Memo

To: Nunavut Impact Review Board
From: Agnico Eagle Mines Limited
Date: May 23, 2023
Subject: Additional Technical Questions from the KivIA – Meliadine Extension Proposal

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In response to the KivIA's request on November 27, 2022 following the Technical Meeting for the Meliadine Extension Proposal, Agnico Eagle Mines Limited (Agnico Eagle) has prepared responses to address annual Qamanirjuaq herd occurrence in the local study area (LSA) and regional study area (RSA) from 1993 to 2022. These requests were identified as KIA Technical Questions Q1i to Q1vi.

Q1i. What is the extent of exposure based on the proportion of the herd? *Answers to include an update of Table 9 (AEM 2020) which has the number of collars and the total collars (2010 – 2019) available for the Qamanirjuaq herd annually that enters (a) Meliadine RSA and (b) LSA for the mine site and AWAR and (c) moves from the RSA into LSA?*

Response
A summary of collared individuals from the Qamanirjuaq herd in the LSA and RSA from 1993 to 2022 is provided in Table 1. Exposure was defined as collar locations in the LSA and RSA, rather than individuals whose collar pathways overlap the LSA or RSA. In other words, there are individuals that may cross the LSA in between collar fix intervals that are not captured in Table 1. Note that previous dates provided in the 2019 annual report were incorrectly calculated (Golder 2020).

The earliest and latest date of each individual in the LSA and RSA was averaged for each year. Collared individuals spent an average of 1.24 ± 2.70 days (mean ± standard deviation) in the LSA, and 12.6 ± 16.1 days in the RSA based on only years where caribou were detected in either study area. Collared caribou were not detected in either study area prior to 2006, and have consistently been detected in the LSA and RSA since 2012. Since 2012, collared caribou have entered and exited the LSA in late-June to mid-July, and the RSA from late-May to early-August (Table 1). On average, 19.2% of collared individuals each year have entered the LSA, and 40.5% of collared individuals each year have entered the RSA since 2006. A comprehensive analysis of caribou movement through the RSA and LSA will be provided as part of the Commitment 38 analysis.

Table 1: Average Date of Entry, Date of Exit, and Duration of Time of Caribou Collars in the Local Study Area and Regional Study Area

Year	Total Collared Caribou	Total Collared Caribou in RSA	Mean Entry Date RSA	Mean Exit Date RSA	Average Number of Days in RSA	Total Collared Caribou in LSA	Mean Entry Date LSA	Mean Exit Date LSA	Average Number of Days in LSA
1993	5	0		-	0	0	-	-	0
1994	5	0	-	-	0	0	-	-	0
1995	8	0	-	-	0	0	-	-	0
1996	8	0	-	-	0	0	-	-	0
1997	11	0	-	-	0	0	-	-	0
1998	11	0	-	-	0	0	-	-	0
1999	10	0	-	-	0	0	-	-	0
2000	9	0	-	-	0	0	-	-	0
2001	11	0	-	-	0	0	-	-	0
2002	8	0	-	-	0	0	-	-	0
2003	7	0	-	-	0	0	-	-	0
2004	17	0	-	-	0	0	-	-	0
2005	11	0	-	-	0	0	-	-	0
2006	25	2	Sep-17	Oct-06	19.0	1	Dec-29	Dec-30	1
2007	23	2	Apr-16	May-28	42.5	1	Feb-15	Feb-15	< 1
2008	35	1	Jul-14	Jul-14	< 1	0	-	-	0
2009	28	0	-	-	0	0	-	-	0
2010	11	0	-	-	0	0	-	-	0
2011	33	2	Aug-02	Aug-02	< 1	0	-	-	0
2012	21	5	Jul-15	Jul-19	3.6	1	Jul-17	Jul-17	< 1
2013	43	12	Jul-10	Jul-14	3.8	2	Jul-13	Jul-13	< 1
2014	29	7	Jul-09	Aug-01	22.7	3	Jul-08	Jul-09	1.0
2015	42	36	Jul-14	Jul-28	14.3	26	Jul-20	Jul-21	0.7
2016	48	37	Jun-27	Jul-15	17.8	23	Jul-12	Jul-14	1.8
2017	78	69	Jul-06	Jul-11	5.0	33	Jul-09	Jul-09	0.6
2018	61	50	Jul-03	Jul-17	13.4	37	Jul-13	Jul-14	1.9
2019	82	69	Jun-21	Jun-30	8.6	20	Jun-28	Jun-29	0.8
2020	60	29	Jul-01	Jul-11	10.2	10	Jul-07	Jul-10	2.9
2021	36	21	May-30	Jun-27	28.5	5	Jun-26	Jun-26	0.2
2022	45	28	Jun-17	Jul-10	22.9	14	Jul-06	Jul-07	1.3

LSA = Local Study Area; RSA = Regional Study Area

Q1ii. What is the minimum number of caribou annually exposed to the mine site and AWAR? *The answer to include minimum numbers of caribou exposed to the mine site and AWAR from the daily total numbers of caribou from the road surveys and behavioral surveys correlated to the number of collar pathways.*

Response

Road surveys, behaviour surveys, remote cameras, and collar data document caribou movement through the Mine and AWAR (i.e., the LSA). These survey methods were not designed to determine a total count of caribou that move through the LSA, however relative numbers from each survey type can be provided (Table 2).

Caribou behaviour surveys have been completed from 2020 to 2022. These surveys targeted specific groups of caribou to answer research questions, rather than attempting to determine an estimate of the total number of individuals. Observations from behaviour surveys also include individuals that occur up to 3 kilometres from Meliadine Mine infrastructure (i.e., beyond the LSA boundary). Caribou behaviour surveys recorded group size ranges (e.g., 201 to 500 individuals). Lower and upper estimates of caribou detected from behaviour surveys are presented in Table 2 (e.g., a group size observation of 50-100 used 50 for the minimum value, and 100 for the maximum value). In 2020, 17,232 to 22,118 individuals were recorded on behaviour surveys. Behaviour surveys in 2021 did not record group size ranges, and 33,910 individuals were detected. The highest number of individuals were observed in 2022, with between 42,647 and 47,484 recorded on behaviour surveys.

