MELIADINE GOLD MINE

2023 TAG Annual Report

MARCH 2024

EXECUTIVE SUMMARY

Agnico Eagle Mines Limited (Agnico Eagle) is operating the Meliadine Gold Mine (the Mine), located approximately 25 kilometres (km) north from Rankin Inlet, and 80 km southwest from Chesterfield Inlet in the Kivalliq Region of Nunavut. Situated on the western shore of Hudson's Bay, the Mine site is located on a peninsula between the east, south, and west basins of Meliadine Lake (63°1'23.8''N, 92°13'6.42''W), on Inuit owned land.

The 2023 Terrestrial Advisory Group (TAG) Annual Report documents the work conducted throughout 2023 toward the establishment of the TAG. The Term of References (TORs) were finalized early 2023 ensuring compliance with Terms and Conditions (TC) 132 of the Nunavut Impact Review Board (NIRB) Project Certificate No.006-002 (PC No.006-002) which stipulates:

> *''The Proponent shall, in consultation with the groups listed as Responsible Parties above, and any other parties considered by the Group to be necessary, establish a Terrestrial Advisory Group (TAG). The TAG shall hold its first meeting prior to any construction/installation of the waterlines. The central mandate of the TAG will be to continually review and refine impact management, mitigation, and monitoring details within the Terrestrial Environment Management and Monitoring Plan (TEMMP). The TAG Members will collaborate to share and consider methods, results, and analysis from caribou and terrestrial environment studies and monitoring Inuit Qaujimaningit, Inuit Qaujimajatuqangit, Traditional and Community Knowledge shared by knowledge holders, and other terrestrial environment monitoring data as it becomes available. The Proponent will consider the information shared by the TAG Members for incorporation into the Project's impact management, mitigation, and monitoring measures related to the protection of terrestrial wildlife and wildlife habitat as appropriate. Agnico Eagle shall be responsible for demonstrating how the information shared and considered by the TAG has been incorporated into the Project's impact management, mitigation, and monitoring measures related to the protection of terrestrial wildlife and wildlife habitat as appropriate.''*

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ACRONYMS

AEM	Agnico Eagle Mines Limited
BLHTO	Baker Lake Hunters and Trappers Organization
C38	Meliadine Collared Caribou Meliadine All-Weather Access Road Interactions Memo
GKD	Ghotelnene K'odtineh Dene
GN	Government of Nunavut
KEAC	Kivalliq Elders Advisory Committee
KHTO	Kaniqliniq Hunter and Trapper Organization
KivIA	Kivalliq Inuit Association
KWB	Kivalliq Wildlife Board
MB	Manitoba
NDFN	Northlands Denesuline First Nation
NIRB	Nunavut Impact Review Board
NTI	Nunavut Tunngavik Inc.
NU	Nunavut
PC No.006-002	Project Certificate No.006-002
SDFN	Sayisi Dene First Nation
TAG	Terrestrial Advisory Group
TC	Terms and Conditions
TC118	Decision Tree Revision
TEMMP	Terrestrial Environment Management and Monitoring Plan
TORs	Term of References

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SECTION 1 • TAG HIGHLIGHT OF 2023

A total of four TAG meetings took place in 2023 in April, May, June, and October. Three meetings were held in person. Two meetings (April and October) took place in Winnipeg, Manitoba (MB) and the meeting in June was held in Rankin Inlet, Nunavut (NU), during the caribou migration. All meetings were virtually accessible through videoconference using Microsoft Teams.

The focus of 2023 was the presentation of the caribou data collected at or in the vicinity of Meliadine, discussion relative with the various mitigation measures to limit the impact of the mine related activity on the caribou, and the revision of the Terrestrial Environment Management and Monitoring Plan (TEMMP). Multiples subjects were discussed with a focus on caribou. The agenda content and the participants for each meeting are listed in Table 1. The minutes detailing the discussions can be found in Appendix A.

Table 1 : Description of the 2023 TAG meetings

Date	Location	Main Topics Discussed	Attendees
April 13th & 14th, 2023	Wyndham Lakeview Signature Winnipeg, MB Online – Teams Meeting	**Day 1:** Meliadine Collared Caribou Meliadine All-Weather Access Road Interactions Memo (C38) Baker HTO, Sayisi Dene, Northlands Denesuline – Items of interest Decision Tree Revision (TC118) Roundtable comments **Day 2:** 2022 Annual Report Overview Ongoing projects	Kivalliq Inuit Association (KivIA) Baker Lake Hunters and Trappers Organization (BLHTO) Northlands Denesuline First Nation (NDFN) Sayisi Dene First Nation (SDFN) Nunavut Tunngavik Inc. (NTI) Government of Nunavut (GN) Agnico Eagle (AEM)
May 24th, 2023	Online – Teams Meeting	TEMMP Update 2023 Caribou Migration Waterline Construction Plan	KivIA BLHTO NDFN SDFN

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Date	Location	Main Topics Discussed	Attendees
			NTI GN AEM
June 26th, 27th & 28th, 2023	Katimavik Suites Rankin Inlet, NU Online – Teams Meeting	**Day 1:** 2023 Caribou Migration Update Caribou Monitoring Site – Site and AWAR HTO, Sayisi Dene, Northlands Denesuline – Items of interest TEMMP Revision **Day 2:** Community Elders – Items of interest Commitment 38 – Update Collared Caribou Analysis Memo **Day 3:** Caribou monitoring – Behaviour and trail camera	KivIA BLHTO NDFN SDFN NTI Kivalliq Elders Advisory Committee (KEAC) GN AEM
October 24th & 25th 2023	Courtyard Marriot Winnipeg Airport Winnipeg, MB	**Day 1:** 2023 Caribou Migration Noise Monitoring during the Caribou Migration KivIA, HTO, Sayisi Dene, Northlands Denesuline, Community Elders – Items of Interest TEMMP Revision **Day 2:** TEMMP Revision	KivIA Kivalliq Wildlife Board (KWB) Kaniqliniq Hunter and Trapper Organization (KHTO) BLHTO NDFN SDFN NTI GN AEM

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Date	Location	Main Topics Discussed	Attendees
		C38 – Update Collared Caribou Analysis Memo	

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SECTION 2 • TAG ACTION ITEMS, RECOMMENDATIONS AND ADVICE

Table 2 summarizes and lists the action items, recommendations and advice from TAG meetings and ensures compliance with the reporting requirements section from TC 132 of the NIRB PC No.006-002 which stipulates:

> *''An overview of information shared during Terrestrial Advisory Group meetings and how information from the TAG was considered and incorporated by Agnico Eagle into the Project's impact management, mitigation, and monitoring measures shall be provided to the NIRB on an annual basis in the Proponents' Annual Report.''*

Table 2 : Summary of TAG Action Items

No.	TAG Meeting Reference	Action Items	Follow-Up	Status
2022-1	May 4th, 2022, TAG Meeting	**(R) Documentation:** Recommendations from the TAG should be documented in the Annual Report.	AEM included comments raised through the TAG and their follow-ups in this annual report table.	Resolved
2022-2	May 4th, 2022, TAG Meeting	**PC No.006-002, TC 118:** As per TC 118, AEM should, in consultation with the TAG, develop a decision tree outlining mitigation to be implemented when caribou in specified group sizes are observed within a specified distance of the AWAR and waterlines which will be included in the TEMMP. It is suggested that the TAG reviews the TEMMP, provide comments and follow-up a with conference call to discuss the results.	A session about the TEMMP revision was included in the 2023 Agenda items. *Update 2023: Topic was an agenda item April 13th, 2023, and was further discussed in the subsequent May, June, and October 2023 TAG meetings.* *The draft TEMMP v5 structure was discussed throughout 2023 and the draft TEMMP v5 accounting for comments received throughout 2023 was shared with the TAG on December 20th, 2023. It was reviewed by the TAG on January 24th and 25th, 2024, and again on March 1st, 2024. Following agreement by all TAG parties, the final version of TEMMP V5 will be submitted to the NIRB in 2024*	Ongoing
2022-3	May 4th, 2022, TAG Meeting	**Blasting/caribou study:**	AEM is building preliminary datasets outside of the caribou migration season period.	Ongoing

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
		KivIA wishes to be at site with their biologist for any blast tests conducted during the caribou migration season. AEM should first collect data outside of caribou migration period.		
2022-4	May 4th, 2022, TAG Meeting	**Caribou mitigation with AWAR:** The current threshold for the closure of AWAR is 50 caribou or more. This threshold should be evaluated using road survey data to determine the proportion of caribou interacting with the AWAR in groups of 50 or more. The purpose is to set up a group-sized threshold that determines whether a group-sized threshold of 70% or more of caribou is meaningful.	A session about the TEMMP revision was included in the 2023 Agenda items. *Update 2023: Several studies such as the behavior data, the heigh of land, and road surveys were presented to the TAG throughout 2023.* *The draft TEMMP v5 structure was discussed throughout 2023 and the draft TEMMP v5 accounting for comments received throughout 2023 was shared with the TAG on December 20th, 2023. It was reviewed by the TAG on January 24th and 25th, 2024, and again on March 1st, 2024. Following agreement by all TAG parties, the final version of TEMMP V5 will be submitted to the NIRB in 2024.*	Ongoing
2022-5	May 4th, 2022, TAG Meeting	**Collared caribou data:** It was discussed that there might be a way to give a designated AEM employee direct	AEM and GN are working on finalizing a Data and Sample Sharing Agreement (DSSA).	Resolved

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
		access to the collar locations via a temporary admin password. This would be under a strict agreement that data cannot be downloaded.	*Update 2023: A DSSA was signed on March 3rd, 2023.*	
2022-6	May 4th, 2022, TAG Meeting	**TEMMP revision:** TAG members should have an opportunity to review the April 2022 version of TEMMP and provide written comments to AEM.	A session about the TEMMP revision was included in the 2023 Agenda items. *Update 2023: The TEMMP revision was an agenda item in every TAG meeting of 2023. The TEMMP v5 Table of Content was presented to the TAG in June and October 2023.* *The draft TEMMP v5 structure was discussed throughout 2023 and the draft TEMMP v5 accounting for comments received throughout 2023 was shared with the TAG on December 20th, 2023. It was reviewed by the TAG on January 24th and 25th, 2024, and again on March 1st, 2024. Following agreement by all TAG parties, the final version of TEMMP V5 will be submitted to the NIRB in 2024.*	Ongoing
2022-7	May 4th, 2022, TAG Meeting	**PC No.006-002, various TC:** The TAG should prioritize specific assigned tasks as per PC No.006-002.	Sessions about the various TAG-related TC were included in the 2023 Agenda items.	Resolved

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
			2023 Update: All items selected in the 2022 TAG Annual Report were discussed in 2023 TAG meetings.	
2022-8	May 4th, 2022, TAG Meeting	**TAG agenda:** AEM should circulate a work plan for the TAG showing the priority items for the next few years. Once the TORs are finalized and the caribou crossing memo is reviewed (TC44), the next priority should be the review of the TEMMP.	The revision related to TC 44 was discussed as an item on the agenda on December 16th, 2022. *Update 2023: The TEMMP was discussed as an agenda item in every TAG meeting of 2023.* *The draft TEMMP v5 structure was discussed throughout 2023 and the draft TEMMP v5 accounting for comments received throughout 2023 was shared with the TAG on December 20th, 2023. It was reviewed by the TAG on January 24th and 25th, 2024, and again on March 1st, 2024. Following agreement by all TAG parties, the final version of TEMMP V5 will be submitted to the NIRB in 2024.*	Resolved
2022-9	December 15th, 2022, TAG Meeting	**PC No.006-002, TC44 and C38:** A new analysis is required to address the revisions and recommendations made by KivIA, GKD, and GN regarding the TC44 memo. It is necessary to have access to collared data before conducting data	As per December 15th, 2022, meeting minutes, the consensus was that TC44 could be considered as completed with the commitment to provide an updated memo accounting for Parties' comments once data is available and considering comments from Parties. New study objectives summary:	Ongoing

No.	TAG Meeting Reference	Action Items	Follow-Up	Status
		analysis rather than analyzing images. It is also possible to define deflection. Two (2) main proposed objectives of new analysis by the TAG are to understand: • Movement of caribou; and • Behavior of caribou interacting with the road and the project, and the zone of influence (including delays in time and distance). TAG would determine study area, approaches and methods based on the discussion on December 15th, 2022.	• Looking at ZoI at the time of the year along the road and project. • Considering the proximity of Rankin Inlet and the community. • Step regression is to be determined with movement. • Time and energy. • Caribou behavior, such as walking parallel. • Caribou that interact with road and caribou that do not. • Understand movement in spring vs. post-calving. • Response to mine and road. • The proximity between collared data and road. • Ice on and off. • Landscape and orientation; Herd Meliadine Lake on one side or the other. • Hunting pressure analysis. • Caribou by observing data type and monitoring (HTO). Notation per 6.2 of the TAG TORs: SDFN/NDFN wishes to add the following editorial comment to these minutes, which was not stated during the meeting: "At this time, SDFN/NDFN do not agree that TC44 has been fulfilled/satisfied with respect to the collared caribou memo. It may be satisfied once the new analysis by Agnico Eagle is shared and discussed with the TAG, based on	

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
			updated data and comments discussed between the members of the TAG."	
			AEM was still pursuing in 2022 the caribou satellite collar Data and Sample Sharing Agreement (DSSA).	
			Update 2023: A DSSA was signed on March 3rd, 2023.	
			Analysis using collar data was conducted following the detailed instructions given by the TAG under the topic: Commitment 38 – Update Collared Caribou Analysis Memo. The methodology was presented and discussed on April 13th, 2023. A memo including the results was presented on June 27th, 2023. The revised version of the memo accounting for the TAG's comments was presented at the TAG meeting on October 25th, 2023.	
			No comments on the latest version of the memo were received from TAG parties in 2023. TAG parties were given until March 1st, 2024 to provide comments.	
2022-10	December 16th, 2022,	**Distances & names consistency:**	*Update 2023: To ensure consistency in referencing distances and locations, AEM*	Resolved

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
	TAG Meeting	Ensure consistency when referencing distances and locations.	*provided a map with the kilometer markers during the April 2023 TAG meeting.*	
2022-11	December 16th, 2022, TAG Meeting	**Spill Response Plan:** GKD suggested that additional spill prevention and containment measures could be installed and used (e.g., extra sheathing at the connection points of the lines).	AEM suggested to further discuss this topic at the TAG should Members wish to do so as several considerations would need to be accounted for.	Resolved
2022-12	December 16th, 2022, TAG Meeting	**Documentation during caribou migration:** The annual report should include more information to document the caribou migration, indicating distance and group size, as well as the number of caribou crossing per day and when collared caribou cross. The on-site decision regarding traffic suspension protocol should be further documented based on field conditions.	A session about the TEMMP revision was included in the 2023 Agenda items. *Update 2023: AEM presented to the TAG on April 14th, 2023, the memo: Wildlife Survey and Caribou Herd Observations Linked to Road Closure for 2022 which also satisfy Commitment 26.1.* *The information related to 2023 is presented in the 2023 TEMMP annual report which incorporated TAG's comments collected in April 2023.*	Resolved

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
2022-13	December 16th, 2022, TAG Meeting	**Caribou mitigation with AWAR:** AEM may consider an experiment for the first few days of spring 2023, changing the triggers to less than 50 caribou and more than 400-500 meters from the road, to observe how caribou leaders respond.	A session about the TEMMP revision was included in the 2023 Agenda items. *Update 2023: 2023 caribou monitoring was conducted following applicable requirements as shown in the 2023 Annual Report.*	Not implemented
2022-14	December 16th, 2022, TAG Meeting	**Annual TEMMP report:** Discuss in advance what should be included in the annual TEMMP report in terms of its structure and content. Data from road surveys, behavior data, collared caribou data, and AWAR camera images should be integrated. The effectiveness of mitigation and the shift in the calving season since 2020 should be described.	AEM proposes to provide a high-level overview of the 2022 TEMMP annual report in 2023. As per the 2023 TEMMP annual report content and structure, they will be further discussed throughout TAG meetings in 2023. *Update 2023: A 2022 TEMMP Annual Report Overview was presented as an agenda item on April 14th, 2023. Road surveys, behavior data, collared caribou data, and AWAR camera images have been added to the report.*	Resolved
2022-15	December 16th, 2022, TAG Meeting	**Annual TEMMP report:** The annual report should include the Caribou Migration Daily maps.	The Caribou Migration Daily maps are shared in daily with Members throughout the migration.	Resolved

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
2022-16	December 16th, 2022, TAG Meeting	**Caribou crossing at the Narrows:** It is KivIA hope to install cameras on both sides of the Narrows in order to document the crossing of caribou.	AEM proposed to prioritize the camera locations for 2023 to gather the maximum information along the AWAR and waterline.	Resolved
2022-17	December 16th, 2022, TAG Meeting	**Camera along AWAR:** AEM is recommended to install back-to-back trail cameras along the AWAR to document the entire radius of detected movement when a caribou crosses the AWAR.	AEM proposed to prioritize the camera locations for 2023 to gather the maximum of information along the AWAR and the waterline. *Update 2023: Camera locations in 2023 were disposed to cover Discovery Road and the vicinity of Meliadine site suggested by the TAG on May 24, 2023.* *As indicated by ERM biologists in April 2023, trail cameras must be installed northward to reduce the glare from the sun and to avoid the sun triggering unnecessarily the cameras.*	Resolved
2022-18	December 16th, 2022, TAG Meeting	**The use of drones for caribou monitoring:** - Image clearer with the drone hovering at 300 m above ground level. - Verify the limit at 300-350 m above ground level for large groups of caribou). - Require high resolution (6k) camera.	AEM will account for the information collected and present to the TAG proposed methods to monitor caribou during migration at the next TAG meeting. *Update 2023: The use of drone for caribou monitoring was discussed in meetings held in April and October of 2023.*	Ongoing

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
		• Find the balance between drone size and capacity to fly in windy conditions. • Verify with GN and Transport Canada about wildlife harassment. • Establish a pilot project to gather information about distance and noise. Be aware of female caribou that show alertness behavior.		
2023-1	April 13th, 2023 TAG Meeting	**PC No.006-002, C38:** Members to provide written comments on C38 memo.	Analysis using collar data was conducted following the detailed instructions given by the TAG under the topic: Commitment 38 – Update Collared Caribou Analysis Memo. The methodology was presented and discussed on April 13th, 2023. A memo including the results was presented on June 27th, 2023. The revised version of the memo including the TAG's comments was presented at the TAG meeting on October 25th, 2023. No written comment was provided to AEM in 2023. *TAG parties were given until March 1st, 2024 to provide comments.*	Ongoing
2023-2	April 13th, 2023 TAG Meeting	**PC No.006-002, TC118:** AEM to provide more information on the waterline activities that will take place.	The mitigation measure implemented during the construction of the waterline and in preparation of the caribou migration were	Resolved

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
			described and discussed at the TAG meetings of May and June.	
2023-3	May 24th, 2023, TAG Meeting	**TEMMP Revision:** AEM to provide detailed Table of Contents for TEMMP revision, for review.	The TEMMP v5's Table of Content was presented to the TAG in June and October 2023. *The draft TEMMP v5 structure was discussed throughout 2023 and the draft TEMMP v5 accounting for comments received throughout 2023 was shared with the TAG on December 20th, 2023. It was reviewed by the TAG on January 24th and 25th, 2024, and again on March 1st, 2024. Following agreement by all TAG parties, the final version of TEMMP V5 will be submitted to the NIRB in 2024.*	Resolved
2023-4	May 24th, 2023, TAG Meeting	**Caribou mitigation study:** AEM to provide proposed noise, behavior, and camera monitoring locations around site in support of evaluating caribou response to light duty activities during Level 3.	Noise, behavior, and camera trail monitoring locations were presented to the TAG on June 26th, 2023.	Resolved
2023-5	June 26th, 2023, TAG Meeting	**TEMMP Revision:** AEM to send the first draft of TEMMP September after the NIRB hearing.	The TEMMP v5's Table of Content was presented to the TAG in June and October 2023. *The draft TEMMP v5 structure was discussed throughout 2023 and the draft TEMMP v5 accounting for comments received throughout*	Resolved

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
			2023 was shared with the TAG on December 20th, 2023. It was reviewed by the TAG on January 24th and 25th, 2024, and again on March 1st, 2024. Following agreement by all TAG parties, the final version of TEMMP V5 will be submitted to the NIRB in 2024.	
2023-6	June 26th, 2023 TAG Meeting	**Caribou Migration Survey:** Provide short videos showing the height of land surveys and showing the viewpoint.	The video shooting couldn't take place as planned however videos and photos taken from the field in 2023 are available upon request.	Cancelled
2023-7	October 24th & 25th, 2023, TAG Meeting	**TEMMP Revision:** Complete the TEMMP revision by the next caribou migration; Include a section on the calving grounds; Provide a written draft to Parties in advance of the next TAG meeting; Include a revision frequency of TEMMP and monitoring shared in the Annual Report.	The draft TEMMP v5 structure was discussed throughout 2023 and the draft TEMMP v5 accounting for comments received throughout 2023 was shared with the TAG on December 20th, 2023. It was reviewed by the TAG on January 24th and 25th, 2024, and again on March 1st, 2024. Following agreement by all TAG parties, the final version of TEMMP V5 will be submitted to the NIRB in 2024. The draft TEMMP v5 includes a section a section on the calving grounds and a TEMMP revision frequency.	Ongoing
2023-8	October 24th & 25th, 2023,	**Noise Monitoring during the Migration:**	A session about Noise Monitoring was included in the 2024 Agenda items (Section 3).	Scheduled in 2024

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
	TAG Meeting	Provide additional maps and images of the noise monitoring stations and the sea can wall; Provide a graph with wind speed and directions during the study; Consult the TAG for future punctual migration noise monitoring campaign; Provide a comparison of work suspension versus non-work suspension noise.		
2023-9	October 24th & 25th, 2023, TAG Meeting	**Annual Report Revision:** Propose a process to discuss annual report comments.	A session about the annual report revision was included in the 2024 Agenda items (Section 3).	Scheduled in 2024
2023-10	October 24th & 25th, 2023, TAG Meeting	**C38 Addendum:** TAG members to provide written comments on the C38 memo and addendum.	No written comments on the C38 Addendum were received by AEM following the October 2023 TAG meeting. *TAG parties were given until March 1st, 2024 to provide comments.*	Ongoing
2023-11	October 24th & 25th, 2023, TAG Meeting	**Calving Caribou:** Calving grounds map to be updated.	A session about 2023 Calving grounds map was included in the 2024 Agenda items (Section 3).	Scheduled in 2024

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
2023-12	October 24th & 25th, 2023, TAG Meeting	**Use of Drone for Survey:** To be discussed for future migration seasons.	The use of drone survey will be discussed before the next caribou migration.	Scheduled for 2024
2023-13	October 24th & 25th, 2023, TAG Meeting	**Wildlife Survey and Caribou Observation versus Road Closure 2023:** Provide the following tables in the 2023 Annual Report: A table showing the number and timing of AWAR road surveys that were conducted during the year; A table linking all observations of greater than 50 caribou (by date, time, location and distance from Project) to a documented road closure, as required under the TEMMP or mine.	AEM will provide those tables in the 2023 Annual Report.	Scheduled for 2024
2023-14	October 24th & 25th, 2023, TAG Meeting	**Baseline Analysis of Calf Abandonment by Cows:** KivIA to provide baseline analysis of calf abandonment by cows	No information was received after the October 2023 TAG meeting.	Ongoing

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No.	TAG Meeting Reference	Action Items	Follow-Up	Status
2023-15	October 24th & 25th, 2023, TAG Meeting	**2022 Analysis of calving distribution :** GN to provide the 2022 Analysis of calving distribution	No information was received after the October 2023 TAG meeting.	Ongoing

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SECTION 3 • AGENDA ITEMS FOR 2024

On January 25th, 2024, a calendar with a list of subjects to be discussed at the TAG will be proposed for 2024 (Table 3), consisting of four (4) main meetings. Additional shorter meetings could occur throughout the year as required.

Table 3: Proposed Calendar with Agenda

Calendar	Proposed Location	Proposed Agenda
January	In Person –Winnipeg Online – Teams Meeting	Follow up: Noise Emission and Wind Direction 2023 Calving Range TEMMP Revision 2023 TAG Annual Report Overview
March	Online – Teams Meeting	TEMMP Revision: Caribou related sections
April	In Person –TBD Online – Teams Meeting	Caribou Migration Readiness Caribou Mitigation and Monitoring Drone Use during Caribou Migration
October	In Person –TBD Online – Teams Meeting	2024 Caribou Migration

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APPENDIX A: TAG MEETING MINUTES

Meeting Minutes

Topic:	Day 1 - Meliadine Terrestrial Advisory Group - Agnico Eagle
Meeting Date:	April 13th, 2023 at 09:00- 17:00 PM
Location:	Wyndham Lakeview Signature, Winnipeg, MB and via Microsoft Teams (teleconference)
Attendees:	David Kuksuk –Kivalliq Inuit Association (KivIA), VP
	Jeff Tulugak – KivIA
	Craig Beardsall – KivIA
	Kim Poole, RPBio. – Aurora Wildlife Research
	Caribou Specialist (KivIA)
	Anne Gunn – Caribou Specialist (KivIA) – Online
	Benji Denechezhe – Northlands Denesuline First Nation, Chief Negotiator
	Dan Chranowski – Matrix Solutions inc.
	Wildlife Biologist (Northlands Denesuline and Sayisi Dene FN)
	Eva Elytook – Baker Lake Hunters and Trappers Organization
	Angel Aksawnee – Baker Lake Hunters and Trappers Organization
	Raymond Mercer – Nunavut Tunngavik Incorporated (NTI)
	Daniel Haney – Government of Nunavut (GN)
	Bradley Pirie – GN Project Management
	Stephen Atkinson – Biologist Consultant (GN)
	Robin Allard – Agnico Eagle (AEM), Community Consultation Specialist
	David Kritterdlik - Agnico Eagle (AEM), Inuit Qaujimajatuqangit and
	Wildlife Advisor
	Manon Turmel – AEM, Permitting and Regulatory Affairs Superintendent
	Matt Gillman– AEM, Environment Superintendent
	Sara Savoie – AEM, Environment General Supervisor
	Helene Boulanger, RPBio. – AEM, Environment Specialist
	Dan Coulton, RPBio. – WSP/Golder, Sr. Wildlife Specialist (AEM)
	Meghan Beale, RPBio. – WSP/Golder, Wildlife Biologist (AEM) – Online
	Scott Wilson PBiol, RPBio – WSP/Golder, Biologist (AEM) – Online
	Greg Sharam – ERM, Caribou Specialist (AEM)
	Nina Morrell, RPBio. – ERM
	Wildlife Biologist and Spatial Analyst (AEM) – Online

1. **Meeting Greetings**

   Supplemental Material: None

   Presenter: Robin Allard

2. **Roundtable – Introduction**

   Supplemental Material: None

   Presenter: Everyone

3. **Meliadine Collared Caribou- All-Weather Access Road Interactions Memo (C38)**

Supplemental Material: ppt "Commitment 38 Analysis – Terrestrial Advisory Group Meeting April 13, 2023" – Agnico Eagle

Presenters: Manon Turmel, Dan Coulton, Meghan Beale

Slides were reviewed by the presenter as indicated. Discussion and comments are documented here.

MT: In the last December's TAG meeting, there were discussions around Term and Condition 44, to get it resolved and move ahead with another study, where the TAG would work collaboratively on the study design. We can still meet the objectives of that study and call it Commitment 38. Term and Condition 44 is coming from Commitment 38 and will be discussed this morning. Dan will present what we're thinking and integrating the comments we got at the December session. The goal is that by noon we're all OK with the proposed study design and then get this study going as everyone has hoped for the past few years.

DC: (Begins presentation)

Slide 4 –

RA: Can you explain some of the technical terms like delta D mine?

DC: Yes, delta D mine measures change in distance from the mine between 2 consecutive collar locations, so if that distance isn't great that can imply that caribou are moving in closer, and then like in parallel.

KP: About that first objective, can't a caribou deflect from the mine? Like you deal with the AWAR and the mine in the first sentence, and only the AWAR in the second.

DC: Yes, it's going to be all the same.

KP: Because it might be a little hard to measure but they can deflect off the mine, didn't know if that was intentional or just a short form.

DC: Yes, we can add that in the final.

Slide 5 –

DC: Parturition is calving, when they are having their calves.

DCh: Just to check that 30 km zone would be a base. If the calving data shows additional areas outside, that would be merged with this 30 km zone at a bare minimum?

DC: Yes, to include all mine and AWAR.

SA: Ultimately the interpretation of the results you get, you would be using a combination of those 2 study areas. Your approach is to look at the herd as a whole, because you will be capturing animals during the post-calving period or even in the summer that might not come close to mine and be influenced.

DC: Yes, we talk about that as inclusion control or reference so we have something to provide some context about the effects.

KP: 30 km encompasses the whole AWAR and the mine site and then based on the last few years, the calving and very early post-calving movements have been coming from the NW there, so it's just going to be elongated up to the NW but that's far away from the mine site.

DC: But it reflects the period of calving plus 3 weeks

KP: Taking the median date of calving and adding 3 weeks?

DC: No, would take the earliest and the latest, then add 3 weeks to that.

KP: That could be a few weeks outlier, so you'll add 3 weeks to that?

DC: Yes, by adding an outlier you're capturing all.

KP: Could skew things quite a bit here and extend your post-calving.

DC: This map represents from June all the way through July. More of the later dates are going to be included.

KP: But you're going to include them at 30 km?

DC: Yes, but that's arbitrary, because if the polygon generated from the calving approach includes it then it becomes important when we're trying to define what a control is. That's kind of outside of the 30 km, is what we suggest?

