Disturbance 27	Disturbance 30	Survey Type
332	23-Sep-22	17:03	17:03	NA	NA	NA	NA	NA	NA	01- Behavior
333	24-Sep-22	13:33	14:10	Heavy Equipment	Heavy Equipment	Heavy Equipment	NA	NA	Heavy Equipment	01- Behavior
334	26-Sep-22	16:41	18:20	NA	Blast	NA	NA	NA	NA	03- Pre-disturbance, Behavior
335	04-Oct-22	11:23	11:44	NA	NA	NA	NA	NA	NA	01- Behavior
336	04-Oct-22	11:50	12:22	Heavy Equipment	NA	NA	NA	NA	NA	01- Behavior
337	04-Oct-22	13:17	13:53	NA	NA	NA	NA	NA	NA	01- Behavior
338	07-Oct-22	15:11	15:40	NA	NA	NA	NA	NA	NA	01- Behavior
339	08-Oct-22	16:23	16:42	NA	NA	NA	NA	NA	NA	01- Behavior
340	15-Oct-22	6:24	16:20	NA	NA	NA	NA	NA	NA	01- Behavior
341	21-Oct-22	16:36	17:15	NA	NA	NA	NA	NA	NA	01- Behavior
342	30-Oct-22	11:04	11:37	NA	NA	NA	NA	NA	NA	01- Behavior
343	02-Nov-22	11:31	14:57	NA	NA	NA	NA	NA	NA	01- Behavior
344	02-Nov-22	14:36	15:12	NA	NA	NA	NA	NA	NA	01- Behavior
345	10-Nov-22	14:38	15:03	NA	NA	NA	NA	NA	NA	01- Behavior
346	12-Nov-22	9:25	9:48	Heavy Equipment	NA	NA	NA	NA	NA	01- Behavior
347	13-Nov-22	12:41	13:22	NA	NA	NA	NA	NA	NA	01- Behavior
348	17-Nov-22	10:20	10:53	NA	Light Truck	Heavy Equipment	Heavy Equipment	Light Truck	NA	01- Behavior
349	17-Nov-22	11:10	11:40	NA	NA	NA	Light Truck	Heavy Equipment	NA	01- Behavior
350	17-Nov-22	14:07	14:44	NA	NA	NA	NA	NA	NA	01- Behavior
351	18-Nov-22	13:32	14:03	NA	NA	NA	NA	NA	NA	01- Behavior
352	20-Nov-22	10:25	10:51	NA	NA	NA	NA	NA	NA	01- Behavior
353	23-Nov-22	9:26	9:43	NA	NA	NA	NA	NA	NA	01- Behavior
354	26-Nov-22	9:20	9:53	NA	Heavy Equipment	Heavy Equipment	Tanker	Heavy Equipment	NA	01- Behavior

APPENDIX C PROPORTION OF RESPONSE BEHAVIOUR DURING EACH SURVEY