Remote cameras have been deployed along the AWAR from 2020 to 2022. For caribou to be detected on remote cameras, an individual must trigger the camera to take a photograph, or individuals must be present to be photographed when a timed image is captured. Similar to behaviour surveys, group size ranges were recorded on remote cameras (Table 2). The numbers of individuals detected on remote cameras between 2020 and 2022 ranged from 4,603 (2022) to 6,851 (2020; Table 2).

Road surveys have been performed three times per day during the caribou migration period through the Mine and AWAR from 2017 to 2022. Therefore, surveys may double count caribou that are present for multiple survey rounds on the same day, and among days. It should be noted that it can be quite difficult for observers to estimate caribou numbers during road surveys due to distance and high numbers of caribou that may “swamp” the observers. In addition, observations from road surveys include individuals that occur beyond the LSA boundary (e.g., 1 km beyond the AWAR). Detailed data from road surveys were available from 2022. The total number of caribou observations across all surveys made from June 19 to July 16 in 2022 was 486,890 (where double counting was possible). The highest count of caribou from a single day was 135,000 on 12 July 2022 (where double counting was possible). The highest count of individuals from a single survey was 65,000 individuals, also on 12 July 2022.

Table 2 provides the number of collared individuals that had at least one collar location in the LSA. Since 2012, the number of collared individuals exposed to the LSA has ranged from 1 (2012) to 37 (2018) individuals (Table 2). Between 21 (2012) and 82 (2019) individuals have been collared each year (Table 1). In 2020, 2021, and 2022, there were 10, 5, and 14 collared individuals, respectively. The total number of caribou detected from road surveys on a given day (where double counting may be possible), and the number of collared individuals in the LSA in 2022 was correlated (Spearman’s Rho = 0.56, $p = 0.002$). There were 9 days where both caribou collars were in the LSA and were detected on road surveys in 2022. When the number of caribou detected on these 9 days was divided by the number of collared individuals in the LSA, each collar represented between 1,379 and 27,083 individuals (11,553 ± 9,481, mean ± standard

deviation). This summary comes with the caveat that only females are collared, and that road surveys detect individuals that occur outside the LSA.

Table 2: Number of Caribou Detected from Collar Data, Behaviour Surveys, Remote Cameras, and Road Surveys

Year	Number of Individuals in Local Study Area from Collar Data	Number of Caribou Detected from Behaviour Surveys	Number of Caribou Detected from Remote Cameras	Number of Caribou Detected from Road Surveys[(b)]
1993	0	-	-	-
1994	0	-	-	-
1995	0	-	-	-
1996	0	-	-	-
1997	0	-	-	-
1998	0	-	-	-
1999	0	-	-	-
2000	0	-	-	-
2001	0	-	-	-
2002	0	-	-	-
2003	0	-	-	-
2004	0	-	-	-
2005	0	-	-	-
2006	1	-	-	-
2007	1	-	-	-
2008	0	-	-	-
2009	0	-	-	-
2010	0	-	-	-
2011	0	-	-	-
2012	1	-	-	-
2013	2	-	-	-
2014	3	-	-	-
2015	26	-	-	-
2016	23	-	-	-
2017	33	-	-	Not Available
2018	37	-	-	Not Available
2019	20	-	-	Not Available
2020	10	17,232 – 22,118[(a)]	5,151 - 6,851[(a)]	Not Available
2021	5	33,910	6,175 - 6,200[(a)]	Not Available
2022	14	42,647 - 47,484[(a)]	4,603	486,890

(a) Based on lower and upper estimates of caribou group sizes.

(b) Total caribou observations from road surveys not recorded in all years; values represent total observations where double counting is possible.

Q1iii. Has the probability of seasonal exposure changed? *Answer to identify trends in the annual frequency of collared caribou in the RSA and LSA and how those polygons compare with GN mapped calving and post-calving range (Methods to be discussed but could include 95% annual kernels or Continuous Time Movement Modelling to generate occupancy models describing probability of use such as Brownian bridge movement models).*

Response
Seasons were defined based on Caslys (2015):

- Spring Migration: April 15 to June 8
- Calving: June 9 to June 22
- Post-calving: June 23 to July 3
- Summer: July 4 to August 22
- Late Summer: August 23 to September 16
- Fall Migration, Pre-breeding: September 17 to October 18
- Rut/Breeding: October 19 to November 6
- Fall Migration, Post-breeding: November 7 to December 15
- Winter: December 16 to April 14

Proportions of total collared individuals in the Qamanirjuaq herd that entered the LSA and RSA are presented in Table 3 and Table 4. The number of collared individuals that enter the LSA in each year are shown in Figure 1. One individual was detected in winter in the LSA in 2006 and 2007, and one individual was detected during fall migration (post-breeding) in 2015. Two individuals were detected during calving in 2022. However, these two individuals (QM0050422 and QM0210422) did not produce a calf in 2022 according to the parturition model developed for the Commitment 38 analysis. Mallory et al. (2020) also found advances in Qamanirjuaq calving dates, and green up-dates, based on collar data between 2004 and 2016. All other detections in the LSA have occurred during post-calving, and summer. Individuals have been detected in the LSA during post-calving in 2019, 2021, and 2022. Individuals have been detected in the LSA in the summer in all years since 2012, except 2021, where individuals were detected during post-calving. The highest proportion of individuals were observed in summer 2018 (0.61 or 37 individuals) (Figure 1; Table 3). Collared individuals have also been detected during spring migration, late summer, and rut in the RSA (Table 4). Similar to the LSA, the highest caribou numbers are observed in the summer (Table 4).

Post-calving, and summer core ranges were developed for GN-TRC-05 using data from 1993 to 2022 (the entire period of collar data availability) and 2012 to 2022 (advanced exploration, construction and operations), based on methods provided in Caslys (2015). Overlap of the summer and post-calving core ranges does not differ between 2012 to 2022 and 1993 to 2022. A calving range based on predicted calving locations from a parturition model was created for GN-TRC-05. This calving range does overlap a small area of the Meliadine Mine's regional study area but does not overlap the Mine's footprint (see response GN-TRC-05). No calving locations were predicted within the RSA. However, the post-calving and summer ranges are based on the isopleth of the 95% kernel utilization distributions of caribou locations during predefined date ranges, and do not identify areas of higher or lower use.