KP: Yes. I can see this from a control point of view because otherwise, most of the calving is not going to be physically near the footprint in those first 3 weeks.

DC: I don't know if it will or not.

KP: Lately in the last year or two, they are getting closer and closer to calving and early calving movements. I'm just trying to wrap my mind around how it's all going to work and the implications of the two study areas lumped together.

DC: I like it because biologically relevant.

KP: At the beginning when I was reading through last night. These are on a 3 hr fix rate? Is this the average?

DC: I'm not sure, maybe GN answer that.

KP: That has implications. The resolution of the collar data, if once a day, wouldn't be very good if you try and look at interactions with a road or mine. If it was hour data that's probably overkill. I thought it was actually 3 locations a day, but I could be wrong.

BP: I know its multiple locations a day, maybe 3 but they are geofenced.

KP: Further away, at 30 km outside of mine and 10 km outside of road, it's 1 location a day.

DC: Megan, do you have a sense of the frequency?

MB: I started looking at the data, but the date had to be brought in a different way. When I looked at it, I couldn't figure out just out of a quick look. I didn't pull out the fix rate. It's not difficult to do. It just the data wasn't in a format for me to do quickly. So, when I wrote in the study design a 3-hr fix rate could be incorrect and that's OK. If it's incorrect, then we just weren't informed of the rate. I just couldn't get the fix rate. And if we're thinking it's more like 3 fixes a day which would be 8 hr between fixes then that could be corrected.

DCh: The raw data will tell us the fix interval and if Brad is correct about the geofencing then we have different fix interval rates further away versus closer-up. Closer-up improve the opportunity to get a better assessment. I'd like to request that we do get that clarified.

DC: Can GN clarify that?

EE: What is 30 k?

DC: 30 km distance. Just to be clear to people who have been used to what we deal with geofence, it is a simple term that we use to do define a type of reading collars that is programmed. Before they deploy the collars, they tell the collars to send locations when the collars are within an area. It is pre-mapped at 30 km from let's say Meliadine or Meadowbank or Whale tail mines, then the collars, instead of taking 3 locations a day, they try and take on maybe hourly locations. I don't know what they would be here. They take more locations the closer they get. More resolution, more data as they get closer to a mine site or a road. So, then it's easier for researchers to examine that data and tell what's going on.

RA: The collars talk more frequently when they are close to the mine and the road so we know more what's going on.

DCh: What is the interval of time between the collar sending a signal and the satellite to collect the data?

DC: For reference the red circle on the maps is 28 km from the mine site. I want to talk about it like the kind of temporal pattern. This is the map from 2019 that the GN provided and was included in the TC-44 update memorandum and so the green represents the beginning of June and then as the animals move through time, the dots change in color and eventually the latest ones are orange and those would represent July. Caribou coming up from the NE part of the mine, the green areas and then they're moving SE when they get to Meliadine Lake. They either go east and move past or they go W, move down and then come across the AWAR and eventually they move towards the coast. And then move back up in a N direction. And then cover up some continue N, a few of them do, but most of them then change direction and head S on the W part of that map. Some of the animals, when they're up in the N part, northern line, do come back down and go across the AWAR either for first time or second time. I can't tell from this map. That's kind of the temporal pattern that's happening with the caribou as they move through the project over time. When caribou hit Meliadine Lake, the one that are travelling E following the eastern shoreline of Meliadine Lake, that is a parallel direction to the upper part of the AWAR and mine. We are proposing some sort of reference/control group that is established. that's consistent with the results who showed how important it is. We propose that 30 km would help define the reference/control group and would be animals outside or beyond any potential influence from the mine or road. Is it too big or too small however, the bigger we make it the fewer animals will be in the reference/control group.

KP: I've looked at this data and seen the animations from GN, that's not always what happens. Jeff and Craig can clarify. Animals that come down parallel the NE shore, those one often back around and come through the AWAR and not continuing a counter clockwise circle direction that you just mentioned.

DC: When they get up in this area, some of them then decide to go up and around the top, N of this of the study area boundary, others decide to come back through. Come around the S end of Meliadine lake through this area.

RA: Can this be shared by the GN?

DH: It is shared with the KivIA. We are trying to get a format where we can put them on the registry. It should be done in the next couple of days.

KP: You talk about the treatments, it seems to be how they hit the NW, the northern end of the lake, what they do in the first days is what assign them to a treatment. The treatment that some animals are say these are not crossers, but they can very well be depending whatever route they go. They can still cross or come close to the AWAR.

DC: They would be defined based on the definition assigned in here as crossing the road or not crosser. They are not defined just because they go on the E or W side of Meliadine Lake.

KP: Wondering if we should be looking at some definition, like if they come in a certain distance of the mine or AWAR. How we define them as potential crossers or not.

JT: It also depends on the lake ice conditions. Whether they are going to cross a certain way depend on if there is an opening in the lake. Sometimes, they will cross along the Meliadine area from the N side or the S side but it depends of the years.

DC: We explicitly didn't propose what is a deflector, what is parallel. We need those definition from the factors.

MB: We have proposed a definition of what we think caribou that we call 'the interactors' could be, but if we want to adjust that based on this discussion from the TAG, we can. We recognize there are lot of different ways how caribou can interact. We want to capture the best way possible in the treatment groups.

KP: You talk about paralleling and I think it's a question of scale. Animals that come down the northeast side of Meliadine Lake aren't really paralleling in the sense as paralleling the road. There is still 15 to 30 km out. They are nowhere near the road to parallel.

DC: The definition of paralleling has to be decided by the TAG.

SA: In respect of the 30 km buffer, if you're using this to define control vs treatment, the buffer you got is a radius around the mine site not the road itself. We should be using a buffer contoured around all those sites. Otherwise, the buffer is not 30 km in some parts of the road. The other thing is whether 30 km is too much or too little. One thing to consider is what the available studies show about potential distance over which the project affects movements. In a different time of year, spring migration, John Boulanger got up to 17 km. I'm wondering if 30 km might be too big and capturing a lot of animals that could potentially be control.

KP: Partly, it's the importance of capturing in the 30 km, in the captured the calving and post-calving is the N end of Meliadine Lake which seems to be important.

DC: Why don't we just make sure the buffer includes the N end of Meliadine Lake

KP: So we're looking at a long oval, not a circle.

MT: Would you be suggesting, maybe 17 km? 20 km?

SA: 20 km.

DC: it was measured at 16.8 km.

MB: I just want to repeat back some of the decisions. We use this map as an illustration. It really helps to see the caribou movements through time. The red circle is based on one point and the plan is to do a buffer that includes the AWAR. The buffers will look like an oblong shape that include the mine and AWAR footprint. Then there is discussion based on where we expect interactors or at least the distance we expect caribou to be influenced by the mine and AWAR. We are considering dropping that from 30 to 20?

MT: Yes, perfect.

(Resumes presentation)

KP: Early and late as late June, first days of July vs mid-July?

DC: Versus end of it. There is 2 times when they come through. Part of movement is perhaps seasonality.

KP: Is there 2 main pulses crossing the AWAR in different directions? Or is it one pulse that is spread?

RM: From what I experienced and see, they go down towards Chester, but on their way back some go up and some go back to the AWAR. It can be 10 days, 2 weeks after they passed by, it seems they are gone but then they come back again.

KP: It might be 2 main pulses.

RM: Not every year but yes, it does happen.

DC: It's going to depend on the timing of those pulses whether or not they are captured by the study area.

KP: But that's only part of the study area, the rest is the oval. Any animals that come within 20 km of the infrastructure is going to get captured regardless of the calving season.

JT: What we noticed before too is that like a couple years ago, there was 2 different groups. One was near …, and the other one was near Meliadine and one of the groups near the peninsula was going north. They noticed caribou going southward. It depends.

RM: A lot of the unknowns are due to weather factors, ice conditions. Like if we have a lot of north winds, we can see less caribou. If we have a lot of south winds, we can see more.

KP: But the analysis is going to be done on an annual basis with independent variables.

DC: We haven't got into that. We agree there is potential for seasonality, we should include that.

EE: One groups can tell another group the way to go.

KP: The one group could change direction once it meets the other group.

EE: Yes, one group will tell the other group even though they are far. One group will be going that way, and this group will walk this way to go another way. Like Jeff was saying there were 2 groups. In Baker Lake area there would be 3 groups. When they see they change direction. This group will communicate which way they are going to go. But this one will lead. Then they will gather and then they will move.

RA: Thanks for sharing Eva, please cut in if you have any more input.

DCh: You're saying that if there are 3 groups in an area, there might be one that is the dominant group that will determine where they all head to? They may communicate by a couple of single individuals and then eventually the one group that is making the decision to go in a different direction, the other groups will follow because they are more of a dominant group? Maybe more experienced caribou in that group?

EE: Yes.

RM: it's called the First Group, we can translate back and forth in English and Inuktitut, like if I'm saying (Inuktitut), it means the first group you have to let them alone, let them pass and do their thing. You can translate it in words, but in Inuktitut it's heard and felt. There's another saying too (Inuktitut), there's nothing you can do. It's just the way, what can you do.

DCh: I was also sensing, letting them do what they do, that's sometimes what is often referred as leader groups. The first group to get into an area and go in a certain direction. They are usually the

one to let them do what they want to do because maybe other groups are going to follow their lead. Is that it?

RM: Yes

JT: I heard that caribou sense with their hoof. They are using hoof to follow groups.

DCh: I also wonder if it's the sensing bones on their ankles, I'm wondering how far away other group can hear that movement and possibly tying to that indicating the direction to go. Did you notice that?

EE: The other groups know where they are. They recognize. The group communicates.

KP/DCh: There is 2 waves, 2 seasons (post-calving and summer), does it matter when in the summer they come through from the analysis perspective whether they are from E to W, W to E, a week or 2 later, it will be considered as interaction in the summer season.

DC: It will be considered as summer season. I want to make sure we capture the 2 periods, the early when animals are moving towards the coast.

KP: Up until a year ago that was outside of the 3 weeks post-calving period. It depends on how you want to define summer and the end of it. That's why I was asking about how you want to measure the post-calving period; 2 weeks after the last one which is into July. You want to call that post-calving or summer or period? If you're saying period, you're making an arbitrary assumption on animals coming through each year at some point. Then, 2 weeks later, other animals coming through. I agree that 3 weeks post-calving peak, the way I would define it, is important because the animals are very vulnerable and they are not a lot of grasses, they are lactating, they are small, they are moving OK. After that, some people define post-calving. GN has done this before too. It goes well into July, but it's kind of semantics in some respect. It calls the rest the season. Regardless of when they come through on their phases or herds it doesn't really matter from an analysis perspective, it's just 2 different groups of animals.

DC: For a period of post-calving defined, everything else is another season and we can have an end date.

KP: I don't see the point of trying to split up phases or portions of the summer, it just waters down the analysis.

DCh: Over the season the weather can be different in each year, so we had that as a variable?

KP: It is captured as a covariate.

DC: It sounds like you don't want season, you just want a single period in time, but with covariates.

SA: Scanning the animations that GN did for two seasons. GN had defined June 23rd to July 3rd as post-calving, and the summer is July 4th – August 22nd which seems to catch most of the data.

KP: Talking to Jeff over the last 5-6 years, I know recently they are starting to come early but until last year, you didn't normally see that until July 5-10 which is what most of us could call the summer season. Now, you got animals calving further north on the range, moving in faster, so some of that front end is that post 3 weeks period. You could split it out but then you're just drawing a line on a time zone. Suddenly, the next day they are in summer. I don't see the point of that. You want to keep in mind the 3 weeks period because that's when the calves are most vulnerable. How that would affect analysis I'm not sure.

SA: You can see from the maps between 2015 and 2018, the main interactions were in the summer period, then suddenly 2019 it's post-calving. Recently the interactions are earlier, June 22nd.

MB: Actually, my preference would have been to keep it all as one time period as well, so if that's the consensus, where we include weather and temporal covariates, to help understand how things fluctuate over the season, that would be ideal. That would help increase our sample sizes within the treatment groups rather than split it up.

KP: What about covariate of age of calves? Then you're able to capture days since calving perhaps.

MB: Are you thinking about it from a movement perspective where a cow would be limited in her ability to move in a certain way with a young calf vs older?

KP: No, more just the age of the calves, maybe in the first 3 weeks. This is why I wrote 1-2 weeks.

AG: The calves are mobile, they can keep up with the cows. The problem is they run out of energy and have to rest and that stops the cows from moving. So that's why age is important because the calf can't move at the same rate as the cow. The cow will have to stop and forage. If you have it as a variable, the season, early July vs later in July, you'll capture those variables. The reason we mentioned age of the calf is it's a different consideration from interruptions to the cow is foraging. You have to keep those separate, but they would be covered by season as a variable.

MB: I think that would be reasonable to include a temporal variable of age.

DC: The only constraint that comes to mind is that not all collared caribou would be predicted to have a calf. You have to make an assumption about age to apply to those individuals.

KP: Typically, 85% of the collared cows would have a calf to start. Few are going to lose them.

DCh: The original database doesn't indicate age of the cow that was captured?

KP: The are all adult cows, all could potentially breed.

DC: Just with use the seasonality, it will eliminate that constraint. Again, it's the first 3 weeks that are the main constraint on the cow's movement, it just means that some variation is due to calves.

KP: Could eliminate constraint if your analysis is assuming calving for some. Most animals up there are going to be calving. Some of the no-breeders will be delayed, getting to the calving ground and even catching up, but if you are assuming calving you can't assume they will lose their calves after 4 days.

DC: The calving models predict calf mortality.

AG: When you look at the foraging behaviour, they are foraging in groups. The non-pregnant cows, which are easy to identify because you have the calving movement rate, they tend to forage in the same groups as the cows that have a calf, and such being group dynamics. By 3 weeks, there will be not that much difference between the foraging time and therefore the movements between the cows that did and didn't have calves.

MB: We would use the scientific method mentioned by Dan to predict a calving event. That can also be used to predict within that sensitive period when the cow is foraging differently and moving, taking breaks more often because of the calf. You can tell, all of a sudden, changes due to the death of a calf. You can determine whether the females lost her calf. Then, at about 3 weeks, the cow no longer needs to take as many breaks because the calf is up to speed and able to move for longer periods. The covariate just becomes null or void at that point because at that point as the cow moves as usual with their calf.

DCh: Determining the calving date is about the cow not moving a great distance over a series of fixed intervals. If you're having long fixed intervals, you can't do that as precisely as you would do with shorter fixed intervals.

AG: The experience with this herds is that even if you're measuring daily rates of movement, you can detect when a cow drops below the 5 km/day threshold and assume the beginning of the calving period.

MB: If it's on a day period like 5 km/day, if we had 3 fix a day, then can we estimate calving plus or minus a day.

KP: Yes, you won't have any problem doing that.

DCh: I'd like to know what those fix intervals are for that particular database.

MB: Agreed, that will help us know whether we can expect some difficulties or accurately estimate parturition.

SA: With the way the study area is defined we have the mine, the AWAR, and Rankin Inlet in the study area, we are looking at combined influence and infrastructures. Is there a way to exclude data that would be more influenced by Rankin Inlet? Modify the study area to try to focus on the mine and the road.

DC: We might not actually be able of doing that because, for example, if caribou were responding to Rankin Inlet at 30 km then some of the animals within our study area are under their influence. I don't know exactly how to set that out. We just need to acknowledge that it is a contributing factor.

KP: Related to that, what about hunting?

DC: It is a covariate presented in the next slides.

(Resumes presentation – Slide 6)

AG: Question about the segmented regression. I'm not sure that it's correct that it assumes the dominant direction of the caribou movement is perpendicular to the road. I understood that it was to an extent based on the rate of movement. And that it's very sensitive to, not the direction, but to the duration, the time that the caribou were in the vicinity of the road rather than being tied to the direction. Can you explain?

DC: It's a measurement of the change in distance of each of the consecutive locations to the anthropogenic disturbance, and so just what I mentioned, is that that might create that response variable. For those animals that are moving along Meliadine Lake, which is kind of somewhat parallel to the mine and the top part of the AWAR. They may or may not be responding to the development. But that regression approach is going to be predicting and saying that it could be associated with those because that's what it's designed to do. Does that make sense?

AG: Possibly. I suspect that it would be wise to use the segmented regression and then we talk about the result, because I don't think your comment about the dominant direction being perpendicular is a weakness of the method. The key thing we need to talk about for all 3 methods is sample size, presumably the individual caribou, but how do these 3 methods accommodate when the caribou are travelling in groups together, influencing each other behaviour. How do you accommodate that to include proximity as a variable or other ways of dealing with sample size.

MB: With the delta D approach, it seems like, we are stuck if we are about using that approach. The steps would be in relation to the mine because that is how the delta D is calculated. It provides a little less flexibility to test movement, different phenomena of movement, and habitat selection. It is difficult to set them apart from the mine because that is how that delta D is defined. Whereas I think we can do a lot of the same things and ask a lot of the same questions with the step selection analysis. It gives us a bit of flexibility in that we can ask these questions related to distance from mine and difference in movement and habitat selection in relation to the mine and AWAR. Also, we

can test these phenomena in the absence of the mine and AWAR. We can, you know, ignore those covariates. The contrast of those tests will be important to understand what's going on.

AG: I think that makes a lot more sense than the way the drawbacks were explained including the other variables such as how you define the habitat variables. I'd agree with that.

MB: We can do the same things and ask similar questions as the Delta D approach. But the iSSA gives us flexibility in what we can test. We don't have to test mine or AWAR if we just want to look at movement as a function of habitat selection. In certain models, we allow that to happen. In other models, we do test mine and AWAR influence. The contrast in those results can tell us something.

AG: How does group behavior reduce functional sample size and how you accommodate it?

MB: We were proposing to do the caribou year as the sampling unit, and we would model each caribou year individually and then come up with a population level model for the treatment group if sufficient caribou years are available in the treatment group. That population level model would account for the results of all those individual caribou year models. We did have some discussion about how to incorporate group and some of the discussions about that there are leaders within a group and there are followers. On top of that, one group may influence another group. That does become very complex to represent with math, into a model. How do we represent what we're seeing on the ground in a model. No matter what, the collared Caribou are a subsample of the entire herd and all the caribou out there. There are many caribou in relation to how many are collared. Part of the key piece here is no matter what, even if we were to try and define groups with the collar data, we may still be missing other groups. We erred on the side of putting forward individual models with every individual caribou year that we have in the collar data because we still recognize that will be a big sum. It will be a subsample of what's going on on the ground within the population and the herds.

AG: Yes, that makes sense, but I'm not sure how much of a solution it is. The thing to do is to see preliminary analysis and then we'd have a basis for some of these discussions.

MB: If we were to go down the route of defining a group or defining leaders within a group, how do we define that concisely and sort of so that it applies in in all cases. How do we define that with the telemetry data that we have? And if we do come up with some sort of definition of what a group of caribou is based on, what we can glean from the telemetry data, whether it's proximity and you know, spatial location at certain times? Is that going to be a robust way to define a group? And can it apply in all cases? And that's I guess my bigger concern is that I'm not certain we can do that, so maybe if there's ideas on how we could do that, we could discuss that too.

AG: A starting point would be the proximity of the individual collars to each other. Something similar to nearest neighbor because that increases the likelihood that the caribou are influencing each other. The big problem with identifying leadership is that leadership is not a fixed thing. It changes over time, even within hours or days for a group. There are no cows who are automatically leaders. It depends on the situation. Defining leadership is tricky. Defining groups is probably easier. A starting point would be proximity of the collars that are close together in time and space.

MB: I agree to an extent. What about all of the individuals that aren't collared and how did they get divided into these so-called groups that we may be able to define. We could use proximity of collars and collared caribou in space and time to understand whether we apply some threshold. If they are physically this close to each other on the landscape, it's likely they are in the same group. Therefore, we maybe drop one of those individuals from analysis to avoid replicating multiple individuals within a group. Are our groups easy to define? Do we have distances? Is this something that ebbs and flows? Do groups change? Can they get bigger/smaller? Do individuals break off?

AG: It is important to realize that groups are flexible. They are constantly coming together, separating, depending on the situation. Define a group can be hard. The representation of the collars with the other caribou is equally hard to work with. Proximity of collars to each other is relatively easy to measure.

KP: Anne, how would you deal with animals that are within 2, 3, 4 km of each other? And then they're not and then they are? How do you deal with that from the sample size and inclusion point of view? Just seems complex.

AG: It is complex. You can't deal with the uncollared caribou in an analysis like this, unless you make rules like you assume that there are caribou within the vicinity. The only way to approach it would be when the Caribou are in the vicinity of the AWAR or the mine site that are being monitored. You have independent data on the representation of the collars, of other uncollared caribou. You have the daily road surveys, the cameras, the behavioral survey. You could take a subset. It has the problem that it's within a kilometer of the road or the mine site. You do have some independent data that you can look at the representation of the collars. I can't think how it would fit in this analysis.

KP: I didn't mean about uncollared animals. If you had adjacent collared animals that were close together then they weren't, then they were. How would you deal with that. Uncollared animals is different game, which gets even more complex even the collared ones.

AG: The integrated steps selection analysis is that. It depends on the time scale, but if you can measure the proximity. How it changes during and depending on the duty cycle. You do know how sensitive that would be as a variable and what time scale you would use it at. I think that would answer your question, Kim.

KP: From the Qamanirjuaq analysis we did for the draft Nunavut land use plan for KivIA, these collars are on 4 hr fix rate. That's six locations a day. I don't know about geofencing because none of our analysis was dealing with May and June and only after 2021. We didn't have any caribou that came close to the Meliadine mine within 30 km in the analysis we did, but outside of any geofence that's a 4-hr fix rate.

MB: What is the danger of including every individual collar that we have? How does this bias their results? How do we contextualize that in terms of how we go forward? If the decision of including individuals maybe just biases the results in a predictable fashion and we can contextualize that in with our results, it may be the simplest path forward. We also have to think about not so much the method to finding groups, but also what the risk of not doing it is.

DCh: I am concerned about taking data away from the analysis. The collared caribou database is a subset of the entire herd. How representative is it? We should recognize that there are going to be limitations to the analysis. I would keep as much data as possible. Looking at some of the information that Anne has mentioned when getting closer to the mine and to the AWAR, there might be a need to look at this. Maybe some sort of a sensitivity analysis. I'm concerned about getting rid of data more than I am about some of the limitations that might be understood to be the case, because it is a subset of the entire population.

MB: It does not make sense to drop out individuals from a population that is already a subset. However, I'm not against the idea of making groups. What I could see happening is if we keep individuals and we recognize that individuals may be making choices related to crossing, deflecting or other movement paths or behaviors are, we recognize that it may be as a function of what the group is doing and not so much an individual choice. Does that matter? There are still 3 or 4 caribou being influenced in a certain way in relation to the mine and AWAR. It will trickle through in the results. If you have a big group of caribou acting a certain way based on the leaders of that group,

the leaders are still influencing a big group. I don't know if it's bad to have the pseudo replication of followers within a group.

EE: You have collared map of the herds? Does HTO office have map?

BP/BH: We can get her biologist and get maps like this. We can't know from which herd the collared is coming from, but we are working to make sure that all herds are collared. The Baker Lake HTO is on the mailing list to get these maps.

BD: Regarding the collared caribou, you need to monitor collared caribou. How healthy are they? How long they have the collar? How do you monitor the caribou?

BP: The collars are on for 2 years. When they are installing the collars, it's done with a net system. They are conducting assessment to ensure it's healthy enough for a collar and it is done at that time. The collars themselves don't provide data on the health of the animal only location.

BD: Years ago, I shot a collared caribou. The collar was heavy and going back and forth. All the skin there was bare. The caribou was just bone. That's the reason why I ask if you monitor the collared caribou. You don't monitor the health of the caribou that have the collar.

BP: Those collars are an older version, the newer ones are much smaller, much less invasive. It is difficult to get information on health. I don't think there is any collar that could provide that. You will have to track down the animals, captures and do an assessment. The procedure is quite invasive. We want to avoid doing any encountering with animals as possible.

DCh: Brad, do you fly fixed wing surveys during the period when the collar is on the caribou just to determine if the caribou is alive or any other observations.

BP: For the Kivalliq, there is no fly fixed wing. I don't think so. Baffin is done with helicopter surveys. If the animal dies, we are going to see it stopped. If a collar does stop moving for a certain amount of time, then we can go and pick it up.

(Discussion about collar shape, use, methods, time of installing collar)

BP: Trying to minimize that (number of collared caribou) as much as possible, minimum number of animals to get adequate data for mitigation and monitoring purposes.

RA: The collared caribou information is useful.

Slide 6 – Modelling Approach

DC: Agreement to use the iSSA method?

(General sounds of agreement)

Slide 7 – Population Level Estimates

CD-D: It could be over a period of 1.5 to 2 years, so data in that big database is considered one of them.

DC: An example might be in the Caribou was collared in 2012 and 2013. We would treat and code the animal on each of those years, so that's unique individual by each year.

MB: If a caribou acts one way in one year, like it goes to the east of the Meliadine Lake and then the next year it goes to the west, it allows us to put each of those years into a different treatment group and understands that caribou could behave differently over different years.

CD-D: Just to back up with the 3 different analyses you were looking at, the delta, the Brownian, and the iSSA. I like this iSSA because it incorporates selection and movement.

Slide 8 – Covariates – Movement Metrics

DC: Need two definitions from the TAG – deflection step, and parallel step.

SA: Suggestions for deflection vs parallel step. John Boulanger defined and distinguished the 2. They limited these covariates to locations within 5 km of the roads. These behaviors are expected when animals move close to the road. Deflection would be animals that came within 5 km and failed to cross. Paralleling would be animals that came within 5 km and crossed at some point, but their trajectory changed to parallel the road and eventually cross. And if they didn't, they were deflectors. Deflectors never cross. Parallel are the ones that eventually cross but for a period they will move parallel the road. In term of parallel, how do you define that. I would suggest the angle of movement which is the difference between the angle of the step and versus the predominant angle of the infrastructure over the same step is less than 10 degrees. Something like that.

MT: We'll have covariance on the topography change that could explain why.

DC: Yes, we still need what would qualify as deflection or not.

MB: For clarification, within a 5 km distance of infrastructure the step is either a deflection with no crossing event or the step is paralleling. Would there still be a subset that we would further define as paralleling?

DCh: In the paralleling I would be interested in determining the length of time that they are not crossing. They may approach, we look at their movements, we define them as paralleling, and they eventual cross. I think it can be a short time period or a longer time period. That is a factor that may need to be measured in relation to the AWAR or mine.

MB: From that definition, the actual act of crossing whether or not the step was a crossing step would only be within the paralleling group will be nested in the parallel group. Am I understanding that correctly?

KP: No, an animal could come up to the AWAR and just go straight across. That's not a paralleling step, that's just a crossing.

MB: OK. And that's kind of what I would expect as well. So then to me that means there has to be some definition of the animal movement trajectory in relation to infrastructure before the crossing step or after the crossing step that defines a parallel step. Is that correct?

KP: Yes. That's the problem with dealing with one step at a time in isolation.

MB: The road crossing step would be in isolation, whether or not that step crossed or not. A caribou could in theory go back and forth. And they could have a one for crossing every day for a week if they decided to go back and forth like that. However, the paralleling and deflection, it is entirely possible that we define those based on a portion of steps or a portion of days prior. We could apply thresholds that say if behavior looks like this, for a certain amount of time in a certain space, that's paralleling or deflection. We don't have to make every one of these contingent on just the step itself. And then we could apply paralleling to a whole slew of steps.

KP: Yes, I like that.

SA: With this analysis there are 2 effects that we are interested in; One is whether animals cross or not, and the other is if they do cross how long do they take the cross. Is there a delay?

MB: Yes.

SA: So how do we capture those 2 effects with these variables. Deflection should be, do they cross or not? Once they approached within a certain distance, do they cross? And if they don't, that's deflect? If they are not classified as deflected animals, it might be a temporal variable that looks at how much time they spend within that 5 km zone before crossing or not.

BP/DH: I got clarification on the fix rate, for the collars. The way they are set up we get 6 fixes per day, every 4 hr when they are in the vicinity of the mine. The issue can sometime come when the connection to the satellite. They don't connect to the satellite at the time, those fixes can stay in the memory buffer and when they get the connection, we get all the fixes. When we get the maps, we read 4 hr, so 6 fixes per day.

CD-D: When they passed the geofence?

KP: No, it is all the time. We were analyzing pre-calving and calving movements nowhere near the mine infrastructures and we were having 6 locations a day which is a lot of data points and suggesting that Meliadine is not geofenced collars.

RM: When there is caribou around the mine, there is quite a few caribou monitors surveying the area we could use that as well for validation.

BP: The only issue with ground monitoring is the distance they can see out to. We had caribou deflecting about 3 km away from the road especially when you get the busier roads like the one at Meadowbank. The only issue having eyes on the ground is they can actively monitor to about 1.5 km on the road for proper detection abilities.

DCh: For the data that was looked at and because it is wide open country. I expect there is very few drops fixed intervals. It is minimal.

KP: The rate success is checked with the number of locations and potential number of attempts. It is extremely high with this collar. There is no bias from cover. It's good data.

DCh: For every 4 hr is great but if it was geofenced around the mine, road, you could get down to an hour within a month and really be able to analyze impacts.

KP: It is a trade off between battery life and number of the locations.

SA: Because of the step selection method relies heavily on short location as opposed to what Kim was talking about which is a limitation in term of paralleling. The sequence of steps might be parallel. Deflection is an animal that has potential to cross the road within a given step but doesn't. You could look at the movement rate of that collar prior to entering the treatment zone. You average that movement rate, 5-6 km/hr, the steps every 4 hr then you got the zone that which that animal potentially could move across that road would be 4 times the average movement rate. So instead of using a 5 km zone, because an animal could cross that in less than an hour, they are moving 10 km, you may have to define the purpose of deflection. Define a step at which the animal could theoretically cross because of the movement rate but doesn't. In term of sequence, it may be deflection, parallel, cross.

KP: It's the number of steps leading up to a step that provides the context for that step. I just actually looked at an analysis of winter road up near Ekati. They use seven steps before for speed and direction to make a call on the next step as to what changed between the 7 previous steps. And you kind of need that, if you have paralleling and you say plus or minus 10 degrees, but in one step if they go off to 12 degrees, all of a sudden it's not a parallel step but in actuality it's the whole sequence. Rather than once step at a time you need the context. It is the overall delay, not just single parallel crossing or not. It is the delay if they cross or not or didn't cross. You need the whole sequence to figure it out.

MB: If we can come up with sort of a biological example by the limitations of what one can do in a modeling frame. Let's not try to worry too much about how I code it, but what you've just described for example, like the 7 previous steps which based on a fix rate would be a time period. We would say either 7 previous steps or a time period. There are ways that I can do a moving window within the data and look at. For step 17 we're going to look at steps 9 to 16 and inform 17 and then just

keep going down the row like that. I'm hearing some good discussion from a biological standpoint, how we would define it and I think that's been valuable.

KP: To put context the 7 steps that I quoted was from a study that was using geofence collars with 1 hr fix rate. The current rate will go back 1.25 day roughly. You would have to evaluate whether you want to use 7 steps in this instance or maybe 4 or 5 or one day, which would be 6.

DCh: It would make sense to have average of the direction those 6 steps of a fixed point that can be used to compare the next step down the road. The complication of the additional 6 steps, you kind of need to qualify the direction and maybe the speed with a rolling average. We are going to be looking at this over years, so you need to have it contextualized.

SA: For deflection, your definition would be that based on the previous say 4 steps, phenomenon, direction and speed of movement, the collar was within range of the road but didn't cross. That would be a deflection during that step.

MB: In a hierarchical way, how we define this. The first piece here is that these steps occur within a certain distance, and it matters that they do not cross, ultimately, within that distance, right?

SA: Let's say you looked at the previous 4 steps and you averaged movement rate, and then based on turning angle or direction, and speed, you would then be able to define steps in which a crossing was possible but did or did not occur within distance from an infrastructure.

MB: What speeds and turning angles define a deflection? Are we saying that every step that comes within a certain distance and we can assign a mean directionality and mean speed to every step based on the preceding 4 or 6 steps.

SA: 6 step is the last 24 hr. What the caribou was doing in term of speed and movement and direction in the last 24 hr.

KP: Or 12 or 18 hr, you'll have to play with that to see what makes sense.

MB: We would have turning angle threshold or speed threshold to make the decision on is this paralleling or not, is that correct? How we take those mean turning angles and mean steps and inform the overall directionality over the previous 18, 20, or 24 hr. How do we take the directionality and speed and use that to inform what a deflection and paralleling is.

KP: Ignoring paralleling for now, but what Anne and I looked at Ekati data a couple of years ago, we decided on a 60 degrees hard turn.

MB: I'm familiar with that analysis. That helps. Then a hard turn would say that the predominant angle of movement from those 24 hr. If you have multiple hard turns 1 after the other, that's what gets you an average of a hard turn right? A bunch of high turns and but that also means the caribou was just going back and forth in different directions.

SA: There is a problem with back and forth, but you can probably capture that with a filter on the turning angle. Consider continuous or consecutive turning angles.

KP: That was deflection essentially. Paralleling is the same principle, the previous 4 or 6 locations, the main directionality.

DC: The same qualifiers, but no crosses?

KP: It has to be within a certain distance of the road (5 km). At Ekati, they took the 97% percentile distance approaching and that was 5.2 km, and they only considered movements within that 5.2 km in their assessment of eventual crossing.

MG: Paralleling was really important when we were doing it step by step by step. But if we're thinking about it now as what is the pathway suggesting the caribou could deflect or cross. The paralleling does not matter anymore. So, the question is does it cross or deflect?

KP: Yes, that is a very good point. Maybe it is just the total delay time regardless if they're doing this or that and not crossing is more important than the actual description of what they're doing. That could be valid.

KP: If they go back and forth like Steven said. That's just as bad. They are still not getting across.

MT: Let's say they are just foraging; we'll see it with the covariates? That will come in later.

MB: The goal would be we can interact some of these binary variables with forage land cover. We could do it with water. We could do it with a variety of spatial covariates to try to understand if the variation whether or not paralleling occurs or whether or not deflection occurs is a function of land cover or is it a function of road or a combination of both. We'll try to get at that in the models.

DC: I'm just trying to keep track. We have deflection, paralleling and crossing.

KP: There's the time factor. Is that accounted for?

MB: If we were to define an invisible fence or invisible distance of where we start considering all of these movement behaviors, deflection, paralleling and crossing. What happens if we just calculated a time for each caribou? They will have an option of whether they crossed or not, one or zero, once they got into the zone. Then they'll have the option of, we'll just calculate how many days it took or how many hours it took from crossing the line to crossing (the road). If they do end up crossing. I haven't thought about how this all fits into the modeling structure. It is possible. It provides us a continuous variable in terms of time for each individual and like how long did it take once they got into the vicinity to cross or not and maybe just build on that if you think it's valuable.

KP: Yes, as long as time is monitored in there.

AG: The idea of time is critical and then the deflection and the paralleling and the crossing are really the mechanisms that explain the duration of the time. I think that would be great.

MB: If we're getting a longer time period between entering the area and crossing, with this we would not be able to say if it's due to deflection or paralleling. Because we wouldn't be measuring those separately. Or maybe we do this in conjunction with deflection and paralleling definition.

AG: Im not sure why you couldn't measure them. Earlier you talked about a hierarchy and a moving window. The hierarchy, the top level is the duration of time within a distance of each individual. Then you could use the moving window to pick up the mechanisms for why they were spending more or less time. Wouldn't that work?

MB: It would but then what it means is we still need to define deflection and paralleling but then we also are just accounting for time as well. I think we're on the same page. I just didn't want to pitch the time idea as a replacement for the deflection and paralleling if that's not what we wanted, because if we still didn't have a definition of paralleling or deflection, we wouldn't know what might be causing a longer time period.

AG: We need both. We need the time, and we need to figure out the deflection. Deflection and paralleling are probably not exclusive categories either. You might need to only to find one of them.

MB: We're back to needing some sort of definition. We still need to be able to determine whether the movement patterns we're seeing once that caribou gets into the vicinity, whether the movement aligns with deflection type movements or paralleling type movements. If we calculate how long it takes for the caribou from entering the vicinity to crossing, and in some cases they may not even

cross. If we were to only do that, and we don't contextualize it as whether it's deflection or paralleling, that still doesn't get us any further into understanding what that movement behavior is.

KP: Can the deflection and parallel do the same thing, like you have an animal just in a perfect sense coming in at 90 degrees to the road. If it turns a 90-degree angle and starts following the road, it's deflected by our 60 degree definition, but it's also parallel by what Steven originally proposed. So, it's the same. Aren't you assigning that animal into both deflection and paralleling. Deflection is ultimately if they, whether crossed or not? It is. OK.

MB: I was just going with Steven's first definition of deflection being cross or not.

DCh: We won't need parallel, we need deflection; crossing and not crossing.

GS: If an animal is coming along parallel to the road to begin with, and it doesn't cross, has that been a deflection? I don't want to come up with a definition that is a self-fulfilling prophecy. Are we assuming that every animal has the need to cross. The animal that doesn't cross is being deflected. Some animals probably won't.

DC: We would take in consideration the previous steps. If the animal is moving parallel before the zone then it is not qualify as deflected.

GS: Some categorical variable that saying the caribou is about to cross.

MG: Can the model have decision point? Not every step is one of the 3 categories. Based on previous steps, it become a decision point. Based on the trajectories and making a decision to go somewhere.

SA: Maybe with this paralleling, the outcome is the crossing distance and trajectory. Do they cross or not. Do you consider deflection or parallel. You make an animal with each step goes: deflect, deflect, cross / deflect, deflect, never cross…

MG: Does all steps need to be assigned one of those 3 categories? Or we need a 4th different category that is a 'non-decision' step that is just advising the decision step. You could have 7 non-decision steps based on the trajectory. The location where is going to cross or being deflected is the one step that gets assigned the category.

GS: It is more complex because you can have an animal. It comes to the road to make a decision point road then parallels. You are comparing before the decision point to every step after that. The moving frame doesn't move following the road. The decision point stops at some point.

KP: This comes back to a pathway analysis rather than a step analysis. Which Anne and I did a couple of years ago. It's a little more basic but you assign an outcome to each individual animal path, rather than the steps within it.

GS: You had categorized them by hand.

MB: Thinking about what the integrated steps selection analysis is doing and what we do with the data is that we take each point in space where the caribou is and where the caribou used. We take a distribution of that caribou year. We look at the distribution of turning angles and the distribution of step lengths that the caribou, realistically, would take just based on that individual. Then we draw from that distribution of turning angles and step lengths to randomly assign 10 available locations on the landscape. Those used points, where we know the caribou used, get contrasted with values (spatial covariates) for the available points. This is what the model is doing. We could use that structure and take advantage of what this step selection analysis does. You know the roots of what this analysis is. Think of a caribou a kilometer from the AWAR. We got this point in space. We have the steps where the caribou went. Let's say it did quote "deflect". It took a hard turn, and it moved back away from the road. For that used point where the caribou was near the road. We will have

10 points for every single use point in space. They will be linked together so those 10 points will be contingent on that used point. That's how it runs in the conditional logistic regression format. Those 10 points, what if we look at them and OK, 5 of these available steps cross the road. This becomes a bit complex, but it could work. 5 of the available steps across the road and the other 5 went with this turning angle, this turning angle, and this turning angle. They went in a similar direction as the deflection. We can take advantage of the way the iSSA works to contrast why the animal didn't cross the road. Not just pull information from the points. What if we were to contrast steps? The used vs available design pulls information at the point in space. What if we contrasted a step as being a deflection step. Like 0 for crossing, with the 5 steps that did cross as 1. If you have done iSSA, usually the key thing what we'd be doing is we'd be pulling information from the point in space. What I'm presenting here, specifically for this deflection and paralleling piece, is that we pull the information from the available step and not the endpoint. We could get somewhere with this.

AG: Not knowing that much about the analysis but the way you explained it, it sounds great.

DC: Meghan prepared some visuals about caribou crossing.

MB: (screen sharing) (explains visuals)

SA: One thing I have concern with is still trying to define the response based on a single step. Defining a deflection as a certain angle of movement when an animal makes a series of much less angled movements one after the other: moving 60 degrees in a single step or can move 20 degrees in 3 steps. We're still relying on that single step to define the behaviour of an animal. We have 3 basic outcomes that we are interested in: 1- into animals across; 2- animals that crossed but with delay; 3- they don't cross. We should be looking at the sequence of steps animal takes prior to either not crossing and leaving it returning out of a certain zone around the road or prior to crossing. You may have where you've got your available steps you may have 3 of those available steps happen to either across the road or get closer to the road to the animal currently is. Then the animal's actual step that is perhaps some of the important response.

MB: The last piece of what you were discussing about whether the available step gets, whether it crosses or whether it gets closer. That would be what the model is testing.

SA: Testing relative to the available steps. How close does the animal get to the road? We don't necessarily need to have an angle of term to define a response which is.

KP: It comes to how 2 functions of their movement, speed and turning angle. If you have a whole bunch of turning angles, your tortuosity increases which is a description of what's happening. Maybe we don't need a description, but it's important because you can have short steps in this in single direction or short steps going round and round. Breaking this down to a step-by-step process. Do previous steps inform where you are heading.

SA: Where do you draw your distributions of available steps?

KP: The step-to-step variability is probably going to be quite high even when the animals are going relatively straight, especially when they're going in circles. How do you incorporate this 4-7 previous steps to form the general direction of the animals moving into your analysis?

MB: We take 4-6 steps prior, and you could come up with the mean heading. And that would be where the caribou is moving over a span of a few days? Is that definition makes sense?

KP: Yes and adding speed. Possibly changing your speed, direction and tortuosity.

SA: That informs your available steps.

MB: Our definition of turn angle here is on a step-by-step basis. However, our definition of turn angle, steps, and the distribution that we draw from based on the means of a moving window in time.

AG: Yeah, that would make perfect sense and that would bring all the comments together as well.

MB: I agree

KP: Not only do we have a movie window that incorporates the previous 4-6 steps, but it would incorporate the next 2-3 steps because the reaction of the animal changes. Which shows a tighter angle paralleling, as opposed to Point C, which is paralleling. Do you incorporate just the next step, or do you incorporate, a moving window of the next few steps to classify the reaction.

MB: It comes down to a biological perspective. How do we want to define like an anomaly step. If we're taking a moving window from a day before and then we extend that moving window into the future. Trying to draw from just an average or a general idea of where that caribou is going over a longer time period. We're trying to understand whether a particular step or movement behaviour isn't anomaly to that overall path or movement for a day or two.

KP: Within a day at least. At least 3-5 steps. If that can be incorporated, that might work.

MB: What it ultimately does is it would be reinforming our distribution of turn angle and it would be reinforming our distribution of step length. That distribution would be smoothed. It would allow for the more predominant step lengths and more predominant turn angles at the animals usually taking over time. Your available steps and available points would just be informed by a broader time period.

KM: You don't want to over smooth the forward information.

MB: How far into the future do we go?

KP: You don't want to go too far because it'll basically like just smooth out the results. You want to be able to get a 2-4 points reaction going forward and maybe it formed by 6 points in the back end. You don't want to go too far in the forward because you will miss the resolution you may be looking for. The high tortuosity variability and step speed.

MB: Back to your comment about tortuosity, here we have a caribou that have a less tortuous path, which means in a straight line. But here, I have an individual that has a tortuous path. Then, they have a hard turn and then they go back in the same direction. Maybe they cross, maybe they go back and forth a few more times. Ultimately, the step selection analysis will take into account predominantly, when there's a deflection which there could be multiple if they have a very tortuous path, or if there is a certain movement behavior. It just takes it as sample size in terms of how many behaviors. Then, we'll try to explain that over many repetitions of that individual deflecting or paralleling. When that comes through over time, it could be forage. They are always turning on a hard turn because there is just good forage where they want to go. We have a path forward in how we are going to pull turn angles and step lengths, which will allow this heading to be a function of multiple steps like it will consider like a chunk of time and not just the one step before it. Where would we subset steps and ask whether a deflection type step is a function of certain covariates and then also do the same for paralleling.

SA: It comes to did they cross over, delayed cross over, non-cross over.

KM: It's a pathway analysis, not a step analysis.

GS: There is an underlying assumption were to cross something. So given animal point A, it's kind of going at a funny angle, like 20% chance crossing the normal, maybe 80% chance didn't cross.

DC: In the iSSA approach, there is available steps defined the likelihood that 20% cross, how long they have taken it to cross. All the information is captured. We no longer need the 5 km buffer because the available steps would tell us whether or not the move was fair to an individual.

KP: The random available steps defined, how they set out based on previous distances of steps? 95% distribution of randomness or what?

MB: We would make a distribution of turn angles and step lengths that are averaged across the moving window. I don't know if we usually set a 95%, but we could. We can cut that so that we want 3 standard deviations. We can assess that if we want to just do 95% and not get outliers with really potentially long or short steps, we could do that.

KP: Is this driven by that individual animal step or by the population step of that year?

MB: Individuals. I'm proposing a model at the individual level. We are getting the best resolution in terms of what the potential availability is for that caribou in that year.

DC: Individuals that are slower will have smaller steps and individual faster will have longer steps.

GS: Whenever we finish, I would want to have a hard thinking reverse of the definition. Review the definitions to make sure they are presupposing that they all have to cross, or that they were all going to cross.

KP: You should be able to do that with the distribution with the variables.

MB: The available point will go down onto the map no matter what. They have nothing to do with the AWAR but will interact all the available steps with the AWAR, with the infrastructure. They are not being informed at all by AWAR. We were testing where the caribou would go in on a landscape that's devoid of any input. And then we put the input into the model to try to understand why it take this step, not the other.

Slide 9 - Spatial Covariance

KP: When the road is closed, it's actually not closed?

MT: No mine traffic.

KP: There seems to be a convoy almost daily, or at least every second day on these closed roads. That's hopefully captured.

RA: There is less of an issue for Meliadine. We need to break up between Meadowbank and Meliadine. On the road, it is different situations.

DCh: Could it be low intensity driving versus higher intensity trafficking?

RA: When Meliadine is closed, it's closed. The only thing happening is environmental monitoring which is either Agnico or KivIA or HTO.

JT: It is a lot easier to monitor at Meliadine than Meadowbank.

RA: We need to break away from Meadowbank. We need to consider Meliadine.

BP/DH: We just want to confirm when you are saying closure, you include fuel truck and cruise ship.

RA: At Meliadine, yes.

DCh: Do you have road closure definition?

RA: It is defined in the TEMMP.

BP/DH: Are you closing to community traffic?

RA: No, but we are closing our gate. We can't close the road up to our gate (KM 12). The ATVs traffic would bypass.

MG: But we do have data. We do monitor traffic. We will still be advised even if there are people bypassing the gate.

JT: There has been times during migration when there was too much deflection on the migration because of like ATVs. We asked ATVs to be off the road and used other trails.

RA: HTO has not closed the road to all traffic.

AG: Just wanted to make sure that the traffic includes all vehicles, which includes ATVs.

DC: Correct

Slide 10 - Insect harassment

AG: It should have daily maximum temperature. Because caribou is quite heat sensitive. You have distance to lake, but there were probably residual snow patches that would, in hot day (above 20C), influence their behavior.

SA: You got distance to AWAR or mine site. We can't ignore the distance to Rankin. Either you include that under distance infrastructure or, you separate Rankin as a separate infrastructures. Moving away from Rankin, you would get caribou closer to AWAR or the mine. How do you deal with it? As a single covariate?

KP/DC: Or distance to community or a covariate treated as a separated model.

KP: We have road and traffic, but we have the waterline with water running through them makes noises that could be heard when caribou are closer.

JT: If caribou approach the road, they feel the vibration and could deflect them from the road. Will this be considered?

(Discussion inaudible)

EE: Are you covering the pipes?

RA: Gravel on top.

BP/DH: The GN requested it. We were worried that if the pipe was above ground, it would act as a barrier. Originally, it was going to be twins, about 48 inches off the ground.

RA: By covering the line will be easier to climb.

EE: With gravel, so the caribou can cross. If the pipe is built and the road, it will be a gap. They are going to bury the pipe.

BP/DH: It shouldn't have a gap. It will be an extension of the road. We won't see the pipe.

(Discussion inaudible about coverage of waterline)

JT: Is there will be markers between the road and the pipe?

RA/MT: Yes, markers every 150 m

JT: What type?

RA: Like a post for snowmobile and ATVs. Small signs with the indication of 'Caution high pressure pipe'.

DCh: Like a T-post? What will be the height of those signs?

MT: Yes, like a T-post, I don't know the height like but it's not moving.

DCh: For the little signs on the T-post, their orientation is critical. Over time, just the variation of movement in the rock and they start wobbling. It could spook the caribou. More details will be appreciated.

SA: About grouping based on whether they come down W or E side of the project. I'm looking at these animations and I see that the animals that go down the E side of the project, many of them do interact and they cross the road and the mine side. They do it in the summer or later on. If you look through the animations, it happens consistently.

MB: We want to keep this as 1 season with temporal covariates to account for how caribou might act differently. Is it more an issue in the language we use to describe the treatment groups whether it might be more appropriate to open up that group of AWAR and mine interactors. Instead of breaking it by interactors and non-interactors, maybe we just include whether or not they initially chose to go to the W or the E. The reason we've designed the treatment groups is to ask questions about whether the caribou does choose to go to the E or W. Do they interact with the AWAR and mine differently than a caribou that doesn't. It could be a contrast to make when we apply the candidate sets for the different treatment groups. Is it a fundamental thing that we need to change or is it we should do a better job of naming the treatment groups to reflect what's going on?

KP: The animals to the E of Meliadine Lake are assigned does not interact with (the mine and the road). What I've seen from similar animations and collar data that allow them do interact. If you want to keep this interactor or non-interactors classes treatments, is there any way you can assign it on an individual basis where an animal, picking an arbitrary distance from the road or the mine. Then they are assigned to the non or the interactors group, regardless of which side is coming from. Is that possible in your analysis?

MB: I think it is important because the design of the treatment groups was such that we were hoping to test in the interactions and how the mine and AWAR influence movement. For the caribou that are interacting with the mine, however we decide that and the others that are within a vicinity but may not be 'interacting with the mine'. This is the driving force behind what defines our treatment groups and if we need to tweak the definition of what defines an interactor.

KP: If you were grouping them based on which side of the point of the lake they came down, we're going to be blending animals that are that have the potential, do compose with the mine, or those that don't even bother. It would water down the analysis.

MB: Defining those treatment groups based on how we expect the caribou to be influenced and/or react to the mine, I think that's ultimately the important thing here because we have to remember that once we fit individual models to each caribou year, we are going to be putting them together in a way to average a population level model per treatment group. So having really strongly defined treatment groups will be important.

DC: You can also come within that 20 km buffer.

KP: Most animals either side of the lake to come down, they will be within the 20 km buffer. Is that what you're saying? In 20 km possibly they are an interactor.

DC: The 20 kilometers was that definition.

GS: When we were initially talking about this task, the whole idea was to look at caribou movement at a bigger scale because the scale that we've been talking about until now has been like the 2 days as they're coming up the road is and what they do. We know that caribou move at a much bigger scale, so they do loops or go all out to the coast, or all go W. So, are the ones that are going towards the road doing something similar to caribou that are really far away, like 20 or 30 km, like all going

W together. Is there are these guys doing something sort of macro scale different than these ones over here at the same time? It doesn't really matter what it means, one that come around the lake crossing later.

KP: that is a bigger scale question. Is this analysis set up to examine that kind of question?

GS: Why all the caribou go E.

DCh: E or W, is not really something we're worried about. It's more about defining area that puts them in a category of potentially impacted versus potentially not impacted.

DC: The control group gives us an idea of what they're doing in the absence of the mines. They're making decisions in the tundra, and they don't like lakes. That means that we get to look at whether that's different or something kind of global change. Just that one day interaction with me can make changes.

RM: I think there's too many variables unless you're there to see it.

SA: Are we having a control group, the potential to interact vs a group there was no potential to interact regardless of what they come W or E. And then within that potential interact group, you've got open or closed operation.

DC: We need to tweak that definition so that they can concludes the ones that come across later.

KP: Why is the timing of when they come across important? Because if they ultimately come into the area at any time regardless of which side of the lake they come down, shouldn't they be captured as the potentially interactors?

DC: The ones that do interact with road are easy to define. The ones that are coming on the fridge don't.

KP: That's why I'm just throwing out some arbitrary distance. 20 km has a study area. 20 km as trigger for interaction or not, or potential interaction or not, seems a bit wide to me.

SA: I suggested it because of what we already have at Meadowbank indicating that movements, at 17 km, have detectable effects.

MB: Can we look on that map and think about where around the coast of the Meliadine lake at what point would we expect there to be an influence of the mine? And then maybe we just draw that buffer backwards?

JT: Like what Raymond said, the best way to solve your question is to see it for yourself. You can see what impact them, whether it's road, whether it's harvesters, whether it's the mosquitoes, whether it's windy, which direction the wind is going. All that when you're there. All those variables, they affected to which direction the caribou will go.

RM: A couple of years ago, the migration was done for 2 weeks and then another group of 40-50 thousand when by. Those ones were not collared. There's a handful that were collared compared to what all there. I have a difficult time to choose what method to go with just few collars. But if you're not there to see it, you might see the one collared and then there's like how many hundred over there? Looking at it on the computer and numbers is completely different from seeing it being on the road like Agnico have seen it.

DCh: Can the caribou observations being done on behavior study could eventually supplement and support this analysis. Certain type of caribou behavior that could end up helping us understand a bit more about this computer simulation. Seeing with your own eyes as another way of doing. In this case, we might need to develop a computer simulation and validate with human will help them refine it better.

JT: The next TAG meeting is during the caribou with migration, we go out?

RA: It is why we are planning for the end of June. We will probably see some animal around at the beginning of the season. See the monitoring being done without feeling the overall impact of the actual migration.

JT: It is still cool in June but July gets very warm. It's a different risk to doing it.

RA: It's a logistic risk. We will be seeing animal; the collars are entering the radius. You would see some reactions. We would be there doing boots on the ground. That was the rationale.

MG: Start is hard to predict, but it's important that we do get the TAG there this year. At the same time, when every year, ERM are around does behavioural surveys on the ground, Nina is there with the counterpart for the full migration.

RA: We will see what is on this reports and study designs. The TAG will see how things are being done, be discussing road height, slopes, etc. What makes sense or not. Understand why it is been done.

MG: We do have a lot more monitoring than just the collars. The collars are supplemental. It all comes together.

MB: We wanted to do it the front end so that we could get some feedbacks for the management and adjust.

MG: To circle back into your question, it was in 2017 that the traffic started to ramp up.

MB: When we developed the variables for mine, AWAR and potentially Rankin Inlet like a distance to variable. We can make that variable like the effects of the infrastructure drop off after a certain distance so that it doesn't go on for 20 km if we think that it's biologically relevant for it to drop off. So that's another way, aside from sample size issues, if we include all caribou years within 20 km, that's not to say that we'll be applying distance to mine as a very important variable at 20 km. By then, the effect of mine would have dropped off and we can simulate that in our variable.

KP: And so then what you're suggesting is we might have individual caribou that are in both groups, treatment and control.

MB: I would break their movements into each group, though I would not duplicate any since it would be exclusive.

DC: If the location is outside 20 km, then any of those individuals locations that are outside of 20 km are considered control, any other within, are consider treatment.

MB: When it comes to these decisions based on a distance, they do become somewhat arbitrary where we're just putting a number in where we break the data. It's usually just our best guess, but we are not always going to know exactly where caribou don't see an effect. And I think that where that will come will be in response in the modelling, how the model results come out and how does distance to mine influence movement at different distances? I don't see an issue with using the 20 km and tweaking the treatment groups. It's mainly the sample size. Will we have a big enough control sample size and how far away does the control group end?

SA: What about starting with the slightly smaller area, 15 km? Because you get towards the outer edges of 20 km where the influence of the mine is going to be more into a control group. Relative to control, we want to select stronger interactors for the treatment.

DC: Fact is there it's because it's a stronger fact. I suggest move on to this is that because I think we made a decision.

KP: At least collars are really good. The fixed rate success is extremely high. But, if you miss the location, and it was an 8-hr fix rate instead of a 4 hr, you're not taking velocity or speed into account because you are just using length.

MB: In this case we'll be removing outliers. There is usually sort of just standard cleaning steps that would go into doing the iSSA because they are either an error and not representative. Step length is measured in distance, like meters or km. It's sort of indicates speed how we look at it in in terms of the results.

KP: Because all the variables in that list wouldn't matter if there was a miss location except for step length. What you could do is just any thing where let's say the distance between from the previous location was eight hours or more, just drop that step length in the analysis.

MB: What I'd want to do is look at the fix success for different caribou years and make the assessment whether that needs to happen based on the like the fix access for that individual or for the group. But assuming they had good success, this may not be a big issue.

KP: It's not huge, but it means that every location will give you twice the speed.

MB: And this thing goes into the model directly as step length, not speed but I was just sort of providing to trying to provide context as to why we would interact step length with harassment and not anything else. And it's we would just expect the caribou to be taking longer steps between fix telemetry locations if they're getting harassed.

KP: The data are good in general.

SA: What about Rankin Inlet influence?

MB: So, I would want to create a variable for each for all infrastructure together and then potentially break out like the mine versus AWAR versus Rankin Inlet. And we could try to test those in the model. The other option, we just remove individuals or movements close to Rankin Inlet that's less desirable. I just think we'll have to try and get at it via the covariance and acknowledge that it's not always possible to tease out the individual contribution of the mind versus the AWAR versus Rankin Inlet.

Slide – Zone of Influences (ZOI)

KP: I have no idea where 18 km came from. The latest analysis we did with John Boulanger concluded that: 1- the ZOI are variable over year, but the average distance from the analysis that he did based on collar data as opposed to the aerial surveys back in our 2011 paper came in about 6-7 km. If we're looking at this ZOI, these 6 km breaks are too crude to accurately detect an annual ZOI. 2- the analysis we did was on summer and early fall range for the Bathurst herd. It wasn't during a period when there were massive movements. Here you have animals moving at a rapid pace on their post-calving migrations or early summer in summer migrations or movements. The numbers that we came up with John may be quite different than what you're seeing here. I struggled applying ZOI to rapidly moving group of caribou.

DC: How about 1 to 10.

KP: Our old original one was 11km based on the poor collar data and 14 based on good survey data. I would assume it would be a lot smaller than 15-18.

MB: We could do 1-2 km increments. We will have a base model and then we'll just apply an interaction term with the 6 km breakpoint for step length and turn angle and then we would have this same model, but we would just apply it for the next breakpoint, for the 7 km. You'd expect those models anyways would come up near the top as doing the best job at explaining variation if there

is a ZOI and if not, we may not see any trend in the model section table. If we need to select break points at a 1-2 km increment to get that resolution, I think that should be fine.

KP: I would use 1 km.

MB: It will be important to acknowledge that this way of testing a ZOI in a period of high movement and very directional movement.

KP: I'm hoping the ZOI analysis doesn't take away the timing or speed and we get to look at the movement analysis.