Brownian Bridge Movement Models were developed for the pre-construction (1993 to 2011), advanced exploration (2012 to 2017), and construction and operations (2018 to 2022) periods (ERM 2023c). These models identify caribou distribution and areas of higher and lower use by collared individuals in these time

periods. Based on these models, caribou distribution during the calving period has shifted northeast, becoming closer to the Mine and AWAR from pre-construction to construction to operations. The LSA is an area of lower use during calving, including the proposed windfarm footprint. The area northwest of Meliadine Lake is an area of high use during the calving period. Use of the RSA during the post-calving and summer seasons has also increased from pre-construction to construction to operations. The AWAR overlaps a moderate to high use during post-calving for the construction and operations period (2018-2022). The area surrounding the mine, extending to the northwest is an area of low post-calving use. The LSA appears to overlap an area of low to moderate summer use during construction and operations.

In summary, exposure of the Qamanirjuaq herd to the LSA and RSA during calving, post-calving, and summer has increased from the pre-construction to construction and operation periods, based on collar locations in the LSA and RSA and Brownian Bridge Movement Models. Overlap of core seasonal ranges with the LSA and RSA during post-calving and summer has not changed. This calving range does overlap a small area of the Meliadine Mine's regional study area but does not overlap the Mine's footprint (see response GN-TRC-05). No calving locations were predicted within the RSA.

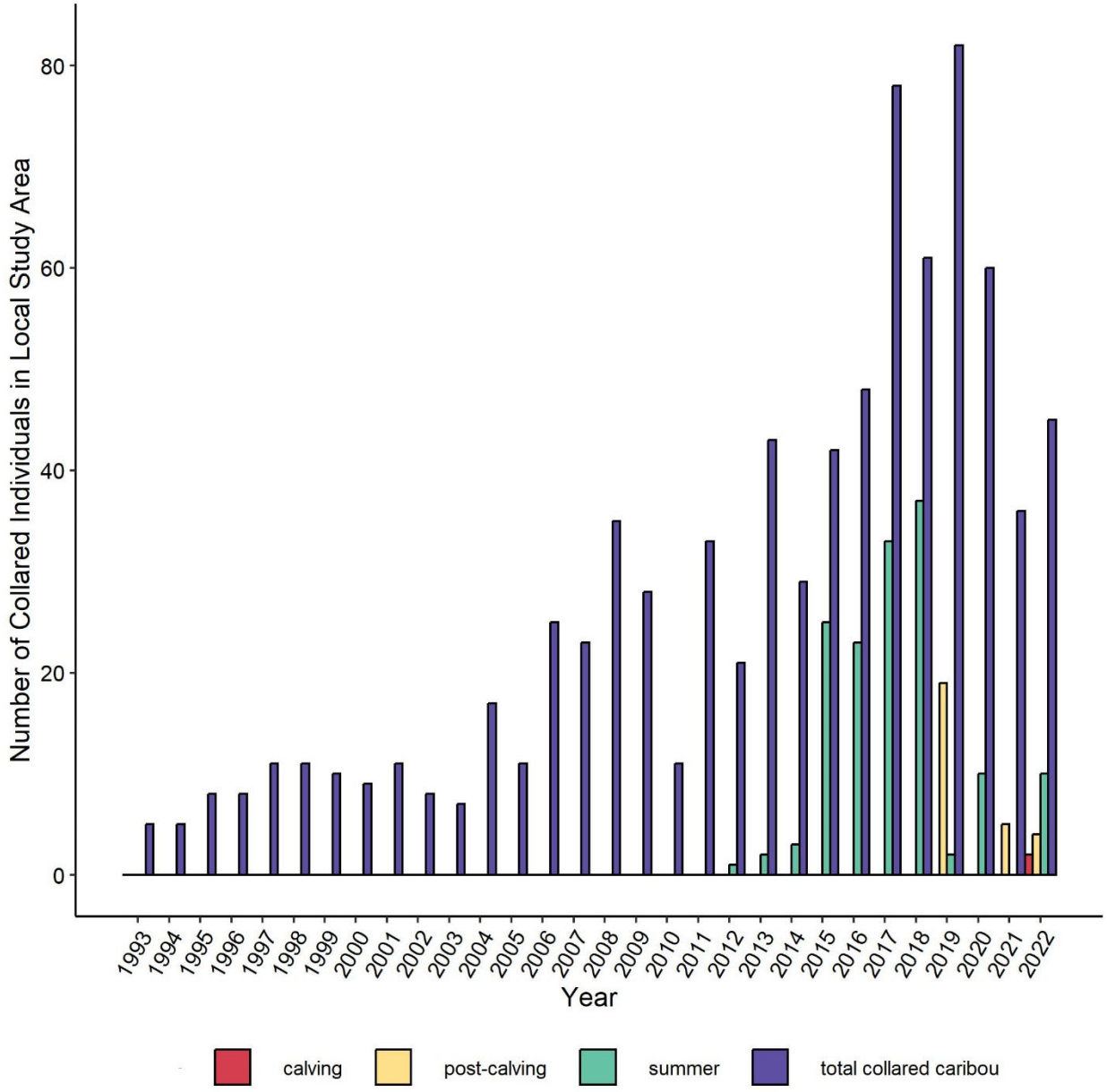


Figure 1. Number of Collared Caribou in the Local Study Area in Calving, Post-calving, and Summer Periods

Table 3: Proportion of Collared Individuals Exposed to Local Study Area by Season

Year	Total Collared Caribou	Spring Migration	Calving	Post-calving	Summer	Late Summer	Fall Migration (Pre-breeding)	Rut	Fall Migration (Post-breeding)	Winter
2006	25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.04**
2007	23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.04**
2008	35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2010	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2011	33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2012	21	0.00	0.00	0.00	**0.05**	0.00	0.00	0.00	0.00	0.00
2013	43	0.00	0.00	0.00	**0.05**	0.00	0.00	0.00	0.00	0.00
2014	29	0.00	0.00	0.00	**0.10**	0.00	0.00	0.00	0.00	0.00
2015	42	0.00	0.00	0.00	**0.60**	0.00	0.00	0.00	**0.02**	0.00
2016	48	0.00	0.00	0.00	**0.48**	0.00	0.00	0.00	0.00	0.00
2017	78	0.00	0.00	0.00	**0.42**	0.00	0.00	0.00	0.00	0.00
2018	61	0.00	0.00	0.00	**0.61**	0.00	0.00	0.00	0.00	0.00
2019	82	0.00	0.00	**0.23**	**0.02**	0.00	0.00	0.00	0.00	0.00
2020	60	0.00	0.00	0.00	**0.17**	0.00	0.00	0.00	0.00	0.00
2021	36	0.00	0.00	**0.14**	0.00	0.00	0.00	0.00	0.00	0.00
2022	45	0.00	**0.04**	**0.09**	**0.22**	0.00	0.00	0.00	0.00	0.00

Note: Collar data available from 1993 to 2022; table represents first year caribou collars detected in the Local Study Area

Table 4: Proportion of Collared Individuals Exposed to Regional Study Area by Season

Year	Total Collared Caribou	Spring Migration	Calving	Post-calving	Summer	Late Summer	Fall Migration (Pre-breeding)	Rut	Fall Migration (Post-breeding)	Winter
2006	25	0.00	0.00	0.00	**0.04**	0.00	0.00	0.00	**0.04**	**0.04**
2007	23	0.00	0.00	0.00	**0.04**	**0.04**	0.00	0.00	0.00	**0.04**
2008	35	0.00	0.00	0.00	**0.03**	0.00	0.00	0.00	0.00	0.00
2009	28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2010	11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2011	33	0.00	0.00	0.00	**0.06**	0.00	0.00	0.00	0.00	0.00
2012	21	0.00	0.00	0.00	**0.24**	0.00	0.00	0.00	0.00	0.00
2013	43	0.00	0.00	0.00	**0.28**	0.00	0.00	0.00	0.00	0.00
2014	29	0.00	0.00	0.00	**0.24**	**0.03**	0.00	0.00	0.00	0.00
2015	42	0.00	0.00	0.00	**0.86**	**0.02**	0.00	**0.05**	**0.05**	0.00
2016	48	**0.06**	0.00	**0.15**	**0.75**	**0.04**	0.00	0.00	0.00	**0.04**
2017	78	0.00	0.00	**0.04**	**0.88**	0.00	0.00	0.00	0.00	0.00
2018	61	**0.03**	0.00	**0.26**	**0.82**	0.00	0.00	0.00	0.00	0.00
2019	82	**0.04**	**0.46**	**0.84**	**0.22**	0.00	0.00	0.00	0.00	0.00
2020	60	**0.05**	0.00	**0.27**	**0.42**	0.00	0.00	0.00	0.00	0.00
2021	36	**0.47**	**0.33**	**0.44**	**0.28**	0.00	0.00	0.00	0.00	0.00
2022	45	0.00	**0.58**	**0.33**	**0.49**	0.00	0.00	0.00	0.00	0.00

Note: Collar data available from 1993 to 2022; table represents first year caribou collars detected in Regional Study Area.

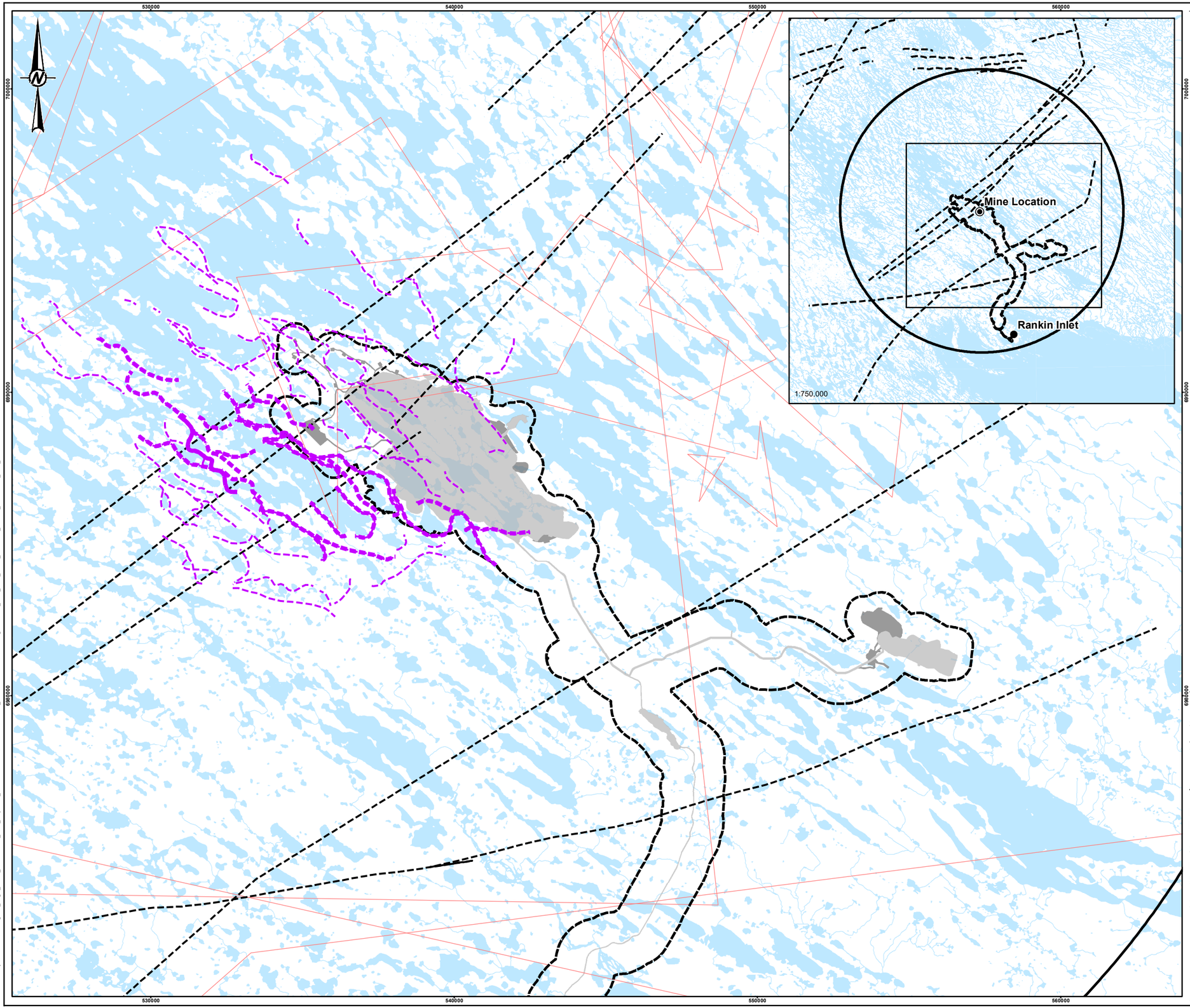
Q1iv. What are the trends in spatial extent? *The answer will include how the IQ migration trails (Fig 1 Caribou-AWAR interactions, AEM responses KivIA-IR-3) and IQ identified water-crossings (2021 Annual Report Table 3) relate to the current use patterns (mapped trails and collar pathways) to determine changes in the historic and current exposure of caribou to Meliadine mine site and proposed windfarm area.*