MB: This analysis is a side candidate set that we apply at the very end of the movement piece. Ultimately, we will be looking at how movement and habitat selection parameters vary within and further than a break point. I'd like to have a very good understanding of what movement looks like before I even apply these break points.

KP: The 120 fixes, they don't have to be within any specific distance? That's just, the animal has to have 120 fixes and neither the collar nor the animal die.

MB: I would want about 3 weeks of information while the caribou fell within the treatment group. So then because the treatment groups are partially informed by distance. If a caribou in year 2019 was part of the control group for only a week and then entered into the other group, then that would get eliminated from the control group based on duration of monitoring within that treatment group.

KP: Are you not limiting an animal that it does come through and get closer across the road? It doesn't matter if it takes 2 days or 20, it's still gets included.

MB: What are we considering for an individual to be something we want to model and represent the population?

KP: Any animal that comes through and approaches. However, you want to define approaches, or gets within whatever distance you want, and either crosses or doesn't cross. That should get included in your treatment. You need enough animal for the collar control. Any animal that comes within the buffer and gets close should be included regardless how many days it spends in there.

(Discussion inaudible)

KP: Anne suggested for growing degree days.

DC: So that's again this issue of one value per day or seasonal range. Seasonal range might overlap our range because they don't update them.

KP: Ok you can take this up with Anne if you want to see if that will fit.

End.

4. **Baker HTO, Sayisi Dene, Northlands Denesuline – Items of interest**

Supplemental material: None

Presenters: Eva Elytook, Dan Chranowski

RA: This is a chance for everyone to speak what's on their mind, the local communities, just want to get that perspective. We just want to make sure that within the TAG that we give a chance to people to speak of the subject that they want to speak of. There's no set time. There's no set topics.

EE: Eva Elytook, Baker Lake HTO. I'm thankful to be present. Seasonal caribou migration time, spring migration is in July according to knowledge. Spring migration, summertime, so herds coming in the spring migration they don't follow the weather, they only want to reach their destination. Few

caribou will follow weather, run away from the bugs, but major ones, they don't follow the group, they don't, they want to reach their destination. They won't stop and follow their wit. To reach their destination. There is 50 thousand follow their wit until their destination. The only thing that bothers caribou is blackfly. Those, they will run away from those, and they follow the wind. I don't know the coast area, but in October, they will walk everywhere. Sharp turn, my late husband used to say, there is something else there could be grizzly bear, wolf, something. They wait to see which way they are going to go. Caribou walking back and forth. They see tracks going this way and this way. Other caribou will follow the tracks.

RA: Thanks, Eva, for sharing. Dan?

DCh: As Benji was saying there was a death in the community, he's making arrangements, so he should be back tomorrow with Goeff. He asked questions about the analysis. What does it mean and where is it going? He wanted to know whether there would be any way of tracking the time. The Dene people are concerned about whether the caribou get in Manitoba for the winter. Is there a way we can start tracking that date? When 50 or more started arriving with the information that is provided with the collar data. Will that affect their arrival date in Manitoba? When do caribou arrive in Manitoba, on an annual basis?

RA: Some type of date, reference on when caribou show up?

DCh: At the Manitoba and Saskatchewan borders. There has been time with big delays. Other times, it seems to be the normal time to arrive. The people are monitoring in that area, is there a way we could do it? He was more thinking actual dates.

RA: There is no data sharing agreement with the Dene First Nations?

DH: Open to initiate one if interested.

DCh: Some general concerns as they may perceive the mine, the AWAR, the Discovery Road, waterlines and coverings, structures as a potential barrier.

DH: In terms of caribou dates, you may want to also ask the GNWT for Saskatchewan.

DCh: The Beverly herd, the Q herd, that gets to be complicated at times, I've seen general annual ranges delineated, but obviously there's the tracking too.

RA: Maybe BQCMB board would have details.

RM: Bert was going to try to get on from Rankin but had technical issues. Just happy to be here and voice my concerns and get clarification. It's good.

End.

Add -on: Presentation of GN caribou animation

Presenter: Steven Atkinson, Bradley Pirie (GN)

SA: Collar data 2015 – 2022. Prepared for review of Meliadine Extension Project. Need to look at these many times to get full impact. These will be made available to all here.

(Review of animations)

KP: One suggestion, that first 10 seconds went fast. Might want to slow them down.

DC: Remove infrastructure when it's not there.

KP: Maybe lighten it, but nice to know where it will go and see the animals move through it.

JT: Show at a little wider scale where the caribou are starting to go up.

RA: So those will be shared in the next few days?

DH: Yes, those are ready now. If there are any requests for changes you can send those to me.

KP: Slow down those first few seconds?

DH: We have made them not editable, but I can look into that.

End.

5. **Decision Tree Revision (TC118)**

Supplemental material: Presentation "Decision Tree Revision"

Presenter: Matt Gillman

DCh: I see this as a setting up a structure similar to an Environmental Protection plans and have identified potential impacts. How may that impact caribou? What measures are going to be implemented? What is missing is know how you are going to build the waterline. What kind of equipment are going to be there? What is the period of intense work? Will there be gaps between the road and the waterline? Will it be periods of time with a lot of exposure? I really don't know what the actual construction process is going to be and in what way is it going to be phased? I see this as a good start. What exactly the construction activities are going to be, tall structures or equipment with cranes. It can mean that it may be a different mitigation.

MG: Very good point. We had the discussion with construction on our side and we made the agreement that the work that is planned during the migration will be dialed back into very simple activities that won't require lengthy open trenches or exposed infrastructures. Anything like that. What I can do is concisely work with construction to get the answers for you and bring them to the TAG in May. What we want to do in May, is talk specifically about the caribou migration and what the roles and responsibilities are. If we start with this level, I think it would be good to agree on how we are thinking about it and then we can bring in that level of specificity to that meeting in May. Talk about exactly what would be occurring under those different levels. The idea is that, like I said, the KivIA and the HTO and us, the Environment Department, would filter out anything that construction wants to do that would in our eyes not be protective of the caribou. In the interest of the TAG, I think that the TAG in May would be the right time to have the discussion.

DCh: With my experience of pipeline construction in southern Canada, there are stages of development: trenching activity, movement of pipeline into position, laying the line, covering the line. Those specific types of activities generally are related to a time interval with certain types of equipment. If I could ask for a little bit more clarity on how that's going to happen and where and what time frame. It might help to come up with, you know, compartmentalize certain types of mitigations that are a little clearer in relation to how this construction is going to occur.

MG: That's a great suggestion. That's something we do this time of year with our different departments around site. It's called our operational readiness plan around caribou migration. We meet with each department to understand what their specific mitigations are or help them development for the work they're going to be doing. And we prioritize instruction this year. So, we're in the process of doing exactly that. I think in May we will have all those answers or at least the bulk of them and we can have a more detailed discussion. At this point their plan is indeed to do not the light activities, but less obstructive and easier to pull out along the AWAR and have a separate crew on the bypass road that would be independent of site having their accommodations. And so there would be two groups.

DCh: I can see that being a concern, 2 crews, one closer to town that much further away from the mine site. But I still want to know how it's being planned.

RA: This year will be KM 15-30 and Rankin to KM6

MG: We can visit some worksites in June.

KP: Your monitoring, we raised this previously, from road surveys with binoculars, can get out to 1.5 km but your trigger distance is 5 km. What is informing that monitoring?

MG: You can see 5 km from site (top of piles)

KP: From work I've been involved with at Baffin, even with Inuk who have better eyes, you can maybe push 3 km.

BP: Very difficult to see 5 km even in perfect conditions.

MG: We've had success, can see across Meliadine River. Risk of missing caribou in low spots is noted.

(Discussion inaudible)

MG: I think the memo we just discussed all morning will give us some advice on that.

SA: 5 km from waterline construction, in the short term, get incidental observations from communities, HTO.

MG: Agreement with KHTO that they monitor with us. The idea is that an Environmental monitor would be with the construction team all the time, monitoring for caribou.

KP: That person will be on the road, they will maybe see up to 2 km, not 5 km.

MG: Yes 5 km will be a challenge.

HB: Tomorrow we will talk about drones, which could be another way to know if some caribou will be coming in this way.

SA: How long of a length of road will you be constructing at one time?

MG: Pipe is 100' sections, installed piece by piece.

(Discussion generally inaudible – behaviour group size data)

GS: With behaviour survey, there is a break in distribution about 2 km estimated, beyond 2 km, larger groups can be seen.

KP: Range finders in behaviour data collection?

SA: The threshold for Whale Tail is 1.5 km for road suspension, because once you get beyond that all you can see is larger groups.

RA: This is the case with Meliadine is that there are larger groups further away.

MG: I think the memo will go a long way to providing valuable insight.

KP: At the local scale what Greg just mentioned, this is a good starting point. At 1 km for sure, and 2 km is nice because it doesn't take an animal long to go from 2 km to 1 km. If you work within the limits of more consistent monitoring, then it would be better to structure around that rather than the off chance of an incidental observation at 4 km.

(Discussion inaudible)

MG: What could help is getting few spotting towers at high points.

RA: Good point

(Discussion of high points)

MG: For this decision tree to work we need to see 5 km.

KP: I struggle to see what your accuracy and resolution is at 5 km.

JT: Also, it is harder if they are coming from E to W.

KP: Is you don't see at 5 km, why don't you change the distance?

MG: That would be nice, but the TEMMP stipulates no work within 5 km of the caribou.

KP: But this is a specific waterline construction decision tree, why need to follow the TEMMP?

SA: We have to think about the revision of the TEMMP as a whole, right now is specifies a work suspension when there are more than 50 within 5 km, but that seems to only apply to the mine. The TEMMP also says that the road will be closed when caribou are within 100 m. Have you looked up the observations from road survey data to see how often this is likely to be triggered?

MG: Yes. Wording in the TEMMP is that work is suspended when more than 50 entering 5 km including road construction. So that's why we went this direction. If the TAG decides that we are willing to make a temporary amendment, maybe we can talk to the NIRB.

DCh: Almost guaranteed to be the situation that you can't see that far. Unless you have some way of standardizing the way of making observations, which is restricted to the highest point in middle of mine site. There needs to be a way of a system of observing that will be consistent. With the waterline being in 2 locations on the AWAR you might want to consider a slight revision.

KP: You will to be tight at 2 km for sure.

RA: We are still need to meet the 5 km for now, but focus on the area we can be sure, with those in our group, but still us trying to focus on reaching 5.

MG: As much as possible, work in areas with a good view, spotting tower,

RA: Will know the movements of the collars so will have all the data.

KP: You're doing 100' at a time, not the first 100' and then moving down 1 km to do another 100'?

MG: They could do that but it's not ideal.

(Discussion generally inaudible)

MG: Focus on areas we have good optics, we do recognize it will be very challenging, full-time monitors, drones will be a game changer.

RA: Will talk about drones, HTO concerns, surveys. Useful tool.

(Discussion of drone technology – generally inaudible)

MG: I'm hearing the group agrees the next step is for us to work with construction, understand details of the work, provide more context to the mitigations, and how we will increase our success rate of seeing 5 km. Assuming we agree on this high level structure, we will do the homework to show how we can make it work and mitigate the concerns you have.

End.

6. **Roundtable – Day 1**

Speakers: everyone

Supplementary Material: None

MG: Very pleased with today, very collaborative, contributing to knowledge and protecting caribou in the region. I don't think we need to change anything. Went off the agenda, but important to make time for full discussion. Maybe more contingency time in the future. Today was lots of science, need to make sure to continue making time for IQ and TK when we are having technical discussions. I have homework to do and look forward to meeting in May.

End.

7. End of Meeting

Topic:	Day 2 - Meliadine Terrestrial Advisory Group - Agnico Eagle
Meeting Date:	April 14th, 2023 at 09:00- 17:00 AM
Location:	Wyndham Lakeview Signature, Winnipeg, MB and via Microsoft Teams (teleconference)
Attendees:	David Kuksuk –Kivalliq Inuit Association (KivIA), VP
	Jeff Tulugak – KivIA
	Craig Beardsall – KivIA
	Kim Poole, RPBio. – Aurora Wildlife Research
	Caribou Specialist (KivIA)
	Anne Gunn – Caribou Specialist (KivIA) – Online
	Benji Denechezhe – Northlands Denesuline First Nation, Chief Negotiator
	Geoff Bussidor – Sayisi Dene First Nation, Chief Negotiator
	Dan Chranowski – Matrix Solutions inc.
	Wildlife Biologist (Northlands Denesuline and Sayisi Dene FN)
	Eva Elytook – Baker Lake Hunters and Trappers Organization
	Angel Aksawnee – Baker Lake Hunters and Trappers Organization
	Raymond Mercer – Nunavut Tunngavik Incorporated (NTI)
	Daniel Haney – Government of Nunavut (GN)
	Bradley Pirie – GN Project Management
	Stephen Atkinson – Biologist Consultant (GN)
	Eamonn Carroll – GN Department of Justice – Online
	Robin Allard – Agnico Eagle (AEM), Community Consultation Specialist
	David Kritterdlik - Agnico Eagle (AEM), Inuit Qaujimajatuqangit and
	Wildlife Advisor
	Matt Gillman – AEM, Environment Superintendent
	Sara Savoie – AEM, Environment General Supervisor
	Helene Boulanger, RPBio. – AEM, Environment Specialist
	Dan Coulton, RPBio. – WSP/Golder, Sr. Wildlife Specialist (AEM)
	Scott Wilson PBiol, RPBio – WSP/Golder, Biologist (AEM) – Online
	Greg Sharam – ERM, Caribou Specialist (AEM)
	Nina Morrell, RPBio. – ERM,
	Wildlife Biologist and Spatial Analyst (AEM) – Online

1. Meeting Greetings

Supplemental Material: None

Presenter: Robin Allard

       (See Attendees above)

2. Day 1 Recap

Supplemental Material: None

Presenter: Robin Allard

RA: As said in the round table yesterday, we keep the mindset positive and constructive in our approach. We make sure that we can protect caribou in all our operations. Thanks a lot for being open minded and working with us and making sure that the Meliadine TAG is successful. Nothing

from yesterday needs to be added or corrected. Consider that we have people on the line, speak loudly when speaking and keep a look out as they may have comments or questions.

End.

3. **2022 Annual Report Overview – Part 1**

Supplemental Material: ppt "2022 Annual Report Overview" – April 14, 2023, Winnipeg MB, Meliadine TAG Meeting

Presenter: Sara Savoie

Slides were reviewed by the presenter as indicated. Discussion and comments are documented here.

SS: (Begins presentation)

Slide 7 –

SS: We want to highlight that Agnico Eagle now has the Kivalliq Elders' Advisory Committee led by David Kritterdlik who is here.

RA: We try to collect as much (IQ) as we can and take any opportunities to collect and validate IQ within the process. With David, we will be going around the communities to collect IQ and validate with the Elders' Group. The next step is how to include IQ in our plans and monitoring. This is an ongoing project that we keep and will never see the end of it. Our effort is focused to ensure that we collect, validate, and integrate IQ. We do the full circle of the IQ integration process.

Slide 8 –

SS: We handed out copies of the memo.

HB: The memo was completed recently; it will be sent to the TAG members and time be given to the TAG to give feedbacks on the memo.

DCh: I am looking at page 10, June 21st, 2022, time survey 12 PM, at 6 PM, estimated caribou number is 50, estimated distance of 150 m to W, but no road closure. It had to be greater than 50? It as to be 51 to make it happened, but at 50, it was decided to not close the road. Was it one group of 50 or multiple groups for a total of 50? Just looking at the table, does the observation have to be greater than 50 for a road closure?

MG: In the TEMMP, the trigger is 100 m from the road.

SS: That is a commitment we have to document all groups greater than 50 caribou regardless of the distance (from the road). This is why you have some distances here that are 4 km some are closest some are 200-300 m.

SA: I think it's great to see it reported. Is the TAG Annual Report included in the overall TEMMP annual report?

SS: It is included as an appendix of the Annual Report we submitted to NIRB.

SA: This is ultimately what we will be looking at revising the TEMMP. It is looking at situation where we are having 50 caribou or more within 100 m of the road whether the triggers need to be revised.

SS: There is a larger discussion on the TEMMP revision that going to take place. I also want to add on the first part of your question. The intend for the TAG Annual Report is to be appended to the TEMMP Annual Report. This year, it was a stand-alone appendix just because of the timing. We

got the Terms or Reference signed in early 2023. In future, it will be integrated to the TEMMP Annual Report.

SA: What is direction? Direction from the road?

HB: What we did is we took the maps that we were sent 3 times a day and we put it in writing. The quantity and the distance are estimated. We would like to try to improve the system to be more accurate in distance and numbers. With the drone, we can double check numbers and distance.

DCh: On the note of June 22, there might be a discrepancy, 50 caribou seen at 150 m to the W and the road closure was in place as compared to previous day, were 50 caribou at 150 m E but was not closed. There is some inconstancy. Why is that done?

HB: If there's one group of caribou say within 100 m, the road is closed. If you look at the line above it's 50 caribou, 0 m, then the date, during that date we just closed it. It demonstrates that we did what we said we were going to do. So, it's not a discrepancy.

DCh: Previous line closed the road.

HB: Yes exactly. So, we base our wildlife survey, and we get help from KHTO, GN, KivIA, it's not just us. Then 3 times a day we get some maps and try to show where they were seen.

SS: I'll add, perhaps we could highlight the event that triggered the road closure, would that be helpful?

DCh: Yes, colour coding help.

MG: For the readability of the memo, there is some improvement to be made there. Colour-coded could go a long way.

KP: Nice to see this. A suggestion would be to add a column is the source of the observations would be good to see on there too. There is a lot of estimated distances, 4.5 km, 5 km observations, for me, it is just a stretch. Maybe there were other people out, aircraft, HTO, road survey, but just to have the source of the sightings would be good.

SS: It's something we can do.

JT: It is not just road where you might see them from KM 23 there is also other observations where it's where the elder's cabins at the park where this is a certain distance away.

KP: it comes down to is this an official, Environment AEM road survey, is this something we are doing from the waste rock pile or tower, is this an incidental sighting or from HTO. It shows the effectiveness and efficiency of the monitoring, who is doing what. If 95% of the sighting is not from road survey, then you have to wonder what this survey is doing and vis-versa.

HB: It is shown in the other table, but not as precise as it should be, but we do also keep track of who's doing the surveys that day. But we also keep track of who is doing survey, who is in the field and going this information, where and who.

SS: Just to recap, we got great ideas to improve this and if other comments come throughout the day or next days, feel free to reach out by email. For this table here, we talked about ID the source of the observation. If we can categorize between AEM Environment, AEM consultants, community-based observations, HTO monitor observations, aircraft, incidental observations.

KP: In a digital format will be much easier.

SS: We will do that, we have the information here about road closure, but we'll identify properly which events trigger the road was closed and who observed the caribou.

RA: We want to show better when we close the road and why on the paper. We see this, and we did that. This is what we want to show more clearly in our reporting. Maybe add graphics, something visual that would be beneficial to show to the community. Something to bring to our consultation.

RM: If I was trying to explain it in an inuit language, this will be pretty good, handy, showing road closer by AEM, HTO, KIA. Try to take this so someone looking in an inuit language will be good.

SS: Thank you for the feedback.

MG: There was some discussion yesterday, Helene maybe you can speak to it, during these road closures there are no convoy for fuel, supply, nothing.

HB: When we are in level 2 or if we know there are caribou in the area and the road is still open, we will be allowed to do convoys, KivIA is with us. So, they can decide if we need to stop. If there are caribou around, we try to go very slow.

MG: But that's when the road is open.

HB: Yes

MG: The reason we do the convoy is that a risk that at any time the road could close. But when the road is closed, it's closed (unless essential services like medical emergency).

RA: Meadowbank site and Meliadine site have different operation.

MG: Yes, it's only a 3-week period, we re-fuel beforehand.

RA: Road closure at Meliadine could be more detailed. What road closure means; what is on the road. That is something we will improve on.

JT: Expectations are high for Meliadine. It's been working great at Meliadine I have to say. It's been improving over the year. One comment about the Meliadine migration is when there is a large herd coming whether is a further distance than a 100 m, there were times where the road was closed on approach of caribou whether they were at 300 m away or more, just for preparation, so people don't get stuck on the road.

KP: Yes, that's good, behavior groups shows that large groups don't come close to the road as much. Caribou make decision well before a 100 m whether they will thing about cross it or get close to it. Those numbers should be changed going forward. It just way to close by then, the damage has been done, decision has already been made.

JT: I agree with you.

MG: On our side, we will have that discussion in the part of the TEMMP revision, we don't wait for herd to get 100 m before acting.

KP: I know, you should align the TEMMP decision tree with what you are doing.

JT: It depends on the current staff. It is a good working relationship, who knows if the staff ever change it might be seen differently. New staff will follow the paper that say 100 m and that won't work to well.

MG: The memo, the key piece of the decision is the thresholds for deflection and the zone of influence will be used for the TEMMP revision.

End.

4. 2022 Annual Report Overview – Part 2

Supplemental Material: ppt "Meliadine Gold Mine Project Caribou Monitoring Programs" (ERM)

Presenters: Greg Sharam, Nina Morrell (ERM)

Slides were reviewed by the presenter as indicated. Discussion and comments are documented here.

Slide 4 –

SA: Have you looked at comparing the movement of collar survey and what you see on the land survey? For example, any of these polygons related with a collar data with what do you see on the ground or vice versa. How comparable the observation methods are.

GS: We have not yet.

RA: At Meliadine, we are trying to see if any collared caribou were monitored. I didn't have de chance to see one with a collar. We could probably try to tie with an actual collar movement.

SA: Someone mentioned yesterday that after the last collar left, you still have a large number by the week after. I was wondering, the other way around, when they are coming in, if you start to see large amount while the collars are still kilometers away.

MG: I would have this information.

SA: That give you a better idea how you can best used collared information. Maps can be used knowing that.

GS: The triggers used by the collar is that they have left the calving ground right now after that is provide on where the land survey is. I don't think anyone is waiting on that.

MG: No, once they start approaching the site at 30 km, we are going to have surveys.

JT: We get the collared data a day after. They were there already. That is our observations that were used at that point.

RA: I didn't have access.

KP: Well, the technology is there. I have live access to one mountain goat, bighorn sheep running around. I can see where they are within an hour. So that technology is there, I just don't know their system. Two comments, one is for these meetings, we have to get better sound systems. People are struggling on the line to hear. Second, we have 3 x 5 km circles coming from somewhat arbitrary points just because they are height of land. Do we need 3 separate 5 km circles? It seems to over complicated things having those 3 circles. You should blend them into a Polygon.

MG: I agree

DH: Suggestion for device call an Owl, it's an electronic device with a camera that spins and focus on the person that is speaking.

MG: This figure is a good example. We do our survey at the TSF which is a good viewpoint there. You can see clearly on the other side of Meliadine lake from the top. We can do our 5 km survey from the site. It will be a challenge with the road, but we'll work on that in the next couple months. But it is possible from site with the heigh of land. In foggy day, it's a different story but when we can't see, we assume there is caribou.

GS: (Resumes presentation)

Slide 5 –

KP: But again, looking at animation, collared data, and being around for while, I remember animals coming around from the E, often hit the road. Then either parallel or deflect or move N and then cross (around KM 27). Your lines are not wrong, I just say that one is also a common one I've seen a number of times.

DCh: From the E, when they hit the road they may actually even further S toward Rankin Inlet then cross the road.

GS: Partly why we added these arrows is a little foreshadowing of some of our data. This is one of the learnings we've had in terms of the caribou movements. The first 2 years that we ran both the camera and the behavior programs, we would get a big pulse of caribou coming W to E across the road then possibly some coming back and then there would be a big lull for maybe 7-10 days, at which point, we, as onsite monitors, start taking down cameras, we start demobbing from site and then for two days there's a stream of caribou that come across to the S. In 2022, we had our people just sit put and we caught that 2nd pulse of caribou going E to W.

KP: Did the collars inform that pulse?

GS: There are collars, they are moving really quickly. It takes 3-4 days to take de camera down, and then the caribou are back, and you just miss them.

KP: There is a delay on the collar maps too. Is it only 1 day?

JT: Sometimes it is 2 days. It depends, on the weekend there is no update.

RA: What I was told is, if the animal has not moved a lot it is, we have no update, but it is the same than the day before.

BP: Yes, we can provide maps on the on the weekend as well. You'll see delay because we try get to upload signal from the satellite. We will see that with the collar maps, we still have the end points. When we do get the update, you will have those 2-3 days of data.

GS: In 2020 and 2021 with covid restriction there was a request not be surveying at the very bottom of the road (AWAR). In certain times, there would be harvesting at the bottom half of the road. Our surveyor did not feel comfortable with people closer to the road. In the first couple of years, our work was focused on the northern 2/3 of the road. In 2022, after covid and understanding that we might have a second wave, we had people out on the southern part so we caught that second pulse of caribou coming through.

Slide 9 –

DCh: When you are saying they are not static from year to year, you may be taking the GPS location of the crossing last year and then you'll maybe take that the years before. How much of a difference are you talking 100 m, 1000 m?

GS: The cameras are in the exact same location every year so we're able to compare year to year with those cameras. The cameras are also all facing the same direction (N) on the same side of the road (W). We tried to control for camera position that way and I think we are seeing big shifts along the road in terms of where they are crossing of several kilometers. We have some maps later.

Slide 10 –

JT: The pulses of caribou you have on the road, can you compare that with that caribou collar data to see the group sizes and combined to see how many caribou the collar data represents?

GS: Good idea, until now, have not had the collar data, but now we do.

DCh: These images you recorded at the crossings, do you estimate the number you see?

GS: Yes

DCh: It is not an estimate of the herd, but an estimate of what is in the image.

GS: We class the photos. We take 10 photos per trigger then a resting period of 1 min. We get a ton of photos of the same group crossing. From photo to photo, you can't tell if you are seeing the same caribou and their movement. We have a series of photo for a series of trigger. Each trigger is an event, and we count the maximum number of caribou we see in any of the photo. This is the estimate for that event.

RA: Did you capture any collar on the caribou photo?

GS: I don't think so for this project.

KP: Does AI go through the images or are you hand doing them?

GS: Until Christmas, we had an intern going through them. Since, we have an AI, call Mega Detectors, which goes through the photos and put the ones with animals in a separate folder. An intern classifies those photos then a biologist QAQC the data.

KP: The AI wouldn't catch a collar but a person would have a better chance.

GS: The AI only detect photos that have animals.

KP: What's the belt colour?

BP/GS: It is white.

EE: What is AI?

RA/KP: Artificial Intelligence, it is a program that helps sorting thousands of pictures.

GS: It is a machine learning system, we collaborate with Google, they have built a program that identify a photo that has animals. It can also flag vehicles. We share our Arctic data with Goggle to help train the machine learning and improve it.

AG: When you have this burst of photos, can you use them to look in detail at the sequence of behaviours it takes for caribou to cross the road: Hesitating, in alert, crossing, looking at the surface? Can you create a sequence of crossing behaviours.

NM: Just a comment about the collars on cameras. We are using AI, but we still have someone going through the caribou photos to estimate the group size. We have never seen a collar on camera. Not yet. For Anne's question, it would be interesting to try and string together photos. My guess is there would be too big of a gap between photos to get much information because this is not a video.

AG: It is a sequential series of scans, the data would lend themselves to analysis in terms of frequency of behaviour.

NM: We have pieced them together to make something that looks like a stop motion film. I am not sure we would be able to get much information of hesitation or deflection. The caribou will cross behind the cameras as well or the cameras will stop triggering when they are more than 40 m away. We don't get a complete picture.

AG: You would get a useful picture of some of the social behaviour. You can see caribou looking at other caribou crossing the road. Seeing the other caribou is part of their behaviour regarding the road. The elders have commented a lot on the material. You might see hesitations, caribou sniffing

the roadside. Get some information that you might be able to share with the elders on caribou responses.

DCh: You say when a camera is triggered, it does a sequence of 10 then automatically going into a resting period? If there is a continuous movement across the camera, does the camera continue to trigger?

NM: Yes, it will continue to trigger. We set up to take 5 photos per event, but if the event is longer, it will take more.

DCh: There is potential of having events showing a total crossing where you could sequentially watch images and identify certain type of behaviour.

EE: Are the camera facing this way? There another camera crossing the road too? Facing what?

GS: All cameras are facing along the road. The road will be on one side and the cameras are all facing N. We can see caribou as they are getting ready to cross the road, crossing, and onto the road. We just have one on the W end side. The cameras are all facing N, just one on the W end side. The reason they are all facing N is that it draws a grid on the photo and looks for something warmer than the background. If it moves, then it takes a picture. If you face them S, it takes pictures of the sun all day long.

SA: Just looking at the animations for these 3 years. For 2022, where you had camera all the way down the road, the 2 peaks that you identified correspond with the animations. But for the other 2 years, you didn't have cameras on the southern portion?

GS: We had camera as south as possible.

SA: When you compare the animations and peak crossing times, for 2020 and 2021, you missed a couple of peaks later in July, because they occurred further S. Interesting to see how much annual variability there is when you have multiple years of data with full coverage.

GS: You can see in 2020 there was a major pulse starting around 1-2 July. And then there was a second pulse. But we had already demobbed at that point and it was further S than our cameras were. So then in 2021, a big pulse almost a week earlier and a smaller second pulse 2 weeks later. In 2022, a long drawn-out multiple pulses crossing the road, ending around the 4th July, and a week later, another big pulse in the S. Would be interesting to plot the number of collars within say 2, 5 km of the road and if that lines up.

JT: When you look at the pulses, do you look at the whole migration? There's 3 different groups migrating, Whale Cove, …, Meliadine site. Is the direction of the pulse taken in consideration?

GS: Good question, but we haven't had the collar data until now.

DCh: You mention the cameras if they face S, it would take continuous pictures? Just wondering about a way of having a better sense of numbers of caribou crossing. If you put cameras back-to-back, you could have a diameter of an area that give some density measurement.

GS: The sun will wash out the photos. I don't know if the key crossings are really coming out as a specific trail where they cross within 100 m. We're seeing a broader front. These cameras are 500 m apart and 6 of them are picking up a crossing. It is more as a broader front than specific trails of crossing.

JT: Some of the caribous crosses and keep walking along the road and the others start following on the other side and will cross later.

GS: It's just a number of cameras for us to have a sense of what, how that crossing is occurring.

Slide 13 – Camera Results: Road Construction

KP: If you took those 2 outliers out (road height figure), do you know what it looks like?

NM: It is flat.

GS: Meliadine is a recent mine that was built with more caribou-friendly roads that others, which results in little variability in road construction (all flat).

DCh: Question about esker vs quarry material. Esker being fine, sandier material, does quarry is having more coarse material?

RA: Quarry is crushed

DCh: 0-2 cm? Is there a way of measuring the difference between the 2? Caribou would prefer esker for a road covering.

GS: Commitment was made that roads would be constructed as much as possible from esker material. A major esker is at KM15. The road was built using quarry material until the esker then use the esker material.

MG: There are sand material.

Slide 16 – Behaviour Monitoring Objectives

KP: Since you've been showing us how the animals go through in both directions, E or W isn't necessarily up or downstream as they are going both ways. It is not just upsteam or downstream but also should be E or W.

GS: In 2020 and 2021, W was upstream, and 2022 E and W were up and downstream. Good point.

AG: Road open or closed is for the mine mitigation measures as official closure. The road are still open to ATVs when the road is closed? If this is the case, how do you segregate your data when there is absolutely no traffic vs ATVs, and also take in account for the fact that you have driven to the observation site in a truck?

NM: The road is typically closed when we do these surveys. We didn't have enough data to make comparisons between road being open vs closed. Because when there is caribou on the road, the road is closed. Regarding ATVs, they are generally on the road whether it's open or closed. We don't have a ton of information from times when there are no vehicles on the road at all. About the survey vehicle, there have been times we have recorded our own vehicle as a disturbance. Because when we come around the corner, the caribous were there and there were already responding to us, so we don't have a chance to mitigate our own arrival in the area.

AG: You might want to reword the objective. You are not able to look at open vs closed road, but you are able to look at behaviour response to a disturbance.

NM: Yes, it does make sense

DCh: When you are out on the road you could observe directly what is happening to the caribou when an ATV goes by and see the behaviour reactions. We believe ATVs as an impact. That could be data you start collecting. Then you see behaviour reaction of caribou when ATVs are near by.

NM: We do have a lot of surveys where the only disturbance is ATVs going by. More than 50% of disturbances recorded across all surveys are from ATVs.

GS: We record class of vehicles, so generally either pick ups, ATVs, survey vehicle, or convoy.

Slide 17 – Behaviour Monitoring Results: Crossing Locations

AG: In 2020 and 2021 you did sample within the mine site. Is there a reason why in 2022 you did not?

GS: We just wanted to focus more on the road.

NM: In 2022, we had places where we were going to survey around site. We went to those locations we just didn't see caribou close enough to survey their behaviour around site.

AG: In the animations, a couple of times where caribou approached the site, they turned away. With the expansion project, having the mine activities being intensified, it would be useful to have more behavioural observations at the mine site.

NM: The places we survey are some of the best height we can get (waste rock pile, Dyno plant). It is dependent on when we are there to survey and when the caribou are there. If we need to shift priorities next year we can, that something we can do.

AG: I suggest for the group to have input on this. Excellent job on responses to AWAR. I wonder if we should shift emphasis to looking at what is happening as the caribou approach, sometime goes through, sometime don't the actual mine site. Part of the reasoning is to establish a baseline before the mine site activity is intensified. Even if the mitigation to apply is to close the mine site activities, it's not a complete closure of all activities. It worth having more behaviour samples from the mine site.

DCh: There was monitoring around the mine site in 2022, but there were no or limited observations. I am interested to know as well. Maybe there is a need for more than one observer.

JT: In 2022, the lake ice stayed longer so that might have played a role in why they didn't cross in Meliadine site.

NM: Even though there is one team out doing behaviour surveys, we work with the Environment team who are doing 3 time a day driving surveys. We know where the caribou are and we can target our efforts.

GS: We have a training program for the Environment team at the beginning of every season. We have a presentation, study guide, test to identify different type of behaviour. Half of the data in the first year we got was from the environment team, the rest was from our team.

Slide 18 – Behaviours and group size

GS: This is not a representation of group sizes along the road because we wanted equal distribution across group sizes. We pass by some groups to get ones of certain sizes. Small group sizes (up to 50) were more likely to show disturbed behaviour irrespective of disturbance.

KP: There are security in numbers.

GS: There has been some theories that larger groups may be more reactive. Because if one animal freaks out, the rest might follow.

JT: Do you notice which animals were easily spooked? When they have calves? The calf would be the first one to run and the rest will follow.

GS: We don't capture who is spooking who. We only doing survey every 3 min.

NM: We do record if the group is mostly cows/calves or males.

KP: The third dimension is distance from road. You said that the larger groups are not coming closer to the road. Doesn't that confound the behaviour? Larger groups are away and smaller are closer?

GS: It does and that's why we need all group sizes at all distances. Nina has spent time looking at this difference of group size vs distance.

NM: We identified that as a problem early on. In the last years we have been able to collect more data across size ranges and distances. We did a chi square test to see if the variables are too closely correlated to compare them in the same model. Prior to 2022, they were too closely correlated. Since 2022, the correlation coefficient was lower than the threshold as we identified as been too high. We could have modelled them together, but we kept them separated.

AG: Almost all the photos are cows and calves, do you have a breakdown of what proportion are bull groups and can you add that to the analysis?

NM: We started collecting that variable in 2022 after suggestion from TAG at Meadowbank. I didn't add it as a variable to the model this year because we pretty much only had cow/calf groups. The bulls come later in the season. We don't have enough data to compare.

Slide 19 – Behaviours and Distance from the Road

SA: At what point do effects of distance from the road become negligible? Beyond a km?

GS: We got step up in the number of animals and behaviours at 300 m. We don't see another step up in our data. I could see having several steps: 300 m, and another further than 1 km. And I don't know if we can tell from this data.

NM: With these surveys there is a limit as to how far we can accurately survey.

GS: The human perception of distance is terrible and log based. If you think something is twice as far away, it is 8 times. There is a lot of difference. We were nervous about perceiving distance. After 2020, we moved to a laser range finder. After 2020, we are all measuring distance to caribou.

GB: Have you observed injured animals?

NM: I have seen animals with a limp, but none severely injured.

JT: There is time when during the migration where caribou have hoof rot or swollen hoof. If we did see wounded animal, we would contact a conservation officer.

GB: I just wondered if they had enough time to rest when the other animals are gone because of the condition.

JT: From what we've noticed, they got left behind.

EE: My dad used to tell us that, when we see an injured animal, because they are walking so long … (*generally inaudible*)

Slide 24 – Behaviour Monitoring Results: Summary of Key Results

AG: With 3 to 6 min recovery, this time of the year, foraging is key because there are maximizing milk production 3 week after birth. Is there any way you can give a cumulative loss of foraging time on a daily basis, from your data? And I know it's tricky because it a 30 min scan and there are different groups.

NM: A potential issue would be that we seek to conduct surveys when there are convoys. We don't have a ton of surveys in the absence of disturbances. We also aren't out there at night, and we know the majority of caribou are out here at nighttime, when we are not working. We would get a biased assessment for worse case scenario.

AG: Even if it's not a daily basis. I agree it's probably conservative. But, it will be useful to have the total of loss foraging time per your total of observation time.

NM: Do you think a certain base level of time not foraging is acceptable? Because we do observe at this time of year is a lot of walking and high energy behaviour in the absence of disturbances near and far from the road. For a baseline, we would have to establish what is normal.

AG: Back to the question of what is walking, it's part of foraging. They are not competing but are keeping an eye on what each other is doing. The other key variable would be mosquitos. Even given those limitations, it's something to follow up on.

DCh: Insects should be incorporate as a variable. That is a disturbance I don't see in here that can influence caribou behaviour.

GS: It was looked at in the exploratory analysis. We looked at environmental variables (temperature and wind speed) and saw no difference type of behaviour.

NM: We do include wind speed in the statistical models because we know it is related to insect harassment. So far, we haven't come up as an important variable in any survey. It doesn't mean it is not, we keep in it in our variables in our model.

AG: Do you keep track of how bad the mosquitos are? Because none of the photos seem to show they are high intensity.

NM: Not really, we could, in my experience it's not usually too bad at the beginning. The mosquitos arrive with the caribou. As the post-calving season goes on, the mosquitos intensity increases in my experience. Last year was not bad.

AG: The Inuit would have an idea of when they are bad. It's something to keep track of.

JT: Last year, the Meliadine Lake was frozen later so there might not have been as bad mosquitos. From my observations, in mid-July you might notice. The caribou won't be as much in the low areas. They will be on the top of the hill where they might have more breezes like at KM15.

DCh: Following through with insect harassment as a measurement, it could just be low, medium, high, as a qualitative measurement.

EE: The bug harassment is included in green up. They won't pick on me or you but will look for maybe a caribou or a wolf… (*generally inaudible*).

JT: On a nice day, caribou will be more stationary on top of hills. Then when the wind picks up, the migration starts again because they are not as bothered by the bugs.

MG: Based on what Eva and Jeff have said, if we're going with insect harassment it would have to be daily because it will depend on hot days and wind. Added complexity, but I think that's important. On this photo, there is 0-3 cm size quarry material on the side of the road here. That is what the Bypass Road is constructed with and the AWAR is top with for maintenance.

DCh: Is this what the quarry material looks like?

MG: Yes mostly just due to pulverization from traffic. Side of the road is original material before it's driven on.

End.

5. Ongoing Projects

Supplemental Material: ppt "2023 Ongoing Projects April 14, 2023 – Winnipeg, MB Meliadine TAG Meeting" (Agnico Eagle)

Presenter: Helene Boulanger

Slides were reviewed by the presenter as indicated. Discussion and comments are documented here.

HB: (Begins presentation)

(*Discussion of differences in km points between presentations – request to have one set of rules that everyone follows*)

Slide 4 – Caribou Monitoring Using Drone Update

KP: Higher than 120 meters?

HB: Yes and if it's beyond the light of sight.

KP: When you say permit, is it from Transport Canada

HB: It's the pilot certification.

JT: Do you have information about what conditions they operate in, like weather, wind?

HB: I don't have but we can look into it. So, this will be part of the trial, testing different models. For the Mavic, it is about less than 40km/h. The wind will also affect the picture quality.

DCh: Distinction between 1a and 1b vs option 2 is that they would require continuous flight, whereas option 2 could be stationary, less detectable. The option 2 that give you a high-resolution picture.

KP: Option 2 could go beyond a km but you just don't have visual on it?

HB: Yes, but also the battery only lasts 20 min. Also, take-off and landing are more disturbing. We would propose to do it at least 1 km away from the caribou.

KP: I've seen more the option 2. Technology is changing quickly. They are tame like they just lift off and within few seconds you don't hear them and they are very nimble. They take incredible photographs. Those kinds of restrictions hold you back if you needed a km away to actually go up for see something.

MG: This is just for this drone. We're just talking to Dan about an upper model that can go higher further, and longer battery. So that's something to keep in mind is there are helicopter-based ones that can go higher and further. It's just not the one that was assessed here.

KP: They're pretty quiet. These things are being used for everything from a bird nesting sites to whale surveys. Technology is going ahead leaps and bounds. You are always going to be restricted by wanting to go more than 1 km. We don't need to go 30 km, but then you may want to go higher than 120 m. Although at 120 m, caribou might not notice.

EE: Animals have better hearing than people.

HB: Yes agree. Studies on Dolphin and Union caribou herds was conducted at about 80 m and they found out that about 60 m they start to see signs of disturbance. But at heights above 120 m, we need a flight plan that will restraint our survey. Under 120 m, we have more flexibility.

MG: We would invest in a model if we can use this for base monitoring at further than 1 km.

EE: Could eagle attack it (*generally inaudible*)

HB: Yes, it could be a risk. We are aware of some nest locations. If it's higher elevation, it should be ok, but if it's lower, it could bother them. If the raptor think is a threat, it will attack.

Slide 5 – Caribou Monitoring Using Drone Update

(review of imagery with zoom)

(video of option 1b drone)

JT: What's the minimum speed?

MG: 70 km/h

KP: Can you remind us of what the testing on the Dolphin and Union herds was about?

HB: I will get you the references (Torney CJ, Lamont M, Debell L, Angohiatok RJ, Leclerc L-M, Berdahl AM.2018 Inferring the rules of social interaction in migrating caribou. Phil. Trans. R. Soc. B 373:20170385). The other was a wildlife survey was between 75-100 m. Bathurst Herd was surveyed by a plane at 120 m.

JT: We've also been looking into drone training so we can have similar option for our monitoring.

HB: We'd also like to invite HTO, KivIA to be involved in any testing onsite.

RA: We could do something, a demonstration, during a TAG meeting.

HB: Doing a demonstration will help understanding drone monitoring, the option we have and the advantage of using it.

SS: Has KivIA identified some drone options yet?

JT: We haven't decided but are open to options, not just for caribou but quarries survey.

HB: Another limitation is the airport would be we can't go below KM 6.

SA: I support testing this. I used it myself. Usually for wildlife aerial surveys, you fly around 400 ft (120 m) for effective detection. Anything higher than that you lose a lot of observations. So, 120 m is perfectly fine. Is the rule it can't be out of line of sight?

HB: Yes. This rule was mostly for the city though. The other limitation is the battery.

SA: Can you get multiple control points? Like along the road, if you had somebody else this end of the road, someone that end the road, so drone fly all the way.

HB: I'm not sure.

KP: This tool really can be used to push surveys out the 5-10 km limits. Beyond a few km, if it's a dead zone where it triggers things, but you can't look out there. You should make sure it can handle 5 km. The versatility of the option 2 seems to be the way. If there is an important issue where you can just go and check because we suspect something. It has to be versatile to be effective.

HB: Yes, different types can be useful for different purposes. And need to test the sound.

JT: You can used propeller that are silent.

DCh: Some are making an eagle sound. Some model can be fly in higher wind speed. In the current limitation will be requirements by Transport Canada. But I believe that's that 300-m level, you need a certain pilots license then there is some other level below that allows anyone to fly small drone.

JT: Is Agnico looking at having seasonal staff for a drone, or hiring a company?

HB: At this point we don't have the certification so we will need help but will need to consider. We do have pilots for the small drones (type 2), but we also need a wildlife permit, letter of approval from HTO.

MG: Operator considerations will come when we determine what's acceptable in terms of hardware. And after that we will select what type of pilot we need.

DCh: Need to look into low and high frequency noise, what the caribou can hear.

MG: Next step is consultation with HTO and KivIA, make sure everyone is on board. It will change our abilities to monitor to long distance.

Slide 8 – Vibration Monitoring During Blasting

SA: Challenge is finding wildlife to observe? Couples years ago, a video of a caribou reacting to an underground blast was showed. Would it be possible to recreate this blast and establish on what the caribou react? Possible to do retroactive analysis for available video of blast responses?

MG: We could do that.

JT: I got direction from my director before to have no blast within 5 km during caribou migration.

MG: The TEMMP has that wording and this is what we are actually doing. What we are trying to show is to validate data supporting that.

SA: If you having trouble finding, you've got video shows caribou reacting and if you could reconstruct that past event then monitor the site where they were and simulates it.

JT: We observed something similar at Meadowbank, we don't have video, just observation.

DCh: if you're ending up plan an underground blast, if you even have people can be onsite. If you are planning it ahead of time, you can display people around site to observe any wildlife possible.

RA: That increase of activities also changes. So that what makes it are to be consistent. But it is not impossible.

HB: Have to clear a certain area too for safety. That's why we used camera.

MG: Different blasts have different characteristics too. We are still developing relationship between blast type (production and development), different charges, different levels with vibration, and air pressure and find the different point zero of each type of blast. That's step 1. Step 2 would be to compare these different radius to animal behaviour. But at this point, we are still developing that relationship. About that video, it was happened during a massive blast. Would be possible to use opportunistic retroactive analysis where available. We will look into that.

SA: Once you have the baseline for the different blast types, air pressure and vibration, you assess the data. Based on what we have in the field, it's unlikely that there would be a reaction to the blast at 3 km and then you go out testing and that way you get a temporary sort of agreement that you could cut back the path of 5 km to 3 km and do some blasting and do some testing when there are caribou say at 3 km.

HB: There are also ways to adjust the blast influence on a certain distance.

MG: One way to think about this, the same way the *Fisheries Act* is set up. There's an equation you used to ensure that you're not going to impact them. It's all going towards what you're saying Stevens, is there a point 0, is it 3 km? This is what the science says. Now let's start bringing the elders out, the community, the GN, the TAG to observe in the field and maybe we can repair the perception that we created with that original video several years ago because it is quite detrimental to the operations to not be able to blast during the migration. Priority one for the operations would not having any caribou impact and protecting the caribou. So, before we ever propose that back to the TAG, we want that data to support this discussion.

DCh: You sound like you're getting a real good range of everything. All the conditions that you're saying you need to get that baseline before you could even be able to begin this. That sounds great.

MG: Very early stages.

SA: I'm correct in understanding it? Once you have your baseline data and measurements that you would eventually be proposing a revised zone on which you would then do some tests.

HB: yes, but I need the data first. It's hard to tell right now.

CB: Maybe bring dog during blast.

(*Discussion of dog on site for H&S*)

JT: Need also do considered where the animal are standing, is on bedrock for example.

HB: Usually most of the blast monitors are located on bedrock. But we want to change areas to make sure the equations stay the same. The more blasts we have that we can record, the better the system will be, a better understanding we are going to have.

DCh: In seismic work blast model device monitors vibration, is something you are also collecting?

RA: Those are what you are seeing here (meaning slide's photos)

EE: Those are underground?

HB: Devices are on the ground, on the rock for underground blasts.

EE: Experience a blast, we felt that wave. (*Discussion inaudible*)

HB: Next time, I will explain how the waves move, and how the blast monitoring works.

DCh: The waves move differently though different rock formations, type of ground, water etc.

HB: I did look into the literature to see about caribou and blasting, and there's nothing.

End.

6. **Next Steps**

   Supplemental Material: ppt "Next Steps April 14, 2023 – Winnipeg MB Meliadine TAG Meeting" (Agnico Eagle)

   Presenter: Matt Gillman

   Slides were reviewed by the presenter as indicated. Discussion and comments are documented here.

   MG: (Begins presentation)

   RA: What we discussed in December was that we would have a meeting in March-April (now), and virtually one in May to discuss upcoming migration (readiness plan), and an in-person meeting just before migration (June) in Rankin.

   MG: In May, we will specifically discuss about the Decision Tree Revision (TEMMP), and the Caribou Migration Readiness Plan. This is a plan how to communicate with TAG during migration the roles and responsibilities. In June, in person in Rankin, to go over the roll out of the Caribou Migration Readiness plan and observe how we executed at the site.

   (Resumes presentation)

Slide 3 – Overview of Caribou Migration Readiness Plan

   DCh: Are you the person who all the departments communicate with?

MG: Yes, I lead these, and the general supervisors and their coordinators assist in communicating frequently with the other departments. We do a kickoff meeting and then we meet with them every 2 weeks up to the migration to ensure that they understood what they need to do.

Slide 4 – Terrestrial Environment Management and Monitoring Plan Revision

KP: How does the Meliadine Extension work into the process?

RA: Until it's approved it's not included.

KP: So we'd have to incorporate updates into a subsequent version.

MG: I imagine it will be commitment to the NIRB process to update the TEMMP

RA: Yes but that version will be less work after revising the format, discussing thresholds, etc. But we could decide to wait after the extension to update the TEMMP.

KP: No, this TEMMP is due to a revamp. May 2023 is an online discussion to help map out the revision process.

MG: Map out the documents itself. After what the updated version of June will be sent to the TAG for revision.

DCh: Is the current one on NIRB website?

SS: yes, April 2022 is version 4.

KP: There 2 version, that was very confusing. It's the one that's labelled version 4 April not the one labelled with a different date on it. But it has more information than the April one because it was to address the waterline. It was confusing.

SS: There is confusion between versions submitted through the permitting process and through the current operational process. The current is the one of April 2022, Version 4. We will send that after this meeting so we all work from the same one. The work will we do in the next revision will be transferred to the extension process.

MG: The concepts will be transferred for the extension.

RA: In February we signed the TOR, GN accepted. But now, we have to make a technical change to section 8.5. The GN has asked to remove the reference to the GN in that section, because after looking into this there is no legal mechanism for them to provide the corresponding financial support to the HTO.

BP: On the legal mechanism, in order for the GN to provide funding correctly for HTO operations such as participation in the TAG, there will be see attachment decision. So that requires a full process going through the HTO, making the request of formalizing it, and putting the request for decision up to cabinet. But at this time, the GN is not in position with any legal mechanisms to directly provide funding. Right now, GN funds NTI, and NTI then decides how it funds HTOs.

KP: NTI gives it to the regional viewer.

BP: Usually yes

RA: Agnico agreed to that change, since it doesn't really impact other parties. We just wanted to pass that by the TAG. We will revise and then another version will be posted on the website. Is everyone ok with this?

DCh: All version will need to be posted on the NIRB website.

RA: The previous version was posted, and once the new changes will be done and accepted, the new version will be posted on the website.

BP: Can we get a clarification on Section 3.5 as well? (Reads section 3.5). It really should say "parties will make best effort to notify the TAG prior to it, prior to submitting request''.

RA: We can't hold people to the 7 days deadline basically. We should try to meet the deadline but we want to make sure it says conditional.

BP: Clarification that you can't be forced to make it 7 days prior.

EC: Not seeking a word change today, just on the agenda for the next TAG meeting for discussion.

RA: Wanted to make sure it's clear for everyone, it's written there but it's a working number, it's something for us to make sure that things are advanced, but it's not illegally found deadlines. Just want to make sure that we enforce and make that clear to all the practice. No one will be held to the 7 days deadline.

DCh: On behalf of Kelly, we would like to suggest 30 days prior.

End.

7. TAG – Next Meeting

Supplemental Material: None

Presenter: Robin Allard

(Discussion of timing for May TAG meeting)

Consensus - Will set placeholder for Wed May 24, afternoon.

(Discussion of timing for June TAG meeting)

RA: Previously penciled in for week of June 26 (June 26 – 30) for in-person meeting in Rankin.

Discussion that wind farm site visit is June 19 week. Discussion of possibility to do both that week.

Discussion of TAG week of July 3.

Consensus – Will set meeting for June 27 – 29 (Week of June 26).

SA: For next meeting, maybe all should review the TEMMP and make comments.

RA: We will send a version for comment.

8. Roundtable – Day 2

Supplementary Material: None

Presenter: All

DK: I have been talking with Agnico Eagle for 4 years now. We are been working to get the traditional knowledge and IQ, meet that with technical knowledge to work the 2 together. Technical information and language, we're trying to explain it to the locals, but it is very complicated. For the last 3 years we've been trying to get the local communities where we have a group of elders. We find out what the community may be thinking. We get those grouped together, and we meet with them. To talk to them about concerns. We get a bit more information on the community through them to get that information into higher level. But to take the higher level down to our local level, it's complicated. Those of us who are Inuit, trying to understand, try to explain it to our local. Me, Robin,

our supervisor, we come together after we meet with the elders. Trying to get the technical language into our local language. Going through that now with elders, once we get that technical information to a simple information so the elders can understand, they will support. It's not all negative from elders or local people. We are not doing everything for ourselves anymore. We are doing everything we can for our grandchildren.

End.

9. End of Meeting

Next meeting dates:

May 24th, 2023 PM – Online
June 26th - 28th, 2023 – Rankin Inlet

Meeting Minutes

Topic:	Meliadine Terrestrial Advisory Group - Agnico Eagle
Meeting Date:	May 24, 2023 at 13:00- 17:00 CT
Location:	Microsoft Teams (teleconference)
Meeting Chair:	Robin Allard – Agnico Eagle (AEM), Community Consultation Specialist
Attendees:	Kim Poole, RPBio. – Aurora Wildlife Research, Caribou Specialist (KivIA)
	Anne Gunn – Caribou Specialist (KivIA)
	Dan Chranowski – Matrix Solutions Inc. Wildlife Biologist (Northlands Denesuline and Sayisi Dene FN)
	Harold Putumiraqtuq – Baker Lake Hunters and Trappers Organization (HTO)
	Raymond Mercer – Nunavut Tunngavik Incorporated (NTI)
	Daniel Haney – Government of Nunavut (GN)
	Matt Gillman– AEM, Environment Superintendent
	Sara Savoie – AEM, Environment General Supervisor
	Helene Boulanger, RPBio. – AEM, Environment Specialist
	Greg Sharam – ERM, Caribou Specialist (AEM)
	Nina Morrell, RPBio. – ERM, Wildlife Biologist and Spatial Analyst (AEM)
	Leilan Baxter (AEM) – *record keeping*

ACTION ITEM SUMMARY

Action Item	Summary
May 24, 2023 – 1	AEM to provide detailed Table of Contents for TEMMP revision, for review.
May 24, 2023 – 2	ERM to provide AEM figures for proposed noise, behavior, and camera monitoring locations around site in support of evaluating caribou response to light duty activities during Level 3. AEM to circulate to TAG members once ready

MEETING TRANSCRIPT

Note: All supplementary material referred to in the meeting minutes is provided to the TAG Members by email for review.

This meeting was recorded for the purposes of transcription, without objection.

Slides were reviewed by the presenter as indicated. Supplementary discussion and comments for each sub-topic are documented here.

1. Meeting Greetings and Roundtable

Supplemental Material: None

Presenter: Robin Allard

2. TEMMP Update

Time: 1:12 – 1:55 pm

Supplemental Material: ppt file titled "Terrestrial Environment Management and Monitoring Plan Revision – Terrestrial Advisory Group, May 24, 2023"

Presenter: Sara Savoie

Overview of Current TEMMP - *See slides 3 - 5*

Proposed TEMMP Revisions - *See slide 6*

Targeted Path Forward for Revision - *See slide 7*

AG: Why the separation of monitoring from mitigation when they are so closely tied together? Changes in the monitoring immediately trigger changes in mitigation. Can you explain further and explain any risks?

SS: We are flexible, but we proposed this approach to facilitate the search for information within the TEMMP document. True that one doesn't go without the other. A table in the TEMMP would summarize sections of monitoring with the measures associated and how they are intertwined.

HB: This is also to make sure that we can find information quickly in the field. We don't need both volumes. There is too much information. We would carry what we need. Both volumes are still dependent between each other, but it's to facilitate finding mitigation measures applicable at the field level.

AG: I can see the risk of having a document too large that's hard to navigate. Perhaps reducing repetition. Another approach would be to have a volume specific to caribou with monitoring and mitigation. Usually when we are looking at the document it's for a certain species or group of species.

HB: Like that idea of having the volumes by species in some cases. However, if we have construction, we can't just focus on one species. This is why the mitigation approach was suggested.

AG: As you say, another possibility might be monitoring/mitigation for the road, the mine site, a certain aspect. You could achieve that by having the volumes by wildlife grouping, and then structure it with colour coded pages that would allow people to flick to caribou-mine site or caribou-road.

KP: Approach for dealing with caribou is quite different from approach for birds. Restructuring the document is great but where do we discuss changes to triggers, or update mitigation measures that might have evolved since the time the TEMMP was developed.

SS: Are you asking where in the document do we see changes from the previous versions?

KP: Not where we see them but if we will have general discussion on what changes will occur in this next version. You are not just restructuring to move sections around. I assume there are

changes to update things that have not been working well, new information that came along, different kinds of monitoring that may be triggering different kind of mitigation or changes to mitigation between version 4 and 5.

SS: Yes, we will identify those changes in the draft to be submitted in June, and up for discussion by then. The floor is open if there are specific topics you would like to discuss.

KP: Nothing specific, but over the years, KivIA has made comments on changes that could occur. It would be good to review those. We can discuss when appropriate.

SS: In annual report, we do have sections where we keep track of various parties' comments and how they were addressed.

RA: The intent is for the TAG to have that those discussions, but we wanted to provide the format first to go from.

GS: About the document organization, I understand where Anne and Kim are coming from with organization by species. We tend to write them for regulators who want to see a package of mitigation around a particular species, in this case caribou. But for the person trying to implement it on the ground, they need a section on the activity, which needs to include all the rules for various species etc. I can't be flipping through to see all the mitigations for different species. Need an index or table for a species and list all mitigations and which section to go to. To make it applicable in the field it needs to be organized by activity type.

DH: Could have 2 documents: regulators and field staff. AEM staff don't need project overview and regulatory compliance, but they need to know the protocols to follow, quick reference document easy to consult. Then, have a complete document for regulators.

SS: Part of this point of view is in our existing culture. We have management plans and then for field personnel we provide SOPs.

DCh: As Daniel mentioned, one official document and then a field manual with the activities and the mitigations for that activity as Greg has said.

AG: I like Greg's suggestion of separating e.g. roads from other activities like at the mine site with clear section with coloured margins. My emphasis is just to keep monitoring with mitigation, and whether that is achieved by species or activity that's fine.

GS: Species groupings, is it really only caribou that we're concerned about? Do we need to separate out the other species, or just caribou? That could be one section that could stand separate from the others.