Response

Figures Q1via to Q1vic were produced using mapped IQ migration routes, caribou trails mapped in 2021, and collar pathways from pre-construction (1993 to 2011; Figure Q1via), advanced exploration (2012 to 2017; Figure Q1vib) and construction and operations (2018 to 2022; Figure Q1vic). Spatial data were not available for IQ identified water crossings. Brownian Bridge Movement Models (ERM 2023c) were also available for interpretation. These different data sources suggest that use of areas near the Mine and proposed windfarm footprint during calving, post-calving, and summer has changed from pre-construction to construction and operations. Migration routes, caribou trails mapped in 2021, and collar pathways demonstrate caribou use the Mine and proposed windfarm footprint during different time periods. Brownian Bridge Movement Models that account for intensity of use of different areas based on collar data suggest that the Mine and proposed windfarm footprint are areas of low to moderate use by the Qamanirjuaq herd as a whole during construction and operation.

Two mapped migration routes (IQ) occur between Meliadine Lake and the Mine, in the proposed windfarm footprint (Figure Q1via to Figure Q1vic). Two additional migration routes (IQ) overlap the Mine southeast of the proposed windfarm footprint. Caribou trails mapped in 2021 were classified as major (limited or no vegetation) and minor (vegetated trails) (ERM 2021c). Overall, the number of raw collar pathways overlapping the Mine and proposed windfarm footprint has increased from pre-construction to construction and operations (Figure Q1via to Figure Q1vic). During pre-construction, there is limited overlap of collar pathways with the proposed windfarm footprint (Figure Q1via). Multiple collar pathways overlap the proposed windfarm footprint during both the advanced exploration (Figure Q1vib) and construction and operations (Figure Q1vic). The proposed windfarm footprint appears to have a slightly lower concentration of collar pathways compared to the southeast portion of the Mine during advanced exploration (Figure Q1vib), and areas south and west of the Mine during construction and operations (Figure Q1vic).

According to Brownian Bridge Movement Models (ERM 2023c), caribou calving, post-calving, and summer ranges have shifted towards the Mine and AWAR from pre-construction to advanced exploration, into construction and operations. The proposed windfarm footprint overlaps an area of low use in the calving and post-calving seasons, and an area of low to moderate use in summer during construction and operations. Areas of moderate to high use occur north of Meliadine Lake from the proposed windfarm footprint during calving. During post-calving, moderate to high use areas occur to the east and west of the Mine, extending south along the AWAR. In the summer, low to moderate areas of use extend from the mine southeast along the AWAR. High use areas determined using Brownian Bridge Movement Models during construction and operations do not appear to overlap with mapped IQ migration routes in the proposed windfarm footprint. However, the migration routes (IQ) overlap areas of low to moderate use in summer during construction and operations.



LEGEND

- CARIBOU TRAIL (MAJOR)
- CARIBOU TRAIL (ALL)

CARIBOU MIGRATION - IQ

- CARIBOU MIGRATION ROUTE

CARIBOU COLLAR PATHWAYS

- PRE-CONSTRUCTION (1993-2011)
- MELIADINE EXTENSION LSA
- MELIADINE EXTENSION RSA
- MELIADINE APPROVED PROJECT
- MELIADINE EXTENSION FOOTPRINT
- WATERCOURSE
- WATERBODY

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REFERENCE(S)

1. TOPOGRAPHIC MAP © ESRI AND ITS LICENSORS. USED UNDER LICENSE, ALL RIGHTS RESERVED.
2. DATUM: NAD83 PROJECTION UTM ZONE 15

CLIENT

AGNICO EAGLE MINES LIMITED

AGNICO EAGLE

PROJECT

MELIADINE GOLD PROJECT
NUNAVUT

TITLE

MAPPED CARIBOU TRAILS AND COLLAR PATHWAYS (PRE-CONSTRUCTION: 1993 TO 2011)