AG: I was basically thinking caribou/muskox, birds, other wildlife, basically carnivores. Much of the monitoring is focused on caribou so to me it's logical to have a separate volume on that. But equally a lot of focus on roads. But I wasn't suggesting individual species.

GS: Could have a summary for caribou, listing mitigations, links to where to find more information e.g. to road section, which would have all the information for all the species.

KP: Caribou is a lot of our focus. I like the idea of the summary, but a lot of it is decision trees, diagrams, figures, and I wonder if a clear figure or several would help summarize this thing. Incorporate short form type of monitoring, triggers, mitigation, etc. then you could refer to it elsewhere. Anne and I are of course largely dealing with caribou but that's not to say the other species aren't important. But I get worried if we start having 6 or 7 species groups.

GS: It will get repetitive.

KP: Maybe a way to approach is a figure summary that links everything together like a flow chart or decision tree.

SS: That is something we were thinking about, a summary table. We would consider putting more visuals like figures.

DCh: Field staff would like to have a summary in my experience, easy to use with colour coding. Separating mitigation and monitoring make it easy for the field staff to apply it.

SS: The common thread would be to make the document efficient for end user whether regulator or field staff, improving our document and navigation aids. The idea to have an appendix or some sort of field-oriented companion document is something we will look at.

GS: Maybe have an introduction with species summaries, then organized by activities later in the document. Would need to be very organized to make sure things match. Starting with species overview and field components, we need to be very detail oriented, so we don't end up with things being different between sections.

DH: I think what Kim was getting at was where in the proposed revision schedule is there an opportunity for discussion on changes such as decision trees.

RA: Our intent is to make a draft that we will discuss in June, and further in October. Those opportunities would come after middle of the draft. By then, we would do our end to get the work done, but we are open to suggestions. The process is a big exercise, we want to cut it in piece and keep working on this.

DCh: We have over the past while made some comments to Agnico about the TEMM. If those were recorded, I would just suggest following up on those comments and address them during the revision that those be addressed. We can see that they were looked at.

SS: Will keep that in mind to clearly identify where the TAG comments were accounted for in the new draft.

End.

3. 2023 Caribou Migration

Time: 1:55 – 4:10 pm

Supplemental Material: ppt file titled "Meliadine Caribou Migration Protocol, May 2023"

Presenter: Matt Gillman

Caribou Migration Basics - *See slide 2*

Protection Zones - *See slide 3*

Meliadine Site Work Suspension Protocol - *See slide 4*

Permitting Activities During a Work Suspension *- See slide 5*

Meliadine AWAR Traffic Suspension Protocol - See slide 6

Communication - See slide 7

Caribou Migration Readiness - See slides 8–10

DCh: I can sense the passion of the environment department in minimizing disruptions to caribou and operations. The diamond drilling decision to is a good one because of the high noise level. You mentioned that sometimes when a decision is made by the environment department about a road closure with restrictions, is that a documented decision?

MG: When the road is technically open under the TEMMP protocols, sometimes the environment department puts extra restrictions justified under the circumstances of caribou coming closer, or only authorized certain type of work, or allow specific users. Yes, it is documented.

DCh: Is that related to the sign off page of the MEL-ENV 0015 page in the last part of the TEMMP, you are referring to for the caribou migration decision?

MG: No, it's an internal document.

SS: For context, we're trying to separate our management plan and our reporting. We do have a lot of meetings related to caribou migration readiness plan (management) or toolbox meetings (staff). All these events are documented and signed off. They are not included in the TEMMP as they don't bring much value, but we could include the template. The management plan might not be the best place for that type of information.

DCh: I just wanted to make the point of having decision documented so if we had the situation before, it could be referred to and help for future operations.

MG: Yes, and it is really our way to keep control over the road situation when the road is technically open. To learn from it or reflect so we're setting this precedent of what we typically allow on the road during restrictions, and can be referred to in the future for others to make decisions with.

AG: First question: The 100 m trigger distance from the road was discussed at the last meeting and considered too close. Should be a consideration of 500 m of the threshold? Second question: It is useful to know the AEM's steps for caribou migration readiness, but it would be useful to have a summary of the post-mortem included in the annual report providing key information about point of view from people on the ground and how well the monitoring and mitigation are working.

MG: Regarding revision of the thresholds, that will be part of the TEMMP revision to be discussed in June with the commitment 38 deflection memo results. And how the data produced in that memo are tied to the threshold to guide the final decision. This is what it can be incorporated into the TEMMP. 100 m is short, but 300 m was suggested to be a more suitable threshold based on camera and behaviour monitoring data presented by ERM. Through discussion with the KivIA and the numbers coming from ERM studies, 25 or more caribou within 300 m of the road is what we would practice in the field, Greg?

GS: That is exactly right. We had a brief discussion about that in Winnipeg. We are definitively seeing a step change at 300 m difference in numbers and in behaviour.

MG: For the second part of Anne's question related with proving the result of the postmortem. I suggest we do. Do the postmortem, review the results with the TAG, then provide those results in the TAG annual report at the end of the year.

AG: Yes, for the use of the TAG because it can be discussed, and any recommendations get carried forward as a result of the discussion and appended to the NIRB annual report.

MG: I agree and would like to do a TAG meeting on the how the Meliadine caribou migration postmortem went.

KP: Good discussion on this distance from road threshold. I like where it is going. There are many components that ERM and AEM are contemplating. One is that the actual collars didn't seem to fit into the triggers. Meliadine has never really had a haul road, but with Discovery coming, there will be. Also, those 5 km circles, I can see the rationale, but it seems to me that merging them makes more sense. It is too fine scale at the outer edges and caribou can move quickly so the distance is not good. Other thing, I hope the TEMMP can capture is the 2 main periods of caribou presence: post calving, which is clear. Those animals are important because that is when hunting takes place The other is the rest of the year when they are scattered around at lower densities when hunting is more limited. Your approach to these periods might be different.

MG: We will need further discussion about Discovery Road and haul roads. On the 5 km circles, it would be logical to merge them with the current footprint. But if the mine becomes more spatially extended with the satellite deposits, having this structure to break these areas up makes sense.

GS: On the TEMMP template, we could be having the history of some sort of mitigation what and why we are doing like 100 m, 300 m, 500 m and the reason for those distance. My suggestion would be to put all of that into some sort of project history appendix so it's there but not in the plan itself.

AG: Maybe a separate appendix or volume all together.

GS: An example would be the Bathurst Caribou Range Plan. They had separate documents that were supporting documents that could include things like project history or detailed methods with various volumes.

AG: You can put all the details in a very practical approach.

Previous Years "Light Duty" Activities During a Work Suspension - *See slide 11*

AG: At what stage will we talk about how to monitor the sensory consequences of these proposed changes from the point of view of caribou?

MG: Worth having the discussion today. It's the view of AEM that we haven't seen an impact from these activities in the past. The caribou are virtually far enough away. Will show drone imagery. The whole site is enclosed by the infrastructure, storage facilities, TFS, eskers. There is improvement to be made in how sensory/behavioural impacts can be assessed. In term of if we do proceed with these activities this year, what monitoring will we have in place specifically to assess the realization of a risk through the sensory data and any behavioural impacts that may or may not occur.

Proposed 2023 "Light Duty" Activities During a Work Suspension - *See slide 12*

Overview of Work Areas and Expected Caribou Locations *- See slide 13 – 14*

Light Duties – Feeding the "Buggy Bin" - *See slide 15*

Light Duties – Haulage to the "Automation Pad" *- See slide 16*

Overview of Work Areas and Expected Caribou Locations – Mill Extension *- See slide 17*

Overview of Work Areas and Expected Caribou Locations – Temporary Tailings Storage Area - *See slide 18*

Overview of Work Areas and Expected Caribou Locations - *See slide 19*

MG: Would like to get agreement of the TAG to carry out these activities this year. Day to day still approved in consultation in others. Greg any comment on monitoring feasibility and availability?

GS: At the last TAG meeting, Anne mentioned moving some monitoring away from road and towards the site, so this would fit. In the behaviour work that Nina does, there is a disturbance field that she fills in. Depending on the activity, we would make sure to fill that in. That would be the only change we would need to make to the behaviour study methodology to accommodate a shift back to the mine.

DCh: Decibel ratings, we have been talking about the need for more noise monitoring. This might be a good application for that. Without doubt, when you shield an area with sea cans that will reduce the distance those noises can be detected. So, doing behaviour monitoring with noise detectors then compared to noise detectors that are further away from the mine.

MG: Greg could you comment on what you think could be useful around noise monitoring?

GS: A lot of the noise monitoring conducted at site so far has been related to health and safety noise monitoring. The focus is on how noisy near the camps is. What Dan was asking for were additional stations further from site to monitor for what noise is leaving the site. I'm not sure where AEM position is with that, but this is something we could look into.

MG: Leilan, do you want to add anything?

LB: With regards to the noise monitoring, historically it's been set up to capture noise at the site perimeter. If we're interested in monitoring noise related to a certain activity that's certainly something that could be looked into.

GS: It seems like there's already been a discussion around noise monitoring with the windfarm. There would be some baseline done for that further away from the project site. Those would be the 2 parts: How noisy it is at the project boundary and how noisy is further away from these activities.

AG: Greg, where would you anticipate measuring the ongoing sound and then the sound at different distances where you were expected your sampling efforts, your monitoring sites. Where will Nina be monitoring behaviour and where would be the cameras to monitor the caribou approach. Could you come up with a summary from either the observations data like the road surveys, the collars when they cross through the site and what pathways caribou take crossing through the site?

GS: Leilan would know the locations of the current noise monitoring sites. The plan for the behaviour monitoring and for the camera monitoring need some planning. We need to come up with a draft plan on where to put the cameras and circulate that back to you.

AG: I must have misunderstood; I thought this year there was going to be a different approach to sound monitoring. Have more use of noise monitoring, rather than the ongoing monitoring of sound profile at people's cabins. I thought there was going to be a baseline with more receivers. Given the uncertainty about where the windfarm is going to be, where that sampling effort would be.

GS: That is something that has not been thought through yet. There has been a conversation around the windfarm, about building up some more baseline data around the windfarm, which was going to include behaviour, cameras, and collars analysis. It will happen before construction but not this year. In response to TAG comments, we were thinking of moving some of the monitoring for the behaviour work and the camera work back towards the mine site. Until now, it has been mostly on the road.

AG: That would be useful to focus that monitoring given these changes in the light activities. I have 2 questions about them. Are the tailings dry? Do they produce dust when they are stacked

near the processing plant? How essential is to the mine operation to be extending the processing building? Can that be deferred until after migration?

MG: Tailings are dry stack at around 15% moisture. Dust is correlated to wind. The idea would be to keep the tailings below the elevation of the top of the sea can for that reason. That risk was identified by our environment team as well. Because the area is sheltered anyway, the idea is it would be acceptable, as long as they are kept below the walls. So, there is no exposure to wind. Also, have a system in place to ensure they can be re-wetted tailings with the sprayer system to keep dust down as necessary. Dust mitigation has been considered and mitigated through those measures. For the mill extension work, it is not considered essential, but it has to be done in the summer. Like I said, it is 1.5 – 2 M to operate the site per day. What we need to operate the site is those other 3 areas, so it is the least important of the 4.

AG: Wind flowing over the top of the double stacked sea cans could create a local vortex. If you have got water spraying available, you have thought to avoid vortex? Because of a consideration for the driver of any vehicle.

MG: What I can commit to is ensuring that dust mitigation protocols are in place and if dust is an issue, it would be shut down immediately. None of us wants dust produced on site for wildlife, environmental, and health and safety reasons. If this work is to proceed thorough dust mitigation, we would have to be in place and monitoring. If the mitigation was not proper, the work would be shut down.

AG: I know it's a short construction season, but I wonder about the wisdom of including extending the building as a critical to mine activity.

MG: As I mentioned, I agree it is the least important especially when we are thinking about systemizing this in the TEMMP in term of what is essential. If we, as a group, feel this one is extraneous, that would be the one we would remove from the list.

AG: Earlier this morning, we talked about the TEMMP having clear definitions. Depending how you define the classes of the proposed light duty activities to critical is a matter of definition.

MG: I agree, let's leave it there, and we can circle back.

DCh: About noise measurements, on behalf of the Dene First Nations, we have talked about the need for more baseline measurements in our technical comments. In this case, it lends itself to an opportunity to take those measurements. The sea cans are a great thing to do to dampen the noise. The baseline measurements have been done in the past for health and safety and within the range of human hearing. We have been talking about looking into getting some baseline measurements that are not within that range. Understanding of course that there are no regulatory guidelines for that, it is to document what may be out there that we may be missing. Also, we know sea cans are made of steel that causes some echoing. I was interested to hear what you were saying, it dampens the noise, I'm sure it does. I still have some reservations about that noise echoing within a steel wall and whether that continues to happen daily.

MG: Lot of good acoustics questions. I agree for the noise monitoring. The question becomes if we collect data, what do we compare it to. But it is better to have the data than not. For us, the plan is to do more camera monitoring and behaviour surveys around the site. Right now, the noise monitoring is related to the cabins. The proposed monitoring the windfarms is also partly related with cabins. I would suggest that this year with these light duty activities, we set up 2-3 noise monitors specifically for caribou monitoring purposes associated to the light duties, and just allow the essential duties. Because there is noise related to running the gensets to keep power on

in the camp, I would propose we do what Greg is proposing. We add a small number of noise monitoring sites not for cabins, but for caribou. Leilan, what do you think?

LB: Like you said, the existing noise monitoring program is set up to essentially compare what the predicted noise levels at the cabins were going to be from the FEIS to what the actual noise levels are. I don't know if there is a similar comparison that could be done regarding the locations of these light duty activities. We could set up the monitors then we would have some data which is better than not having it. I will have to look into what the analysis would be there.

MG: Yes, I'm not sure what the analysis would be, but maybe that's another item we could add to the June TAG meeting or a totally separate TAG meeting. There is a lot of question related with the TEMMP revision. But I think it would be a good complement to what Greg and Nina are doing in the field. I just wanted to validate that there was no roadblock to getting the monitors set up. I mean availability, but I'm sure we can find some somewhere.

DCh: Yes, we can talk about this further.

AG: Greg and Nina, were you at the North American caribou conference? Did you learn anything about monitoring sound and soundscape from caribou perspective? Did you learn anything that could be done this summer compared to what is being done in the NWT around Ekati?

NM & GS: No, we were not.

GS: We know the folks doing the noise monitoring in NWT and could reach out to them.

AG: I could reach out to Megan Perra, she is doing her PhD on soundscapes for the Bathurst Caribou Range. Her work could be applicable to the windfarm, the mine site, and these light duty activities. And how they impinge on the caribou soundscape.

DCh: That is the research I was thinking about. It is emerging research, but we may measure here then could be used down the road. Baseline monitoring would be very helpful.

GS: Happy to reach out and make connections. The only concern I have is whether the standard monitors at site would measure a broader frequency range that Dan is talking about, or whether they are specific to dBA?

LB: They do measure low frequency if that is what you're referring to.

DCh: I was thinking of the ones mentioned in the FEIS. Those models only go to 30 dB, and the lowest is 5 or less. The research also mentioned higher frequency as well as lower frequency that the caribou might be responding to.

GS: Research are needed there. I think we will come up with a plan in term of where we would be monitoring behaviour and the cameras then circulate to AEM then to the TAG.

AG: Could you present a diagram about caribou movement through the site then where you plan to intercept them. I would strongly suggest that if you are getting audio recorders, you either pair them with the cameras and/or the behaviour monitoring so you can link what the caribou soundscape might be with how the caribou are behaving. If I can help you with Megan Perra, I am working with her. We could set up some conversations that would be helpful to you.

MG: Whenever ERM produced the schematics, AEM will review then we can circulate that to the TAG members. Does that sound like a plan? We will add the noise monitoring stations after a discussion with Leilan. A figure for the noise, cameras, and behaviour monitoring locations, we can circulate that and review at the next TAG meeting, assuming it's done. Dan, with your question on the sea cans, I had the same question. I did some research, Montreal uses them for

construction activities and road demolition. They have used them as sound barriers almost in the same set up we are using them to keep the noise down in communities. I didn't get as far into the research as the actual acoustics, but we'll look into it a bit more to see if a) the theory is valid, it seems that there are other applications and maybe research is available. B) if there's anything we can do to improve the efficiency or any alternative.

DCh: This is what hockey arenas do. They are made of steel, and they put in those sound baffles. It dampens the noise as steel produces a lot of echoing.

MG: This is what we ultimately what we are trying to do, dampen the noise. Ok, we will try to get that monitoring plan in place for this year, less than a month. Greg, can we do a plan before June 15th in term of monitoring around site?

GS: What we are looking for is a map where the caribou are moving through site and where we plan to be monitoring them for behaviours, cameras, and noise monitoring equipment. I don't think that is a problem.

MG: Any more questions on the light duties for this year? I want to find alignment on the light duties and the next step forward. We are going to reflect on what was discussed and think about the mill extension seriously. We need to be clear on what activities are essential. The decision is going to be coming from KivIA. We will continue that discussion with Jeff, Craig, and Luis and keep the TAG informed on what comes out of that discussion on the mill extension being included if we feel that suitable. Greg, how would you visualize developing a systematic approach to light duties. They are not described in the TEMMP and would like to release a description of the system. It is the intend of the be a management plan to describe how TAG operates, how the day to day operates in the higher level of approval. How to incorporate that into the TEMMP?

GS: What I have seen in other projects is an approval process. These management plans need to have some day-to-day flexibility or smaller scale decision making process. How do we establish what that process is. Who AEM is talking to in this case, so KivIA and HTO. How are they assessing the risk to caribou would be. What mitigation are put in place. How that approval happens in terms of email for example. Then, how results are reported to the TAG and as part of the annual report. We would be putting possible steps. A small amount of flexibility for the project and a system that could be followed that everyone understands. This might be something we could put together in the early drafts of the TEMMP. Then the TAG could discuss the process.

End.

4. **Waterline Construction Plan**

Time: 4:10 – 4:42 pm

Supplemental material: ppt file titled "Waterline Construction Plan During Migration"

Presenter: Helene Boulanger

Construction Phases – Caribou Migration - *See slide 3*

Overview – Waterline Project - *See slide 4*

Construction Phases – Caribou Migration - *See slide 5 – 6*

MG: To summarize, we will follow the TEMMP for construction work closures. As the main mitigation, our strategy was avoidance of anything that would be an obstacle to caribou

movement. Strong focus on working with a local monitor, high-quality optical equipment. Ensuring we know where the caribou are at all times so we can advise the construction team.

DCh: This is coming together; I like this idea of limiting to a certain activity with consideration of the caribou crossing. When it comes to the monitoring, in the past you have just done monitoring from inside the truck?

MG: Yes

DCh: In areas I have done monitoring, the truck is a good platform to increase your opportunity to see further. You can put a little cage, so a person is not going to fall off. You can improve your distance by using the height of the truck, that can be helpful to see as far as you possibly can.

HB: We were planning to find locations. In some areas, we might need to get out of the truck to access those areas and to climb up. We would like to have local knowledge to locate those areas depending on where we are along the AWAR.

DCh: Yes, obviously if you're going to walk up to a higher observation spot that's going to be the best thing. But I know in other situations the truck can be useful.

KP: Construction is often more disturbing to wildlife than operation during the post-calving migration. Most caribou, if they are passing through the area, they will go over the road somewhere. If it is a typical post-calving migration where they come through in less than 3 weeks, what about if the collars and observations suggest caribou are coming through, just shut down the operation. Once the main slug of collars and caribou have gone though, it is going to be essentially wide open for work. Some people could argue that disturbance along the road could have far greater impact to the animals than disturbance at the mine site such as the light activities you were discussing. Is there a way to compartmentalize to reduce the risk of extra disturbance or disturbance at the wrong time when the animals from whatever distance or direction are trying to move through?

MG: During those Level 2, when we are technically authorized to do work because there is no 50+ caribou within 5 km, but we see a big slug of caribou moving in, we are not going to authorize to do any work because we don't want to set ourselves up for failure. Those considerations go into whether we authorize to do any work. It is going to be based on people observations, movement, and patterns of caribou. We don't want to start work when we know tomorrow there will be 100 000 caribou on the road. Those considerations will go into the decision to start work or not on each day. At the same time, we want to take advantage of any opportunities to do the work, because we only have two years to do the work and we can only work during the short summer. We are going to work with what we got but take decision based on collar data, KivIA, KHTO, community feedback to know where the caribou are.

KP: Fair enough, when would you be starting construction?

MG: It started last week laying bedding between KM 27 – 30.

KP: The 2nd year would be winter 2024. I assumed Jan – April 2024 but you just said 2 summers of work, so we're talking far end of 2024?

MG: Yes, Oct 2024 they will be wrapping up. They won't be doing any winter work just because of settlement concerns. We were planning on starting later in the year. It has been the earliest freshet since I have been here. About a month early this year relative to the average time and we get snow melts and bare tundra in May. First week of May we had our full out freshet. Will see how that will impact caribou migration patterns. Having the tundra green up earlier.

MG: Circle back to previous discussions regarding mill construction, I checked with the general manager, and it is considered important to the future of Meliadine. The sooner the mill extension gets completed this year, the sooner increased production rates can occur. But, it is not essential in the spirit of light duties. We agree to remove the construction activities at the mill extension from the list and just focus on the other 3: the tailing storage, the automation pad, and the buggy bin.

End.

5. Round Table – Open Discussion

Time: 4:42 – 4:52 pm

KP: Meadowbank has been challenged with fuel storage during shut down. But the fuel storage capacity at Meliadine is sufficient so we don't need to throw in fuel trucks coming from Rankin Inlet often if at all during the core of the migration?

MG: Correct, to date we haven't had to. Robin, can you explain the differences between the sites?

RA: The needs for fuel are different for both operations. There is more open pit operations and roads for Meadowbank. The fuel consumption is greater. The timing meaning there is more needs to generate heat, it is blizzard season. The consumption at Meliadine is less, the capacity is less, but we can catch up quicker. The road is shorter. With the 100 km from Baker Lake to Meadowbank, and another 60-80 km to Whale Tail. Historically, Meliadine has never had the specific to do fuel convoys.

AG: Useful discussion and much appreciate flexibility. When are we going to see ERM's plans or revisions to the TEMMP?

DCh: Movement and willingness to listen on all fronts. Does anyone know the status on the collar caribou analysis memo?

MG: Our lead on that is not here, but it's going well. Will have an agenda item in next TAG meeting in June to review the preliminary results of the memo.

RM: NTI will have a new director for wildlife and environment starting Monday. We will be able to tell whether NTI will sign on with the TAG officially.

MG: Kim, total fuel storage capacity is 35 days of fuel onsite when tanks are full. Part of readiness plan is to get them full for June to July. From AEM, this has been a pleasure, challenging discussions, how to interpret different data, but setting ourselves up for best likelihood of success. Thanks to all for being here and contributing.

SS: Next TAG dates are 26 – 27 June in Rankin Inlet, with site visit on the 28. Will be sending placeholders and logistics information shortly.

RA: Manon and the Permitting team saw the opportunity with everyone in town to do a workshop on the Meliadine Extension specifically on the 28 (shared site visit) and 29.

End.

The next meeting of the TAG will be scheduled for June 26 - 28, 2023 (in person - Rankin Inlet and site visit).

Topic:	Day 1- Meliadine Terrestrial Advisory Group - Agnico Eagle
Meeting Date:	June 26, 2023 at 9:00 - 17:00 CT
Location:	Katimavik Suites, Rankin Inlet, Nunavut, and via Microsoft Teams (teleconference)
Attendees:	Craig Beardsall (CB) – Kivalliq Inuit Association (KivIA), Land Officer
	Anne Gunn (AG) – Caribou Specialist (KivIA) - Online
	Dan Chranowski (DCh) – Matrix Solutions Inc. Wildlife Biologist (Northlands Denesuline and Sayisi Dene FN)
	Eva Elytook (EE) – Baker Lake Hunters and Trappers Organization (HTO), Vice Chair
	Harold Putumiraqtuq (HP) – Baker Lake HTO, Chairperson
	Raymond Mercer (RM) – Nunavut Tunngavik Incorporated (NTI) - Online
	John Tatty (JT) – Kivalliq Elders Advisory Committee (KEAC)
	Brad Pirie (BP) – Government of Nunavut (GN)
	Robin Allard (RA) – Agnico Eagle (AEM), Community Consultation Specialist
	David Kritterdlik (DK) – AEM, Inuit Qaujimajatuqangit and Wildlife Advisor
	Janice Aggark (JA) – AEM, Community Liaison and Engagement Advisor
	Matt Gillman (MG) – AEM, Environment Superintendent - Online
	Sara Savoie (SS) – AEM, Environment General Supervisor - Online
	Helene Boulanger, RPBio. (HB) – AEM, Environment Specialist - Online
	Greg Sharam (GS)– ERM, Caribou Specialist (AEM)
	Nina Morrell, RPBio.(NM) – ERM, Wildlife Biologist and Spatial Analyst (AEM)
	Kaitlyn Paul (KP) – Independent Reporters, Stenographer (AEM)

ACTION ITEM SUMMARY

Action Item	Summary
June 26, 2023 – 1	AEM to send TEMMP Draft 1 in September after the NIRB hearing. TAG members meet in person in Winnipeg to discuss the comments received, which would tentatively be late October.

MEETING TRANSCRIPT

Note: Due to caribou presence closing traffic along the AWAR, the AEM Environmental Department's representatives were unable to attend to the TAG meeting in person at Rankin Inlet.

All supplementary material referred to in the meeting minutes is provided to the TAG Members by email for review.

This meeting was recorded for the purposes of transcription without objection.

Slides were reviewed by the presenter as indicated. Supplementary discussion and comments for each sub-topic are documented here.

1. Meeting Greetings and Roundtable

Supplemental Material: None

Presenter: Robin Allard

2. 2023 Caribou Migration Update

Supplemental Material: ppt file titled: "2023 Caribou Migration – Terrestrial Advisory Group, June 26, 2023" and video file titled: "Crossing AWAR km 26"

Presenter: Sara Savoie and Helene Boulanger

DCh: The units that you purchased, are they the same type of units that were used for the FEIS, or do they have a different range of frequency that they're measuring compared to the FEIS.

HB: We already had the units at the site. I would have to double-check the range of frequency. We do have all the technical information, but I can come back to you later about it.

EE: Is the video from today?

RA: It was taken June 19th, last week.

AG: How was the video made? Was it from a truck parked on the road or one of the cameras?

HB: It was taken with a camera along the road and zoomed in. It looks very closely, but we are not, this is the zoom.

RA: What would be the distance of the truck?

HB: I don't have the information right now.

DCh: Probably at least 100 m away. If you have a high zoom, the caribou are not too concerned. Is the picture on the side on the left is the west side, and the side on the right is east or the other way around?

RA: Which way are we looking at.

HB: You are looking south right now, so on the left it's going to be the east side. The mine is in the back of the person that is filming.

RA: What kilometer roughly was that at?

HB: 26.

GS: Robin, how far apart are the nighttime driving markers? Are they 100 m apart?

RA: They are 75 m apart.

GS: So there are 5 of them between us and them.

DCh: It's over 100 m.

NM: 375 m at least.

MG: I went and checked with our caribou monitor who took that video. It was about 1 to 1.5 km away.

JT/DK: On the road, is there something spread on the road to keep the dust down? Is that done on the road?

MG: Not when there is caribou on the road. Throughout the summer and when the road is open, yes, calcium chloride is used on the road to keep dust down.

BP: When was the last application of calcium chloride to the road prior to the caribou migration arriving?

MG: I'll have to get back to you on that one, Brad. It's not applied often, if we don't have much rain, it can be applied more frequently, but it's usually around once a month.

JT/DK: The chemical that's used on the local road to keep the dust down, keep it from flying out, keep the dust down. Is the chemical or material that we see on the road, is that the same kind of material chemical that's used on that road? Because, as we know, wildlife or caribou like the salty taste.

JA: John is asking if it's safe for the caribous when they are eating from the ground.

EE: After the rain.

SS: The product that's applied on the road, it's approved by the Government of Nunavut.

BP: It is approved. It's a standard use. It doesn't pose any health issues. My question on when the last application was more about, like, attractant because it can sometimes happen that the caribou treat the road as a salt lick, and I noticed a few as they were crossing seemed to bend down and were nosing at the road a bit.

RA: Matt will get that information and we'll see when was the last one prior to in the area.

EE: I think it's supposed to be on the GN environment department looking after that. You have to test the soil to see if it's good for animals and human beings.

BP: I don't know who does the tests. I don't think it's us that does soil testing. I think that's Environment and Climate Change that handles that.

EE: It's supposed to be under Government of Nunavut They have to look after the land.

BP: Calcium chloride is a type of salt, and it was chosen as a replacement quite a number of years ago to replace sodium chloride, which is your normal table salt. Sodium chloride, when it gets into freshwater systems, it raises the salinity and harms the fish. Calcium chloride was chosen. It's been tested; it's safe for animals. The only issue that could arise with calcium chloride is as an attractant to road for ungulates and so on, treating the road and the coating on it as a salt lick. But provided that road closures are followed and, you know, traffic rules maintained, it should be fine. There wouldn't be a risk of collisions.

EE: In 2018, my late husband was trying to talk. He wanted animal to be tested because siksiks were licking the chemical on the roads in town. Where is the GN, telling us what to do and yet they're not listening.

BP: Well, I think in town, it is still calcium chloride used which is probably what they are licking. It is safe for the animals, and it won't affect the meat quality at all.

DCh: She was talking about siksiks, the little ground squirrels that her husband observed.

BP: It will be safe for them as well.

EE: There's less than a couple years ago. There used to be thousands of them.

BP: I'm not sure the exact reasons why the numbers might have decreased. I can say with reasonably certainty it wouldn't be the salt itself. Maybe there's additional predators. Maybe there's -- we know that if dogs roaming around, they tend to go after siksik and lemming.

EE: We have millions of dogs now.

DCh: The thing is, I sense that maybe Eva is saying that: Do you know if GN collected siksiks that fed along the road and tested their tissues or looked to see if there were other reasons why they died.

BP: No, we don't have a sampling program for siksik tissue. The tissue sampling programs we have had are when hunters voluntarily bring in a caribou, sometimes a muskox for testing. But we've never had that program run for a siksik.

AG: When GN recommended switching from sodium to calcium, do you have any reports that you can share on the basis for that decision? I'm just curious about it because at this time of year, calcium is as much an attractant as sodium would be.

BP: The decision happened quite a while ago before my time, but I know the decision was made not because of the attractant quality but due to sodium chloride's potential damaging effects from run off from the road into freshwater systems, and it harms a lot of the freshwater ecosystem, raising the salinity. Calcium chloride doesn't tend to have that problem. I'd have to look up and get back to you for what actual studies were used. That would have been at least 20 years ago when that decision was made, but I think it was made almost Canada-wide at the same time.

DCh: Roads in Manitoba and north, they've switched to calcium chloride.

HP: Was that sodium stronger than calcium?

BP: Not necessarily. The reason it was chosen initially was just cost. It's much cheaper because it's so much more plentiful. But it was environmentally very damaging.

RA: It's the best way of managing dust versus environmental impact to make sure we can control dust and not have a more global impact on the environment. So that's why it was the approved product by the GN.

BP: There's a couple of other products, like, I believe Dust Stop, but that's extremely expensive. I believe it's also oil based. It's more a choice for things like air strips.

HP: In Baker, they used liquid on the roads just recently.

RA: The liquid they used in Baker is the same product. It is calcium chloride; they put it in water, mix it, and apply it on the road. It makes for a better application because if you apply it dry, it gets windblown. If you apply it wet, it stays on the road and makes the road harder.

HP: Part of that liquid is still on the side of the road, even in some potholes in Baker, and that's kind of caused questions about it. Because he was saying when he worked on the road here, his gloves used to shrink because of calcium.

BP: There will still be that is the other issue with just about all dust mitigation solutions, is they do kind of have a wear-and-tear effect on things. You've got to make sure to wash the undercarriage of the vehicles that go on them. You've got to clean them off of your shoes, otherwise they'll start degrading, but I don't think there is a product available that isn't going to cause that.

RA: It is s all about the recipe we apply. You can't put too much; you just have to put enough so it stays on the road. That's why we go back 2 times and apply it a couple of times during the years.

MG: Robin, just a quick update. Still working on the exact date. The last application of dust suppression on the AWAR took place between May 25th and May 29th, dust suppressant calcium chloride. So in between that date and this video, there was around 20+ days and quite a significant amount of rain, we had around 80 to 90 mm of rain between that application and this video.

RA: Is there any further questions on the 2023 migration update? They are still ongoing; they're still at it, so we just thought it would be good to have an update.

CB: Just from the last TAG meeting, we were spending a lot of time on the caribou crossing the road and deflection. From that video or from the monitoring, was there anything that you noticed from that, from our last TAG meeting about the question about deflection? How is the behavior to the road? That type of thing.

MG: Tomorrow, in the agenda, we're going to provide the results of the analysis that was focused on understanding deflection of caribou associated with the that was done by WSP. And in terms of what we've observed this year with our monitoring, I'm going to let Nina -- if Nina's in the room, she's been in charge of the caribou behavior monitoring over the past few years including this year, so I'll let her field the second half of that question.

NM: In terms behavior that we see when caribou are near the road, it's not too different from when they're far away from the road, provided there aren't vehicles moving on the road. In the absence of traffic and vehicles, it seems that they behave the same, they're near or far from the road, and that's from, at this point, many hundreds of surveys data collections, both with and without vehicles travelling. And we have surveys up to about kilometers away from the road. What we know is based on this narrow window close to the road. We don't know how different it is when they are more than 2 km from the road, but whether they're on the road or 2 km away from the road, they seem to behave the same. And then, yes, we see a response in behavior when there are vehicles that travel down the road. But what we've seen is that caribou tend respond and then return to a baseline behavior or whatever they were doing before. It usually takes about 6 min, sometimes longer depending on what the disturbance was, sometimes shorter. It depends on a lot of different things: the wind, how far away they were from the road, how many caribou there are in the group, how big the disturbance is, how many disturbances there were, all that.

JT/EE: He said when there are mosquitos around the caribou won't care about the environment around them, because they're running away from the mosquito. When there's wind, they will whatever the things are around the caribou, most of the caribou will follow the wind, even when the wind changes, and they will turn to that.

RA: The comment that John made is that the caribou will adapt their behavior also on mosquitoes and insects being present. They will be moving no matter what if there are insects or mosquitoes

present. And then when there's wind, they may be staying and shifting with the wind just to make sure they can adapt towards that.

AG: It said that the road closure was only until the 22nd of June for the ATVs and the other vehicles. Is that correct or in fact wasn't the road closed when the very large groups were around?

RA: Closed to ATV? Or is the AEM portion closed to ATV traffic or mine traffic?

AG: It didn't specify. It said ATV and vehicles up until 22nd, and I just wondered if that was correct, or did the road open for ATVs but not mine traffic.

MG: In the slide, just to clarify, the dates of the 17th to the 22nd the closure that was done by the GN and the KHTO at Kilometre 8 associated with essentially all traffic, ATVs, community pickups, and then the mine closures were done independently throughout the entire the migration in accordance with the TEMMP and the KivIA road lease obligations. In terms of the AWAR, it's been shut down on June 14th, 17th to 22nd. We were closed. Then the last two days, the 24th and the 25th, those days were all completely closed on behalf of the mine. Then starting yesterday, the KHTO had also set up a barricade at the Char River Bridge and closed the road again in response to that large herd moving in from the east towards the AWAR.

DCh: Thanks, Nina, for your observations. I guess what I did see in the video helped to validate what people said already. My observations were that those caribou were not very disturbed at all. However, those on the road or near the road quite often had their head down, maybe because of the suppressant; maybe not. I guess there could be mild winds there. I'm not sure because there didn't seem to be a lot of movement at that point in time but validate what you say, and we can see this kind of thing. If this was a crossing where wind was maybe coming out strongly, possible we could have seen a large movement of a great number of caribou going across that. This video looked like they were relaxed, and I didn't see a lot of calves in there. It was a very useful video to see. I think it is possible this kind of thing could help us all, with these videos that show that behavior and help to validate what people around here have been observing for a long time.

EE: If they're mostly bulls, elders won't really like the herds, knowing they won't be caribou. Elders used to like the female and calf, and young ones herd, to see those, because they're knowing that they're going to have caribou after summer. If there's lots of bulls instead of young ones, they won't like that herd.

CB: On May 30th, the north end of Meliadine lake, there was a lot of females. There were a thousand females there, and that's about when they started calving. Just to make a note that it's like a calving ground now, the north end of Meliadine Lake. I witnessed a few calves being born there on May 30th. Just wanted to point that out.

RA: What you're telling us is that they're calving on the north end of Meliadine Lake rather than the calving grounds. Was that because they were early in.

CB: Seems like everything is 2 weeks early this year.

RA: Because of the shift?

CB: But there's a whole bunch of different herds that come meet around here, and I just wanted to point that out.

JT/EE: He said a week and a half ago, he went up the road and catch 2 caribou, and he caught one caribou with a calf inside the stomach. And he was surprised to see that, if it's from the time it changed, or are they late? Or is a month ahead or whatever.

RA: What John mentioned is that he went hunting a couple weeks ago, last week, and he caught two caribou. One was a female, and it had a calf inside. He was really surprised by that. Questioning what's the climate change impact, or so there's a concern from field observations from local hunters.

DCh: There always can be late calving in any given year, but certainly if the calving this year seemed to start earlier, I guess it might have been a bit of a surprise for sure. And the fact that Craig has mentioned that he's observed calving on the north end of Meliadine, in my mind, if that's the Qamanirjuak herd, they tend to be more west.

JT/EE: He said the one he caught has good meat. It had a little bit of fat in it. And he doesn't know if the caribou started walking before or -- didn't walk ahead. Are they late?

RA: The meat was good. There was some fat left, but he didn't know how deep in the migration the animal was at, so how much walking had the animal done or not. He's not sure about that. Was he coming? Going? It's undetermined. Things are different for sure.

End.

3. **Caribou Monitoring Sites – Site and AWAR**

Supplemental Material: 2023 Caribou Monitoring Sites Map

Presenter: Helene Boulanger

RA: I distributed the map around the room, so any question on location or what's around there? One of the discussions we previously had was to show where the monitoring was done, where the cameras are at.

DCh: For the cameras and the locations you have, and the new noise monitoring, I'm assuming you set them up, made sure they were running. Did you go back to check once more again within a week or something to make sure everything was running and moving and so that you wouldn't have a problem with a camera that wasn't going to work even though you set it up just once or something?

NM: I set up the camera. So, no, the answer is we haven't been back to check the ones that are outside of the footprint, and that's because the caribou came, and so we weren't able to get out on the land to check that. But when we have an opening in the next week or so, we're going to get out there and check batteries, SD cards, all that. Normally we would do it in a week, but having the caribou there made it difficult to just go out walking.

DCh: Did you check the noise monitoring too?

NM: I did not set that up.

HB: I know they are calibrated every time we pick them up and put them back in. I'm not a specialist for noise monitoring, I know we take the information every 2 to 3 days.

RA: The battery life is 4 days, so max to 4 days battery life. We have to go back and recheck every 4 days.

End.

4. HTO, Sayisi Dene, Northlands Denesuline – Items of interest

Supplemental Material: None

Presenter: Eva Elytook, Harold Putumiraqtuq, and Dan Chranowski

EE: At Baker Lake, we have huge herds. We were busy with companies, KivIA, everyday meeting. I don't know where all those herds came from. Calving. Some spots and they would move, make calving. Walking to the east. Now we have Beverly herd across the town of Baker Lake, but they are near Pitz Lake walking east towards Kazan River. Most of the spring is always cold for me, and I don't know the rest of people.

RA: From your experience, Eva and Harold also, you feel like the fall migration will be a big one?

HP: That's what I think. According to IQ the way we seen that migration crossing the road from north of South Lake and the rest of the caribou herds that went past the Meadowbank camp. The way I've seen those caribou walking, I'm pretty sure we're going to have a big fall time herd coming back walking west.

RA: Could this also be the year where a couple of the herds mix? I don't know what that cycle is at, but I've seen that maybe 8 or 9 years ago where we had 3 herds for rut season at the same time. Could this be the year also?

HP: Yes. Could be. I remember the last time before we started hiring some monitors, I went up monitoring the road to Meadowbank with 2 KivIA reps, and that was with Jeffery and Jamie at the time. And during that time there was a big herd coming from Ahiaq and Wager Bay, but they were coming from the northeast sides of Baker, from the camp. And from there it grew even bigger when that north side of caribou and the western got together. And it became so huge. That's the time we had to keep the road closed for 3 weeks or more. I'm guessing it could be another big fall time herd and the caribous that cross Baker right now, I'm guessing they will be walking this way.

RA: In big numbers also.

HP: But that could change too.

DCh: I would probably start by mentioning how some of the new initiatives, it seems that Agnico Eagle is working forwards. The placement of cameras around and noise monitoring are all very positive from the point of view that we still have time to get some baseline information for the proposed windfarm and the Discovery Road. We all need to get that information now when those disturbances have not occurred. I applaud Agnico Eagle for doing those things. From the Dene point of view, there is concern with the windfarm. Overall, my feedback is that it is still a big experiment. There is very little information about impacts directly to barren ground caribou. If we are going forward, then we have to have baseline information: noise, images, and crossings. In that regard, there is a movement from Agnico Eagle to show that willingness and to be dedicated towards the conservation of these animals because the mine is going to be here maybe for 20 more years. The caribou were here before and everybody wants them around later. And that's the big difference. This is the short-term thing, and people here talk about the long-term future. Dene people want the caribou to be shared too and come down to Manitoba every year. With all these still unknowns, I'm glad to see there is still movement to help us understand where things are going to go. One other little minor thing that got mentioned to me was about the images and cameras. Mostly, it's all daylight and we hear that there might be differences at night. I just don't

know if there are any night cameras set up and locations on the road different places. Maybe something that we are missing in the monitoring of what caribou do at night. Well, they sleep maybe, but I don't know.

NM: The cameras we have installed are all infrared and have the ability to take photos at nighttime. So as soon as it gets to a certain level of darkness, they switch to the infrared camera. The photos from that are black and white, but they're very clear, still, of caribou. And what we've seen is that there's just about as much movement of caribou at nighttime as during the day. I mean, there is 2 hr of nighttime photos at this time of the year.

DCh: Lights are up here all the time in the summertime. But then are you not monitoring during the winter?

NM: No. These cameras are only set up for the post-calving season because they are not rated for an Arctic winter. These cameras will not survive in -40C.

RA: The camera will survive but the battery won't last.

DCh: The lithium batteries can last a little bit longer.

BP: Are they still going to be set up during the fall southern migration?

NM: They could be. I think the plan was to take them down after this post-calving season. Typically, we have them up for the entire time that caribou are around in June and July.

BP: I don't think it will be super cold by the time the caribou are starting to head back south yet.

RA: We just don't see them. We would see them at Meadowbank from the Lorillard, but here, the sightings in fall are quite rare. They're minimal.

NM: I think we see the southern movement more in July already. They are out at the coast. What I've seen in the last 4 years is that they go over kind of to the coast around like Chesterfield Inlet, and then after summer or in summer, that's when they come south again. It's not actually fall that we see the second wave; it's more July.

HP: July and August.

GS: The first year, we missed them because they went through and there was a big lull of about a week, and then we took the cameras back and they crossed the road again. Now we leave the cameras out longer into July with the hope of catching those ones as they go west. So mostly they go east first and then they go west across the road further south.

DCh: One of the things related to the windfarm, I know that's a green initiative trying to replace the need of diesel, and while it still won't meet all the needs of the energy, Agnico Eagle has looked at solar and tidal. It doesn't seem to be an option. I'm not sure if they've looked at the run-of-the-river hydro dams where it's used quite a bit where there's lots of water in Ontario. You can pump water through turbines. I guess if you're looking towards going to green energy, look at everything, and I don't know if that's been done, but that would be utilizing what you actually have out here, which is a lot of water, possibly even the water that's used in the ponds here on site, where you can then fill in all the gaps of need for energy, and then maybe you don't have to use the windfarm as much.

RA: For the options that were assessed versus the windfarm and greenhouse gases reduction, that would have to be discussed with the Permitting team. We can have discussion with what assessments and research they did, but that would have to be done with the Permitting team.

DCh: This is something that I did get asked. GN would have to be involved in this.

EE: You have to go to NIRB and Nunavut Water Board and the local people.

DCh: Because it would require the use of water, and that would have to be looked at. It seems to be an option used in certain parts of the country, and minimal impacts, but utilizes water, which is quite abundant around.

RA: Noted. But I don't have the answer to that. John, would you have anything that you want to say or mention?

JT: No.

RA: David?

DK: I'm waiting for tomorrow if this is fine.

JA: Janice in theory will be taking over the role that I had before, so has deep experience and she's been part of HTO for a long while, live in Chester, very focused in Nunavut, so I think it's a very good addition to the community relation team. New to the TAG so I'll give you some time to go around, but basically, we want to make sure that we cover the community portions of the TAG, not forget some of the roles I was doing beforehand. We don't want that to fall into any gaps. Some of the items that Janice and David will make sure that we integrate looking at.

AG: I just have a question about the cameras. I think there were 40 cameras out, happy to see the emphasis on Discovery Road, and 10 cameras at the mine site. Do the cameras still include the three cameras that are dedicated to the traffic monitoring, and if there are 3 cameras dedicated to the traffic monitoring, where are they placed relative to the sound monitoring? Two questions; are the cameras monitoring traffic, and what is their location relative to the sound monitoring?

NM: The 3 traffic cameras are set up, and they're dedicated for traffic just in that they're angled a little bit more towards the road so that they get all the vehicles that pass by, and trigger every time a vehicle goes by. And we tried to space along the road, so one at the north end of the road towards the mine site, one in the middle of the road, and one towards the south. And the only one that aligns with the noise monitoring site right now is would be A8/Cam06.

End.

5. TEMMP Revision

Supplemental Material: ppt file titled "Meliadine Mine TEMMP – Draft Table of Contents''

Presenter: Greg Sharam

DCh: That clarifies it for me a bit. Just the process, though. In the beginning you were saying we're going to talk about this today, and then you'll go back and start doing the draft? But we're not going to talk at it until October TAG?

GS: Yes. The plan would be that it would come out for October TAG.

DCh: No interim period where a draft we would look at in late August or something with a little bit of feedback. Just at the beginning of it or key parts of it? I know how the process goes because that can also slow things down too. I just want it to be clear. If it's not until October, then we all know that's still not the final, and so it would be a draft again.

MG: The idea was to have comments from the first draft provided from the TAG back to the ERM and Agnico by the October TAG meeting. We still need to work on a target date to have that final draft done, but what we had provided in the previous TAG. Depending on how it goes today. If we are ready to go ahead with our drafting of the TEMMP, then what we'd like to do is target end of July or early August to have that first draft submitted to the TAG so that they have a chance to digest it, review it, and provide comments back to ERM and Agnico Eagle by the end of September. And that way we kind of discuss the comments and how we about the first draft and where we want to go on the second draft in the October TAG meeting. We would then take a second revised one based on the comments in October or November depending on how it goes and that would go through a second round of comments up to March, and we would aim to have the file and copy submitted with the annual report in March.

DCh: My only comment to that is, interested parties have to provide final comments by roughly end of July (July 26th). We'll have to prepare a presentation to the NIRB for the Meliadine Extension by August and then, the hearing in September. To look at the TEMMP before that time might be a bit problematic, but certainly after the hearing. But on the other hand, I want to hear from the other interested parties on that, whether that's something they would rather see now than later.

RA: On the timeline, you mean.

DCh: Yes.

MG: Everything we are discussing right now is not about the Meliadine Extension. It is just the TEMMP associated with the currently approved project. I understand you are involved in both sides, so maybe there is an interest to have both pieces of information. But at this point, what we are discussing is just associated with the current project.

RA: I think Dan's comment is, he's busy doing the Meliadine Extension thing, so he may not be able to meet the July-September deadline.

MG: That makes a lot of sense. Why don't we go through the table of contents. We do have a full afternoon, so at the end of this, let's circle back to the timeline and we can discuss what the parties are comfortable with in terms of the revision timeline.

AG: I have a couple of questions. One is about the timeline. If during the expansion hearings there are suggestions for revisions to the TEMMP, will you include them or will you wait for the NIRB report and then have to do a further revision?

MG: I expect what will happen in the revised project certificate is, if there are requests for revisions to the TEMMP, it will be a commitment Agnico makes. Usually, it's 60 to 90 days following the receiving the revised project certificate, and we'll submit revised TEMMP based on the commitments made. So that's how we would propose to go, but the only alternative would be to delay finalizing this TEMMP that we're talking about now until the project certificate is amended. We, at Agnico, are eager to get this TEMMP revised because it's much needed. Our proposal would be to focus on the approved project TEMMP and probably 60 to 90 days following the amendment of the PC, if it is approved, we would likely be committed to providing an additional one with the additional revisions.

AG: My second question is, at the last TAG meeting, we discussed possible structure for the TEMMP. So, Greg, can you summarize this current overview relative to the comments you heard during the last TAG meeting for the structure and why you made some of the choices that you did for the table of contents.

GS: One thing to remember, Anne, is that we do have the separate windfarm management plan that is a commitment of the windfarm application which has caribou in it. The scope of this would be for the mine and the AWAR, and then there would be sort of a separate plan for the windfarm. We may not need to update this plan in response to the application for the windfarm. That might go to the windfarm management plan.

AG: Right. But the windfarm is only one component of the expansion. The expansion includes intensification of mine activities, changes in the traffic, so this may be relevant to the expansion project beyond what happens with the windfarm.

GS: Ok.

MG: I think, Anne your original question was related to the previous TAG meeting. We had a thorough discussion on what we wanted to see changed in terms of structure and organizing sections. I'm going to pass it to Sara or Helene to discuss that. They put a lot of thought into it as well.

AG: That was the point I was making. I'm just curious as to how you reach this structure.

SS: We'll see it in more details in the slides that Greg is going to present, it was based on our discussions during the last TAG where one of the areas of interest of TAG participants was to have the information related to caribou easier found, and as you see in here we have a section that's specific to caribou and muskox. I think your question will be answered as we go in the details of each subsection in the next slide.

HB: We make sure that we singled out the different comments we had at the last meeting. We tried to respond to most of the comments in there, it will make sense as we go through the document. In the caribou section, we did exactly like what was recommended.

AG: Ok.

DCh: About where you have moved down to 1.4, the objectives and scope of the TEMMP. And I guess the TEMMP is put in place because of regulatory requirements. I understand you explained them. It just seems to be, like, the other portions under the regulatory things like commitments to wildlife and Terrestrial Advisory Group, I guess they are not really part of the TEMMP. It just seemed it was a little low in the description of where in the introduction you would put the objectives and scope of the TEMMP. The objectives and scope are kind of related to the regulatory requirements, your certificates and everything like this, and you've already listed them there. I don't know what to think there but I seem to think the objectives and scope should be closer to the beginning when you start talking about things. Almost like you could put that first and then the regulatory background after.

GS: I guess it depends on how you interpret the objectives. If the objective is to satisfy the NIRB requirements, that's a high-level objective. Or if you take the objectives as being detailed objectives that come from the NIRB requirements, we could interpret it either way.

DCh: Is all the objectives and scope of the TEMMP related to the NIRB certificates have to be in there. But then you're saying there's other ones, other objectives and scope that will be shown to be part of the TEMMP.

GS: That is where you list the ones that come both from the NIRB certificate but then there are additional commitments. We will also look into these things, the commitments made at hearings or at the TAG meetings, and then there have been additional requests by the TAG that would also list down. I think that's where you would make full list of your objectives, all the different sources.

AG Yes. If we get this part right, then the TEMMP itself is much improved, so this section really is important. I think one thing that seems to be missing is how the TEMMP relates to the structure and content of the annual monitoring reports, and I think that's a relationship that should be spelled out in the TEMMP even if it leads to some changes in currently how the annual report is structured where the emphasis is on method maybe more than predicted effects. The different ways of monitoring get reported separately rather than to integrate their results and that could be related back to the relationship between the TEMMP and the structure of the annual reports. So that's not so much a comment as a question to you, Greg. Like, do you think there needs to be that relationship spelled out.

HB: What we are expecting to do is very similar to what the existing TEMMP is. For each study, there are no change to that. All the different surveys will be reported. The other part about the objective: each survey within the TEMMP have very specific objective. We might be able to put them earlier because we have to explain the reason why we are doing it. Each survey or program has very specific objective and scoping as well. There will be no information missing, it is simply moved around so it is clearer, and the information is easier to access when it's needed.

AG: I guess it depends really what is in the section on adaptive management and the time scale for that. So maybe I'll just wait and think about it a bit more as you keep going through.

HB: Adaptative managements offers more flexibility. It's what we call a "living document." The TAG is the perfect example of that. If there is any concern, we can still bring it up at the TAG and process it.

AG: Okay. Adaptive management depends on monitoring, and the monitoring gets annually reported, and I think the annual monitoring report could be better structured. I realize that each monitoring method is a response to an individual objective. But that certainly doesn't remove the requirement to integrate some of those to have an overall description of effects that the monitoring is measuring. I will wait and see how it looks as you go through it.

GS: Thanks, Anne. I appreciate the input on that. How we talk about adaptive management and how we report things does influence how the mitigation is done through adaptive management. My vision for the reporting section was about timelines, who it's related to, and not necessarily about redesigning what the TEMMP report would look like. That was sort of outside of my scope for doing this or our scope for doing this. But maybe it begs sort of a larger question about whether there are connections there that need to be described here.

DCh: Just to clarify, the acronym TEMMP stands for the Terrestrial Environmental Management and Monitoring Plan.

NM: Mitigation and Monitoring.

DCh: The plan is the plan, and then there is the TEMMP report, which is the Terrestrial Environmental Monitoring and Mitigation. Those are 2 similar acronyms. One's the big plan; the other one's the report on the plan. Now we have identified that as confusing. We are talking about the Terrestrial Environmental Management and Monitoring Plan; correct?

GS: Yes. Plan. Not the report.

DCh: Only that you got maps. Would be better having actual pictures of sites before they were disturbed, sites after they are disturbed. Again, picture is worth a thousand words.

RA: Understood that the TEMMP is not the FEIS, so it's not the place to refer to initial assessments either.

DCh: True. Good point.

AG: Will the predictions of the FEIS, will that include how those predictions were used to develop the thresholds, or is that in the adaptive management section.

GS: Thresholds for action or predictions in the monitoring section?

AG: Probably both. I mean the predictions are the basis for the thresholds to trigger mitigation. And so that obviously links to the monitoring. Will the thresholds be in this section tied to the predictions of the FEIS or will the thresholds be in the adaptive management section? Does that help?

GS: Yes. We could put those in either section. Is there a preference?

AG: Yeah. Okay. Well, I would like to see them even as a flow diagram tied to the predictions of the FEIS. And my reasoning is, to have that relationship really clear between predicted effects or impacts and then how the thresholds were developed, I think when we get into the nitty-gritty of revisions, based on the annual monitoring to date, some of those thresholds could be revised even while they still stay aligned with, worded very precisely, and we've learned more since then, so perhaps the thresholds should be reconsidered.

GS: Yes. That's a good point. I don't necessarily know if I have an answer in terms of where to put it. Maybe we'll put that in the parking lot for now, and then go through the rest of the sections and we can talk about that some more.

MG: From my perspective, some of this will flush out as we draft the document, but I agree in that we can't wait to talk about mitigations until Section 5 or 6. It needs to be at the front and what were the predictions and what mitigations were developed associated with those predictions. If we are talking about caribou, they might live in Section 4, the caribou section, or they might live in Section 3, but I agree they need to be up front in the document.

AG: Ok.

DCh: Basically, predictions, impacts, thresholds, and then monitoring down the road may show something different.

GS: But the idea around the adaptive management section in the introduction was just to talk holistically about what is adaptive management. I haven't thought yet about where the details of where that would go, sort of the prediction, how that relates specifically to the management plan and what those predictions and thresholds are. We'll need to find a home for that.

DCh: But you did state right here, adaptive management, how it's incorporated into the TEMMP. That's something Anne is asking about. How does that happen. Let's show a clear flow path as opposed to the annual report.

GS: And to address Anne's question from earlier, this is one of the things we heard at the last TAG. We wanted a section specific to the caribou to have everything related to caribou in one place. This is the current sort of thinking. We would start with the caribou monitoring section and list each one of the different caribou monitoring programs. Then there would be a second section which is on the next slide, which could be caribou mitigation.

MG: We were just discussing internally based on Anne's comment. We should talk about baselines and then we talk about thresholds, because thresholds are tied to mitigation and monitoring, but they are not inclusive of one or the other. Just to close that discussion for now baselines would be in Section 3, and then we talk about thresholds to start off Section 4 of caribou. And then we start to talk about monitoring around those thresholds and different

activities, and mitigations associated based on monitoring and the thresholds. That's kind of how we're seeing it now.

GS: Okay. I'll leave it there. That's enough for us to remember what we want for that section, is that it relates from the predictions to what the threshold are and then how the different monitoring would inform those decisions that are being made.

DCh: When we get back to the next slide, you did put down mitigations and then you described something about the actions, driving, flying. My thought is the title would be "disturbances." And then you have underneath that sensory disturbance. Visual, auditory, physical. And so then each of those then would have mitigations. It will be the wind turbines or the road. Each will have a mitigation. So those specific ones you'll be able to list under the physical disturbances, visual disturbances, auditory disturbances, what mitigations came under there instead of going directly to the type of mitigation you're doing. Just to clarify that a little better, I'd like to see something like that.

GS: To organize it by potential effect?

DCh: Because you have vegetation as well. You know? That's a physical disturbance that may occur, and what are you doing to monitor and mitigate.

AG: What happens when Discovery Road comes online? Is that then considered part of the AWAR, or should it in fact be a road caribou migration protocol? Or will this section include the Discovery Road. It's probably a rather picky point, but we did talk at the last TAG meeting about having sections on roads versus the mine side.

GS: Have this as an access roads caribou migration protocol rather than AWAR.

AG: And then earlier you described how there were caribou around during I think it was presumably be non-migratory. It's during the winter, they don't migrate. Will there be another section for "non-migratory," but other seasons, how will you handle this when the caribou are around the mine site and the road during other seasons?

DCh: Seasonal mitigation, possibly. Seasonal mitigation?

GS: Well, from what I understand, the rules apply year-round, we may just want to remove the "migration" word, so it just becomes the access roads caribou protocol rather than migration related. I'm just wondering about removing the word "migration." It's just the mine caribou protocol and the access roads caribou protocol.

MG: I mean, that's how we're treating it now. It's just a question to the TAG on whether we want to the keep it that way or if we want to break it into calving, post-calving, migration periods versus all year round. For me, how it is right now is relatively straightforward and easy to follow, and interpretation of the 2 periods might complicate it.

AG: Biologically and in a practical sense, during the caribou behaviour is so different during migration, and it's a way easier season to monitor and mitigate for when there are very directed movements. When the caribou are in the vicinity, sort of quasi-resident, that is a much more difficult situation because it could lead to. It will have impacts on mine operation because it could lead to extended periods of shut down with caribou just hanging around. In terms of monitoring and mitigation, there's an argument to be made for separating the seasons, largely to accommodate non-migratory and migratory caribou in the vicinity of the mine.