CONSULTANT

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APPROVED	

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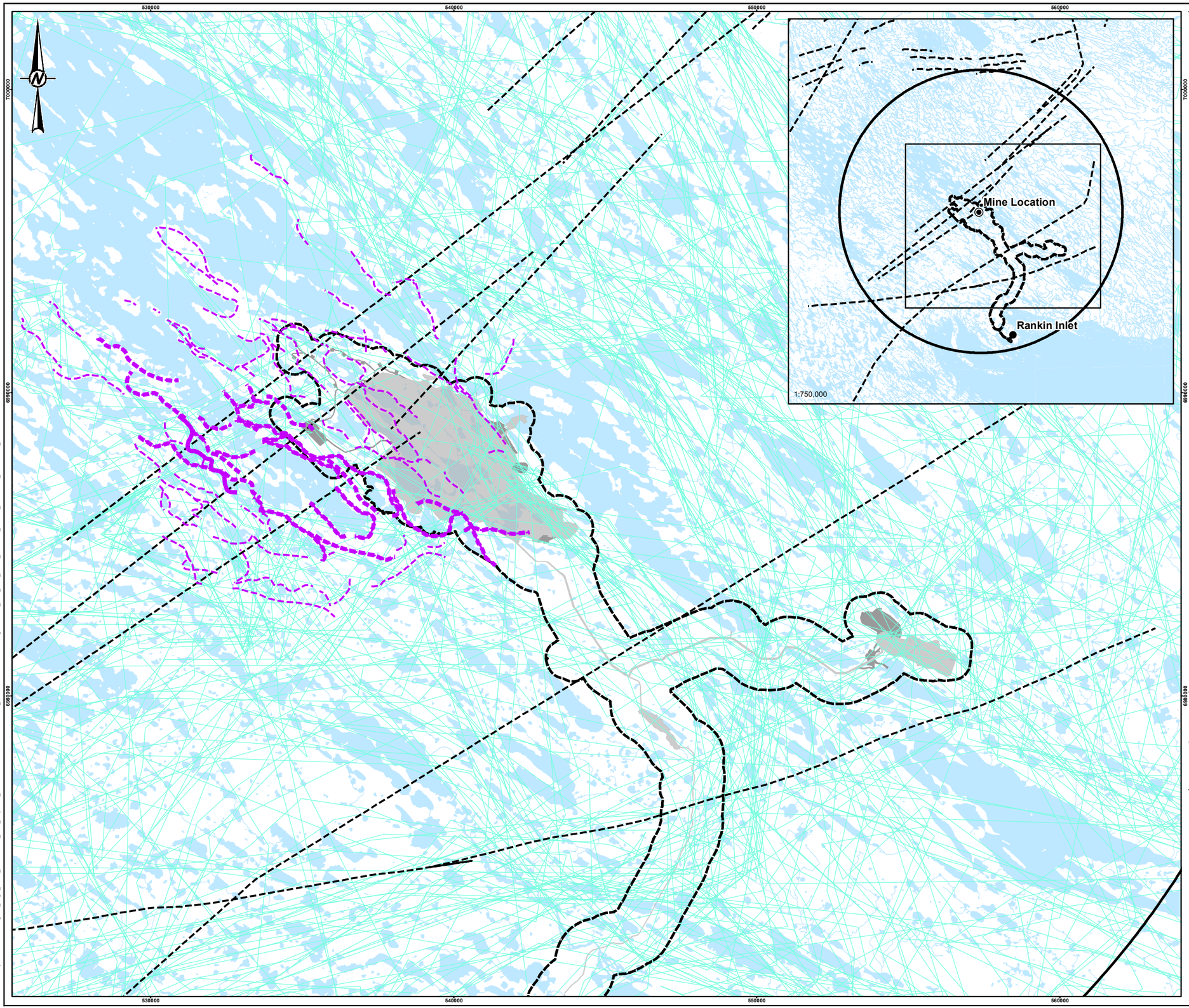

LEGEND

- CARIBOU TRAIL (MAJOR)
- CARIBOU TRAIL (ALL)

CARIBOU MIGRATION - IQ

- CARIBOU MIGRATION ROUTE

CARIBOU COLLAR PATHWAYS

- ADVANCED EXPLORATION (2012-2017)
- MELIADINE EXTENSION LSA
- MELIADINE EXTENSION RSA
- MELIADINE APPROVED PROJECT
- MELIADINE EXTENSION FOOTPRINT
- WATERCOURSE
- WATERBODY

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CLIENT

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PROJECT

MELIADINE GOLD PROJECT
NUNAVUT

TITLE

MAPPED CARIBOU TRAILS AND COLLAR PATHWAYS (ADVANCED EXPLORATION: 2012 TO 2017)

CONSULTANT

wsp

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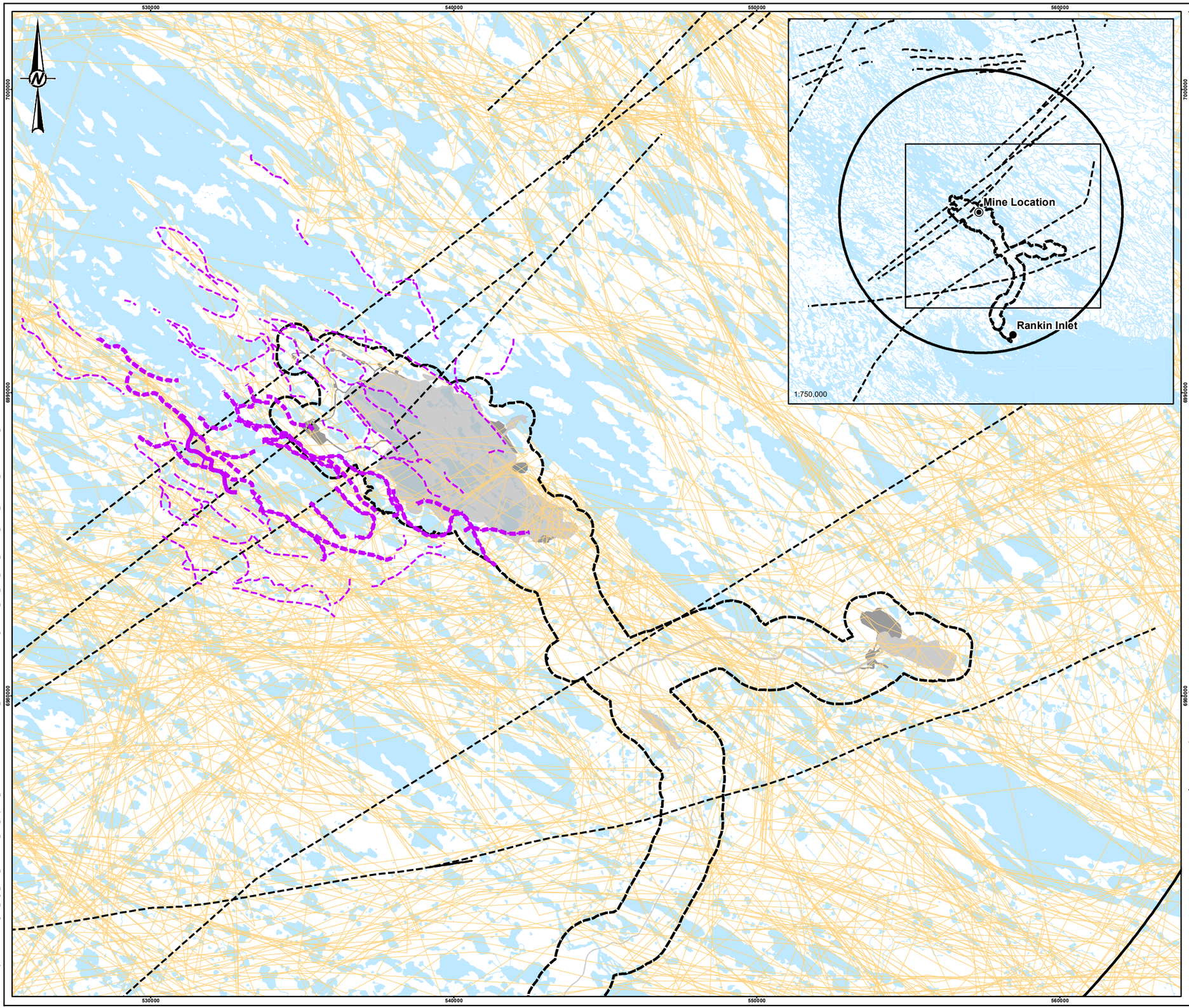

LEGEND

- CARIBOU TRAIL (MAJOR)
- CARIBOU TRAIL (ALL)

CARIBOU MIGRATION - IQ INTERVIEW

- CARIBOU MIGRATION ROUTE

CARIBOU COLLAR PATHWAYS

- CONSTRUCTION AND OPERATION (2018-2022)
- MELIADINE EXTENSION LSA
- MELIADINE EXTENSION RSA
- MELIADINE APPROVED PROJECT
- MELIADINE EXTENSION FOOTPRINT
- WATERCOURSE
- WATERBODY

0 2.5 5

1:125,000 KILOMETRES

REFERENCE(S)

1. TOPOGRAPHIC MAP © ESRI AND ITS LICENSORS. USED UNDER LICENSE, ALL RIGHTS RESERVED.
2. DATUM: NAD83 PROJECTION UTM ZONE 15

CLIENT

AGNICO EAGLE MINES LIMITED

AGNICO EAGLE

PROJECT

MELIADINE GOLD PROJECT
NUNAVUT

TITLE

MAPPED CARIBOU TRAILS AND COLLAR PATHWAYS (CONSTRUCTION AND OPERATIONS: 2018 TO 2022)

CONSULTANT

wsp

YYYY-MM-DD	2023-05-09
DESIGNED	SW
PREPARED	CDB
REVIEWED	
APPROVED	

PROJECT NO.	CONTROL	REV.	FIGURE
22524250	4000/4005	A	Q1IVc

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

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Q1v. What is the duration of exposure*? The answer will include an annual summary of the beginning and end dates for caribou observations from road surveys, collars (updated Table 9, AEM 2020), cameras and behavioral studies to describe the duration (number of days) when caribou are within LSA.*

Response

Table 5 presents the first and last date, and duration (days) that caribou were detected in the near the Mine and AWAR (i.e., the LSA) from collar data, behaviour surveys, remote cameras, and road surveys. All survey methods besides collar data include detection of individuals near the Mine and AWAR, including those outside the LSA. Collar data dates are based on collar locations that overlap the LSA. This represents the first and last detection of any individual in the LSA during the calving, post-calving, and summer periods. Five collar locations from winter and fall migration (post-breeding) from 2006, 2007, and 2015 were not included in duration of exposure calculations. Duration of exposure from collar data ranges from <1 day (2012) to 46 days (2016). However, caribou are not necessarily present in the LSA during the entire date ranges presented in Table 5. The total duration of exposure based on all survey types is also presented in Table 5.

Data from remote cameras deployed on the AWAR and behaviour surveys are available from 2020 to 2022 (Table 5). Behaviour surveys targeted specific groups of caribou to answer research questions, rather than attempting to determine first and last detection dates of caribou near the Mine and AWAR. Remote camera surveys require caribou to walk directly in front of remote cameras, or for individuals to be present when a timed image is captured to be detected. However, these survey types were still useful for identifying outer date ranges that caribou were present near the Mine and AWAR (Table 5).

Duration of exposure identified from road surveys and/or mitigation dates for the Mine and AWAR are available from 2017 to 2022 (Table 5). These dates represent the first and last date when caribou were documented on road surveys, or when mitigation was applied to the Mine or AWAR. Caribou may not be observed on every day during this period, and caribou outside the LSA but within 5 km of the Mine and AWAR are included in these dates. Duration of exposure from observations from road surveys vary across years, and range from 12 (2017) to 28 days (2021). When detections from years where at least two survey methods are available (i.e., 2017 to 2022), duration of exposure is variable across years ranging from 12 (2017) to 31 days (2022; Table 5).

Table 5: Duration of Exposure (Days) to LSA from Collar Data, Behaviour Surveys, Remote Cameras, and Road Surveys

Year	Duration of Exposure Collar Data[a]			Duration of Exposure from First and Last Observations of Individuals During the Behaviour Survey[b]			Duration of Exposure from First and Last Observations of Individuals During[b] the Remote Camera Survey			Duration of Exposure from Road Surveys or Site Mitigation[b]			Duration of Exposure from All Survey Types		
	Start	End	Days	Start	End	Days	Start	End	Days	Start	End	Days	Start	End	Days
1993	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1994	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1995	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1996	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1998	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1999	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2012	17-Jul	17-Jul	<1	-	-	-	-	-	-	-	-	-	17-Jul	17-Jul	<1
2013	13-Jul	14-Jul	1	-	-	-	-	-	-	-	-	-	13-Jul	14-Jul	1
2014	07-Jul	09-Jul	2	-	-	-	-	-	-	-	-	-	07-Jul	09-Jul	2
2015	12-Jul	26-Jul	14	-	-	-	-	-	-	-	-	-	12-Jul	26-Jul	14
2016	06-Jul	21-Aug	46	-	-	-	-	-	-	-	-	-	06-Jul	21-Aug	46

Year	Duration of Exposure Collar Data[a]			Duration of Exposure from First and Last Observations of Individuals During the Behaviour Survey[b]			Duration of Exposure from First and Last Observations of Individuals During[b] the Remote Camera Survey			Duration of Exposure from Road Surveys or Site Mitigation[b]			Duration of Exposure from All Survey Types		
	Start	End	Days	Start	End	Days	Start	End	Days	Start	End	Days	Start	End	Days
2017	07-Jul	16-Jul	9	-	-	-	-	-	-	07-Jul	19-Jul	12	07-Jul	19-Jul	12
2018	08-Jul	23-Jul	15	-	-	-	-	-	-	05-Jul	22-Jul	17	05-Jul	23-Jul	18
2019	25-Jun	06-Jul	11	-	-	-	-	-	-	21-Jun	11-Jul	20	21-Jun	11-Jul	20
2020	05-Jul	15-Jul	10	01-Jul	17-Jul	16	01-Jul	19-Jul	18	03-Jul	17-Jul	14	01-Jul	19-Jul	18
2021	25-Jun	01-Jul	6	25-Jun	12-Jul	17	27-Jun	10-Jul	13	22-Jun	20-Jul	28	22-Jun	20-Jul	28
2022	22-Jun	15-Jul	23	23-Jun	12-Jul	19	22-Jun	20-Jul	28	19-Jun	16-Jul	27	19-Jun	20-Jul	31

[a] Includes calving, post-calving, and summer. Observations from winter and fall migration (post breeding) (n = 5) following entry to exit from LSA during calving to summer seasons removed.

[b] Determined from ERM 2021, ERM 2022a, ERM 2022b, ERM 2023a, ERM 2023b, Golder 2021, Golder 2022 and WSP 2023a.

Q1vi. How does the mine site and AWAR impact caribou movements*? The answers to include the frequency of paralleling behavior and stalls such as at the periphery of the mine site which will require an analysis of movement rates and turn angles. The answer should also include an examination of when collared caribou based on similar pathways at the same time are travelling together.*

Response

The integrated step selection function that will be completed to address Commitment 38 (WSP 2023a) will best address these questions.

References

Caslys Consulting Ltd. 2015. Barren-ground Caribou Analysis Methods Summary Report Draft. Submitted to Government of Nunavut Department of Environment, Wildlife Research Branch.

ERM (ERM Consultants Canada Ltd.). 2021a. Meliadine Project Caribou Behaviour Study, 2020. Prepared for Agnico Eagle Mines Limited. Toronto ON: ERM Consultants Canada Ltd. ERM Project No. 0544016-WP4. 60 p.

ERM. 2021b. Meliadine Project Caribou Trail Camera Study, 2020. Prepared for Agnico Eagle Mines Limited. Toronto ON: ERM Consultants Canada Ltd. ERM Project No. 0544016-WWP4. 35 p.

ERM. 2021c. Meliadine Project Wildlife Existing Conditions Report, 2021. Prepared for Agnico Eagle Mines Limited. Toronto ON: ERM Consultants Canada Ltd. ERM Project No. 0605387-6. 22 p.

ERM. 2022a. Meliadine Project Caribou Behaviour Study, 2021. Prepared for Agnico Eagle Mines Limited. Toronto ON: ERM Consultants Canada Ltd. ERM Project No. 0605387-2. 59 p.

ERM. 2022b. Meliadine Project Caribou Trail Camera Study, 2021. Prepared for Agnico Eagle Mines Limited. Toronto ON: ERM Consultants Canada Ltd. ERM Project No. 0605387-3. 42 p.

ERM. 2023a. Meliadine Mine Caribou Behaviour Study, 2022. Prepared for Agnico Eagle Mines Limited. Toronto ON: ERM Consultants Canada Ltd. ERM Project No. 0652009. 70 p.

ERM. 2023b. Meliadine Mine Caribou Trail Camera Study Compilation Report, 2020 to 2022. Prepared for Agnico Eagle Mines Limited. Toronto ON: ERM Consultants Canada Ltd. ERM Project No. 0652009-03. 42 p.

ERM. 2023c. Meliadine Gold Mine Project Qamanirjuaq Caribou Brownian Bridge Movement Models (1993-2022).

Golder (Golder Associates Ltd). 2020. 2019 Terrestrial Effects Monitoring and Mitigation Program Annual Report. Meliadine Division. Prepared for Agnico Eagle Mines Limited. Rankin Inlet, NU.

Golder. 2021. Agnico Eagle Mines Limited – Meliadine Division 2020 Terrestrial Effects Monitoring and Mitigation Program Annual Report. Prepared for Agnico Eagle Mines Limited. Ottawa ON: Golder Associates Ltd. Golder Doc. No. 20138041-829-R-Rev1; 05 April 2021. 153 p.

Golder. 2022. Agnico Eagle Mines Limited – Meliadine Division 2021 Terrestrial Effects Monitoring and Mitigation Program Annual Report. Prepared for Agnico Eagle Mines Limited. Edmonton AB: Golder Associates Ltd. Golder Doc. No. 20449445-920-R-Rev0; 06 April 2022. 287 p.

Mallory CD, Williamson SN, Campbell MW, Boyce MS. 2020. Response of barren-ground caribou to advancing spring phenology. Oecologia 192:837-52.

WSP (WSP Canada Inc.). 2023a. Agnico Eagle Mines Limited – Meliadine Division 2022 Terrestrial Environment Management and Monitoring Plan Annual Report. Prepared for Agnico Eagle Mines Limited. Edmonton AB: WSP Canada Inc. WSP Doc. No. 21505027-960-Rev0; 29 March 2023. 541 p.

WSP. 2023b. Meliadine Waterline Commitment 38 Caribou Telemetry Study Design. 17 p.