MG: I'm leaning the same way, and I think tomorrow when we review the memo that WSP is going to present, we'll get some good insight on how we can do that. They've applied the collar

data very ingeniously to characterize what is the calving season, what is the post-calving season, what is the range. And it will allow us to classify in the TEMMP when different protocols, like you said, migratory versus non-migratory protocol, when they are implemented through the TEMMP. I like it a lot, so I tend to agree, and Greg's writing it down or written it down. I'm in agreement with that, but I don't know if there's any thoughts from Dene or HTO KIA on that strategy.

AG: You can see the need for this when you look at what happens at Meadowbank and, to a lesser extent, Whale Tail in the summer and fall versus the spring. So that's an example of perhaps the need for more separation based on seasonal ecology.

DCh: That does make sense, to have separate protocols, migration versus other seasonality things. It certainly makes logical sense from the biological point of view.

GS: Okay. And I've just added a piece to Section 4.3 to introduce how the different potential effects relate to the different mitigations. I think there were 4 potential effects. There were habitat loss, disturbance, mortality, and health of caribou, and how each one of the mitigations relate. That could be done either in a table or we could organize the sections that way. The only concern I have about organizing the sections that way so we have a header that says "disturbance," my only worry is it might get repetitive because some of the mitigations might also apply to habitat loss or to mortality. Like, a speed limit on the road reduces the dust, noise, and reduces the chance of hitting a caribou. It applies to all 3, so maybe kind of a crosswalk table to relate the 2, so you know why the sections are organized the way they are.

HB: Greg, what about to do a table at the end, as a summary table for all of it?

DCh: Yes. You have a table, something on the left side, the top is those four categories of types of impacts, and the activity on the left, it may have a checkmark.

GS: Yes. Either beginning or the end.

HB: Exactly. It could be a good summary table.

MG: I do like the checkmark idea, too, Dan. I was doing something similar yesterday with a different document. You set the rules, and then you see where they apply when you read through. Just before we lose track of that, it sounds like we do have general agreement that we'll explore the possibility of separate seasons, migratory versus non-migratory. The memo we look at tomorrow will help us understand how to do that, but for now sounds like we're in agreement. We'll pursue that possibility.

GS: Okay. I guess one thing, in terms of the scope of this work, the way I was approaching it was that this was a reorganization of the existing. So existing mitigations would go into this document but that we weren't making up new mitigations to put in the document, which opening a management plan, you sometimes do. We would just want to somehow, in the production of the document, highlight whether these are old mitigations or some sort of new mitigations that we are talking about or introduced.

DCh: Version 1, Version 2, Version 3 at the end of each plan? There is document control where you have that little table at the beginning of a document that shows you were it all went.

RA: I agree with Greg that showing new measures would show more clearly the additions in terms of TAG discussions.

GS: Either some way of doing that for this review or sort of in general for the document.

AG: But if someone was looking through this quickly for a section on caribou monitoring, and they look at monitoring programs, might they wonder what happened to the caribou monitoring, just looking at this one Section 5 outline?

GS: Yeah. We just want to make sure the caribou and muskox section -- maybe it has a header that's "caribou and muskox monitoring and mitigation," which is a long title, but --

EE: What about bears?

GS: The bears will be under fur-bearers. Good point.

SS: And if I may, Anne, either way, we can keep a separate section on caribou or put in the relevant sections in Sections 5 and 6. We just feel those sections will be unbalanced. There's going to be a lot more information on the caribou, but we're open to removing the sections specifically on caribou and adding the relevant information elsewhere.

AG: What I'd suggest is that you could say, Section 5.2, would be caribou, but it would be cross-reference. It wouldn't be all of the text of the section, but it would a cross-reference to where the caribou monitoring was actually spelled out. If someone just looked at the monitoring programs, they would see caribou referenced but they would just have to go to another section.

SS: That makes sense, we're in agreement with that.

DCh: Or possibly in the introduction there, just to indicate that the caribou monitoring has been previously referenced in the first category, and then you reference that section and go on to this stuff. Then it's not lost in the mix, but it's referred to at least in this one. How does that sound?

MG: Yes. That's good.

DCh: What I was going to ask about the general wildlife monitoring list there, maybe I missed it -- what is that related to? Is that a condition of a -- the certificate, or is it just been a request? I guess I'm just wondering where that all -- is there anything out of that that we can utilize for even further, you know, validating some other areas that are the key monitoring areas and things like this? I see it in the annual report; it's a ton of information, lots, but I still kind of wonder what it is -- why are we collecting it. Is it that we're mandated to or do we just want to collect as much information as we can? I still wonder, where is it taking us? Is it something we can integrate into other important monitoring projects because I almost don't see a purpose to it. I'm a biologist; I like collecting data.

GS: I think a lot of these, the purpose isn't necessarily mandated -- I'll start with the wildlife sightings log and the -- well, for the wildlife sightings log, you're interested in, are there new species we're seeing or seeing them way earlier or are we starting to see bears at the waste management facility? Sort of any leading indicators that we might have.

DCh: That would be a good thing. Describe why is that log being done. Those are the purposes behind it. If all the sudden, you see a "pizzly" at the mine site, you know, or a "grolar bear" or whatever these days they're being called.

GS: And I think those would be the same for -- wildlife incident is a requirement.

DCh: Oh, yeah. And that's like the red fox. All those red foxes that are invading.

GS: The 2 surveillances and the hunter harvest surveys are -- they capture multiple species, but they're really intended for caribou. There might be some reorganization there that might be useful, depending on how we want to talk about them -- we're almost getting into discussing talking about the report, the monitoring report, which is not the intent.

DCh: I see they've got a date, a general location, what is observed, all that time in the year thing. I'm just going, is it -- is something showing up in these things that help validate -- whatever, where the first caribou is seen or -- so I guess I just wanted to know, what are the requirements of these? Why are they being collected? If there's something we can use down the road for more than just putting the table together. I have to look at it myself, too, again. When I look at the annual report, I see this table of voluminous information. It's great. What I want to know is the purpose behind these collections of data and what they will be used for. Are they mandated for any kind of regulatory reason, or are they just something that will be helpful, and if they are helpful, in what way, to what purpose, in some of the other monitoring that we do.

MG: Yes. Fully agree. We'll make sure to justify why we're collecting data and how it's used and to what purpose, that's good practice. A concordance table might be applicable too in this section, but regardless justification and application of the data will be included. It's a good comment.

DCh: Ok. If it is in the concordance table, it should describe why you do this data collection information. Is that what you're saying?

MG: Yes. In the annual report, it will be within the concordance table that explains what data we were required to collect and validate that we collected it and how it's applied. It's good practice not only to say we're going to do this monitoring but for what reason. When we draft this revision, when we say we're doing wildlife sighting logs or road surveillance, we're identifying under what commitment or regulatory obligation or improvement or adaptive management it's being done under, not just saying we're doing it.

DCh: Thank you.

GS: And then I've added just a little note at the top here that if -- to align with the caribou section, the discussion we had earlier about predictions and thresholds, we want to have an intro on this monitoring program for all the other valued ecosystem components to talk about what those predictions are, thresholds, et cetera. We got Section 5 and Section 6, the mitigation section.

EE: Are you guys monitoring the roads only?

GS: Oh, no. There's lots of monitoring. There is road monitoring, but then there's all types of other surveys as well.

EE: What if caribou crossing lakes? You guys monitor for that.

GS: Yes. I can go back. We have to go back to Section 4 which is the monitoring for caribou, we have the collar program. We receive data from the Government of Nunavut and the Agnico Eagle has data sharing agreement with the GN, and they receive, particularly during the post-calving season when it's most likely the caribou are nearby, they receive maps which show as the collars are approaching.

EE: But by eyes, not satellite.

GS: Yeah. And then they have height of land and driving surveys. The driving surveys are on the road, and the height of land, they have a series of locations at the mine site where they can get up and look out, and if the caribou are coming across the water or across the land, they can see those.

EE: By satellite, not by eyes?

GS: By eyes, yeah.

RA: Scope.

NM: The waste rock pile on site, and a couple other high points around site, and then there's a quarry at KM 27 that's high, and you can see for many kilometres around there. We drive up there and then are looking around with binoculars and a scope to see where the caribou are moving.

EE: Not by boat?

NM: No, I don't think any by boat.

GS: But we can see the furthest from that height of land. Several times a day, the environment team makes a map with where they see the caribou, and that gets emailed out to the TAG members. And then they say, is the mine site open or closed? Is the all-season road open or closed? And that's how they operate that day from that monitoring.

EE: Only around the camp? Like, not north of the lake or east or south or west?

GS: Most of the height of land sites are sort of near the camp, and you can see quite a way north of the camp on the other side of Meliadine Lake. And you can see the caribou with a big scope like this coming from multiple kilometres away. And they -- the warnings I think start -- maybe the KIA can fill in, too, but the warnings start a few days before the caribou are getting there. You have a few days where the caribou are 5 km away, they're coming slowly closer. We've seen that in the emails that come out every day. They come closer, getting closer, and the site starts to say we're going to shut down soon. Everybody watches it; we're going to shut down. And then the shut down happens.

EE: You guys going to find out Just by collar? What if there's caribou without collar instead of the collared ones?

GS: Yeah. That's what the spotting scopes is for.

HP: Just like Baker.

DCh: They won't know that that group has a collar in it, what you're doing.

DCh: You find that out later, and then you can determine if some of these groups that identify may or may not have a collar. Quite often they do not have a collar in that group, but you're still observing and taking note of where they are.

NM: The collars just give us an idea of roughly, are they getting near, but we know there's going to be many groups without collars on them. The on-site monitoring would start before they get there and before the collar data shows that they're there. It just helps us know when they are getting close enough to start monitoring.

MG: That's exactly right. Once they're at the calving grounds and we know they're likely to be moving. This year it wasn't necessarily the calving grounds north or Peter Lake. Once it was clear they were ready to start migrating south away from their current calving area, we start to go to those height of land areas with the spotting scope and do our inspections at least once a day, sometimes more often. Helene is going to share a screen right now and show where we go. I'll just explain one important thing that hasn't been noted yet, is the information we gather from the HTO, the Rankin HTO, and the KIA. They have very good information on where the caribou are. Like Craig was saying before, he was observing the calving happening north of Meliadine Lake, and we get a lot of good information from the KHTO and the KIA on where the caribou are and when they're moving south. We don't just rely on the collar maps. We have collar maps to identify where the bulk is, when they're expected to move, and where they're moving to. And with the collaboration of the KIA, HTO, and the GN conservation officers we also work together to have

the best picture of where the groups are, when they're getting close to the site, and then getting eyes on them is what we do with the spotting scope. The spotting scope is the last step. There's a lot of information that's gathered beforehand in collaboration with the community and with the GN's collaring data. I'll let Helene explain where we do our height of land surveys from and how far we can see with our spotting scopes in those areas.

HB: The main ones will be very close at the WRSF. From this point of view, we can see to all directions. If we know there is specific caribou in some area or we know that they might be hidden because of hill, there are other points of view that we go to. On the north side, there is a site there what we call "Dyno." And there's also the weather station from where we can see on the north, northwest and the northeast. From explo camp, we can see the whole part of Meliadine Lake. And finally, at the esker at KM 27, we can see the whole valley, and we have a lot of caribou passing by there. If we lose them from the WRSF, we just go to the esker at 27 and we can still follow them and look at them keep going south.

MG: So really from these various locations we can see 5 km away from the site. And one point I would like to add that wasn't captured in the first presentation in terms of improvements in 2023, is that this year we have the pleasure of having three new local interns on our team and a helper, and we expected it, but their ability to spot caribou without any, binoculars or spotting scopes is remarkable compared to our southern based workers. So having them on site helping us has been quite some help as well, getting them out in the field and spotting herds. We will be continuing that. We have two people from Rankin Inlet, one from Gjoa Haven and Amy from Baker Lake. They've been a big help.

AG: Would it be possible to add the field of view from each of these locations.

MG: We can do that. We were thinking about it for this meeting, but we've been full out with the caribou migration, so our resources were allocated elsewhere. I think that's a good step we can take and present it possibly even in the TEMMP, if there's a spot for it, but at least in the next TAG meeting as an item of interest.

AG: That would be great.

MG: Eva, did you have any more questions? We've been talking a lot and I want to make sure the thoughts of the Baker HTO and Raymond, if you have anything you would like to say, John or David. I'll just pause and see if there's anything else you would like to say.

RA: David's left. He had it. Same for John. David had to attend to some family matters, and John, English is a bit harder, so we don't have an interpreter right now, so it's just not the best session for John to attend. He'll be back for sure tomorrow. For TEMMP review, we judged it might not be best for elder presence at this time, to which he fully agreed.

MG: Ok. Sounds good. Just wanted to make sure if they were there, they had the opportunity to speak.

RM: I haven't gone out in the field for this migration, but one thing I mentioned in the past to Jeff was having markers at 5 km, 4 km, and so on. Do you guys have markers out there this year?

MG: We don't have markers out this year, Raymond. We're still open to it, we just haven't had the opportunity. What we've been doing is having our field crews, they have tablets in the field that have interactive maps associated with them as well as the GIS, geographic information system software, so that they can identify landmarks like a lake or a hill or an esker and measure that distance in the spot with the tablet. Say that's 3 km. But we're still open to the idea of markers and it's a direction we should go in. Just to support that map as well.

HB: For the iPad, we were planning to use one of them on Wednesday and measure it from where we're standing to what we're seeing.

AG: Have you thought about a couple of short videos showing the height of land surveys, swing the camera around and showing the viewpoint, and it would be nice, of course, if there were caribou in it. But had you given any thought to that.

MG: We hadn't, but it's an interesting idea. I think I like the idea I don't know Helene what you think.

HB: Yeah. Absolutely.

MG: Yes. We'll look into that, Anne. And maybe an item for the next TAG meeting that we can work on over the summer depending on feasibility. We'll explore that viewshed map and a little video demo that we'll share at the next TAG meeting, assuming all goes well. It's an interesting idea.

DCh: Matt, are you saying just having the observers up at the top of the waste rock pile set up a tripod, take a video, and then you would know the field of view there, and then the other heights of land sites? That's what I'm interpreting Anne has asked for and you are kind of committing to do.

MG: Yeah. The viewshed would be a quantified view from each location, as data. The video would be more to exemplify the process. I'm not sure what type of optics will be possible to really convert the scope view to video. We can look at it and talk with our tech team and see what's possible, but the viewshed map would be the feasible view possible from these locations, and the video would provide an example of the process itself. The tools you have, what it looks like, and obviously you're not going to have the same quality of view through a video that you would through an actual spotting scope, but we'll do the best we can with that.

GS: No. The biggest change that we've made here is the addition of those introductions where we talk about the predictions, how that fits into adaptive management and how that will -- and what the triggers are for action in that adaptive management. We'll have to give it a little bit of thought about how we separate the monitoring and mitigation that's like related to predictions versus the monitoring and mitigation that's like a see-do kind of mitigation. I see a caribou on the road, I stop. And that's one kind of mitigation with one kind of monitoring. I've seen a caribou; I stop. And the other kind with adaptive management, we've exceeded the thresholds predicted and we come up with new mitigation. And we'll just have to figure out how we're going to talk about those two so that they don't get confused, which is kind of an abstract thing.

AG: Greg, I wonder if a clever diagram would both make the linkage between the effects predictions, the thresholds and subsequent monitoring, and if it was a really cunning diagram, it would also show the separation of the two objectives for monitoring, one of which is to assess effects, including unpredicted effects, and then the other main role of monitoring is, as you said, to evaluate thresholds to trigger mitigation. It might be possible to come up with a figure, a sort of chart, that would summarize all this and make the linkages apparent, and that the same monitoring technique serves two objectives which relate to the two main purposes. Does that help you at all or make sense?

GS: Yes. It will just need a bit of thinking so that it's clear how those two types of monitoring and mitigation are separate. I like it. I think that was the big change I saw; was around how we're managing the adaptive management and where that will go in the document. We have a good home for it. Are there any other comments, either more holistic comments or detailed comments.

AG: One possibility is because this is a draft for review, you can always offer options for sections or figures or outlines. It takes a little more work in terms of organization, but you could allow the TAG to see possibilities or choices that could be made.

GS: So like options or examples from other management plans.

DCh: And that sort of gives us the options of thinking about this. You know, it's like when internal groups work on a particular document that's a share point thing, and then they've got links on here's what it might look like and then go back to the original document. So maybe as was suggested, we can have some other options. It gets too complicated after a while, but initially it might be a good idea.

RA: Loses control of how many versions and tweaks of how many versions.

DCh: There's lumpers and there's splitters, and we can all fit into one of those categories.

RA: We've integrated, listened, marked down what we heard today. I would say the next step would be for Agnico and ERM to prepare something and send it out for review depending on the timeline that we can assess on our side that would satisfy the workload of every party involved in the process. Did I recap well, Matt, or did I forget something?

MG: No, it makes sense. And just to circle back, Robin, there was one thing that was brought up in terms of the timeline, I think it was both Anne and Dan. What timeline we are hoping to meet with the larger TEMMP revision outside of today's discussion, in the context that the parties present today also need to be reviewing and participating in the NIRB hearings and leading up to them in September. With that in mind, it's slightly different than the previous proposal from the last TAG meeting but as with the TAG these things are living plans. The proposal I would like to make right now, and it's open for discussion, is the following: We send the annotated table of contents out to the TAG members in the coming days. We take the time today for Greg and the ERM to work through what we heard today and revise the table of contents accordingly. Send that out to the TAG members, give them two weeks to provide additional comments on the table of contents. Once we receive those comments back, we start the TEMMP revision, but we don't aim to send out a revised TEMMP until after the NIRB hearing is complete so that the TAG members can focus on one thing at a time and we're not giving anyone too much work. What that would mean is from mid-July when we're ready to go with the table of contents up until mid to late September, we'll be revising the TEMMP, and it might take that time because what we talked about today was not only reorganization but also revision. Mid to late September, we send out the revised TEMMP. We'll call it "Draft 1." And then one month following that date, we have our TAG meeting to discuss comments. So that would give the parties a month to review and submit their comments, and then we could have almost a half day to review the comments we heard and have discussion around those comments, and that would allow us to move into the next phase, which would be developing "Draft 2." And we could talk about timelines at that point, with the objective being to have a finalized version in March 2024. I'll stop there and open it up for thoughts on that proposed timeline.

RA: So tentatively, Matt, that would be a meeting in person where in the timeline you just thought of?

MG: We wouldn't have another meeting in person until after the NIRB hearing, I would say late October, because really what we want to do is revise the TEMMP, develop Draft 1 from July to September, send out Draft 1 in September after the NIRB hearing. And then give the parties about a month to review the TEMMP and provide their comments back, and about a month to six

weeks after we send out that Draft 1, we meet in person in Winnipeg to discuss the comments we've received, which would be around late October.

DCh: Sounds good.

EE: When is NIRB hearing?

RA: Mid-September.

DCh: 11th to the 20th. That's the hearing where the interested parties are still putting stuff together till 26th of July, and then Agnico Eagle is going to respond by the 9th, and then we put our hearing presentations together by I think the 26th of August. So, this is much appreciated timeline, Matt, thank you.

MG: Yes. I think we can still meet our objective of March.

RA: I was just adding a little bit more on for Baker HTO. Once those documents are up for revisions, we could sit down together and go over documents. I could write your comments and we could work together making sure that your comments are integrated into the process, knowing it's a bit harder to review and get the document sent out in the time. We can find a way that we can sit down together, for Agnico to write down your comments live as we go along. We would make sure we could include your comments in the revision. That's what I thought of to make sure that you guys can participate in the revision of the documents. Does that work on your end?

HP: Sounds good.

MG: Really good point, Robin, I fully support that approach with regards to the Baker Lake and the Rankin Inlet HTO.

EE: I have a question for Agnico. Separately we have meetings for Baker Lake. How come we don't get a TAG?

RA: It's a good question and it's a question that's been asked before. The reason the TAGs aren't joint or do things at the same time, it creates confusion. You see the revision of the TEMMP, the processes are different for mine sites. It's a little bit different, and it added a layer of confusion in between the groups. We thought of doing everything, so we meet the TAG at the same time within the same time frame, so we reduce the travel for everyone. But we also saw the potential for confusion. The acronyms are different. There's a TEMP with only one M at Meadow. The logic behind the plans is not the same. The timing of herds is not the same. The roads are different also, 180 km roads at Meadow and Whale Tail. There's 30 km from Rankin to Meliadine. Everything is different. It's the same animal. The intent is the same; protect caribou, discuss how mitigating and monitoring measures are done. So that's why they're not combined at this time. And with Meliadine just being created, we didn't want to confuse. And adding on top of that, there's extension being requested on Meliadine, possible extension on Meadowbank. It has layers everywhere, so that's why it's not a joint venture yet.

EE: Okay. Thank you.

RA: The timeline, we're all set and agreed. Anne, did that work for you? It's reasonable at this time?

AG: I think it works for me, but I have to check with Louis and Jeff to make sure, but I think it sounds do-able. Yes, I think it is reasonable.

RA: Noted. Keep us posted if there's anything from Louis and Jeff.

EE: Jeff is working in a different department.

RA: It's all Craig now.

CB: President's assistant.

RA: Jeff is changing roles in the KIA for now, so he's off our files temporarily until everything is confirmed. Are you taking Jeff's role?

CB: I think I'll just keep my role, but I'll be helping Luis out sometimes.

RA: You'll be looking for a new Jeff.

CB: Yeah. I think it's just temporary until October. If he likes it, maybe.

EE: If you guys pressure him and even us, they'll get a new Jeff.

6. Round Table – Open Discussion

RA: What I thought of right now because we're at the end of our agenda for the day, I feel like maybe a quick update for what's the plan for the visit and caribou presence and how can we modify everything for the agenda.

MG: Yes. So going back to the intention of the visit, it was mainly focused around observing the process, behaviour, and camera trail studies, so getting out there with Nina and ideally observing caribou when the road is open from a safe and respectful distance with the TAG. And kind of going over how we do height of land surveys, and we were going to visit a construction site for the waterline and explain the process, but all of that is not looking likely or most of it isn't. So let's assume the caribou don't move. Let's say the road stays closed that way. I think the only thing in those options that remains feasible is the behaviour observation. Getting out there with Nina, walking the TAG through how she does her behaviour monitoring. The only thing we need to be in mind of is that, by doing so, we can't violate the TEMMP obligations as we do it. We can't drive on the AWAR.

BP: Yes. This is Brad with the GN. The GN has made that comment before, but on road surveys we just want to make sure that you have a driver and two observers, one for each side because, we don't feel that using a driver also as an observer would be -- well, it splits the driver's time between looking for caribou and actually maintaining that they don't drive off the road and so on. You're going to have two observers in the car?

MG: The observing is done from a stationary position. And in the general, you're right. There are two people in the truck for that exact reason, health and safety, attention to the task at hand.

BP: Two observers in addition to the driver?

GS: I think we're talking about two different things though, the driving survey and the behaviour survey. The behaviour survey, you drive until there's a bunch, then you park and do the survey. Whereas the driving survey is, you're driving and counting.

NM: And from my observations, the driving surveys involve a lot of stopping and looking around.

MG: Yes, thank you, Nina.

RA: It's not like Meadowbank Road. With having a shorter road, you see caribou, you stop, which makes the process a bit more streamlined. It creates less chances of having gaps. Versus Meadowbank Road, which is 180 km, which you get driver's fatigue, for example. You're trying to focus with heavy scoping and stuff like that. It is a bit different on this AWAR than referring to the Meadowbank one, for example. I don't know if that makes sense to you or not.

MG: We stop at the high points. Thanks, Nina, for that precision.

DCh: Just to what you presented just initially, maybe going up to Kilometre 5, that's just before the bridge closure, and if we're thinking of that tomorrow, Craig and I were thinking of going up to that area after the meeting. We could scope it out and see what things look like just before that area, and I'm going because I want to take some pictures, but if they are there, we might get a good sense of what a good is, would be if it's feasible, and then report back to the group after we've been there for tomorrow.

MG: Yes. To be black and white, the TEMMP says we will not use the AWAR for any non-essential traffic, and the AWAR is defined as the road between the mine site to the bypass intersection. We can provide our map as well from our survey and decide where they are. Because at this point, we don't know what's going to happen tomorrow.

DCh: I have one question to GN. It's June. It's been a year. Where's the survey results on the Qamanirjuak caribou herd?

BP: I would have to ask Mitch.

DCh: Now, you guys probably told us three or four or five months ago, so you must know what the status is.

BP: Technically, this isn't really even my job anymore, so I am in the dark, unfortunately.

DCh: Could you find out before tomorrow sometime for us?

BP: I can try.

EE: How come Mitch never gets back with results from the TAG meeting.

BP: Mitch is not the most working-group oriented kind of guy. He's a technical field person.

RA: Just for my clarity, Brad, you say it's not your file, so who is it officially, it would be Daniel?

BP: Daniel technically right now. He's sick so hasn't been on the call. For the survey study, that's a completely different division, that's our wildlife division.

DCh: Who's in charge?

BP: Mitch Campbell and Drikus Gissing are the people you need to talk to about that.

DCh: I'd like to know the survey results of last year, the calving ground survey. It was a year ago, so it would be nice to know the results.

EE: Where did they pop out?

MN: At the gatehouse, they said the northeast.

HP: These ones came from Kazan?

EE: Half of Beverly Lake, I guess.

DCh: Where's the gatehouse?

NM: North is actually here because Discovery Road goes east to west. That's what they said, they saw them come over the ridge here and that's where they fist saw them, so they were coming -- either they came around this way or they were coming from the coast.

DCh: Right. I wonder if they were coming between Whale and Chesterfield or something.

HP: Janice was just saying that caribou were starting to go to Chester and now we hear they're walking down that soon.

NM: It's a weird year.

HP: Very weird.

EE: I guess these are not Qamanirjuak herd, if they were coming from northeast, because Qamanirjuak herd comes from south.

NM: Yes. I think it is because the collars show that it's still the same herd. We could probably find out from the collars.

BP: It doesn't show on the maps, but the data itself will say what herd the collar was applied to.

NM: But the every-other-day update, we could see if there's one or two individuals that might give us a clue as to where this big group came from.

DCh: Whether they're a mixed herd or originated from Qamanirjuak, from the calving grounds. Lots of different scenarios, but if they were at the calving grounds, maybe they went north and circled back to the coast and came back down, or they're some mixture.

NM: But like you said, that usually happens a bit later.

HP: Usually they follow the wind because we mostly had southeast winds. They follow the winds.

EE: I think they can't be the Qamanirjuak herd because they said they had lots of herds. And they were pretty fat.

RA: This place tomorrow at 9. Thanks a lot, everyone.

End. (15:34)

Topic:	Day 2- Meliadine Terrestrial Advisory Group - Agnico Eagle
Meeting Date:	June 27, 2023 at 9:00 - 17:00 CT
Location:	Katimavik Suites, Rankin Inlet, Nunavut, and via Microsoft Teams (teleconference)
Attendees:	Craig Beardsall (CB) – Kivalliq Inuit Association (KivIA), Land Officer
	Anne Gunn (AG) – Caribou Specialist (KivIA)
	Dan Chranowski (DCh) – Matrix Solutions Inc. Wildlife Biologist (Northlands Denesuline and Sayisi Dene FN)
	Eva Elytook (EE) – Baker Lake Hunters and Trappers Organization (HTO), Vice Chair
	Harold Putumiraqtuq (HP) –Baker Lake HTO, Chairperson
	Raymond Mercer (RM) – Nunavut Tunngavik Incorporated (NTI)
	Brad Pirie (BP) – Government of Nunavut (GN)
	Stephen Atkinson (SA) – Biologist Consultant (GN)
	Matt Gillman (MG) – AEM, Environment Superintendent – Online
	Sara Savoie (SS) – AEM, Environment General Supervisor – Online
	Helene Boulanger, RPBio. (HB) – AEM, Environment Specialist – Online
	Robin Allard – Agnico Eagle (AEM), Community Consultation Specialist
	David Kritterdlik (DK) – AEM, Inuit Qaujimajatuqangit and Wildlife Advisor
	Greg Sharam (GS) – ERM, Caribou Specialist (AEM)
	Nina Morrell, RPBio. (NM) – ERM, Wildlife Biologist and Spatial Analyst (AEM)
	Meaghan Beale (MB) – WSP, Wildlife Biologist – Online
	Dan Coulton, RPBio. (DC) – WSP/Golder, Sr. Wildlife Specialist (AEM) – Online
	Scott Wilson PBiol, RPBio (SW) – WSP/Golder, Biologist (AEM) – Online
	Kaitlyn Paul (KP) – Independent Reporters, Stenographer (AEM)

1. Meeting Greetings and Roundtable

Supplemental Material: None

Presenter: Robin Allard

RA: Welcome to Day 2 of the TAG meeting. We'll just do again a quick roundtable and then a quick debrief of what was done yesterday. Any questions, anything that was left unanswered that we may or may not have answers. And then we can proceed with the agenda. Debrief from yesterday. Does anybody have any questions, concerns, or just comments on what was done yesterday? I think we've made some headways on TEMMP review. We have a path forward. We

had constructive discussions on how we can do things at Meliadine site. We have the same angle of protecting the caribou herd and allow people to safely harvest caribou for their means and at the same time having a mine site within the ranges also. Anything on yesterday in the room? I see no hands raised. Online, any comments? Seeing none.

2. Day 1 Recap – Logistic Site Visit

Supplemental Material: None

Presenter: Matt Gillman

MG: From our side, the road remains closed under our TEMMP and our road lease, so we can't authorize any visits on the AWAR, which includes the site road all the way down to the bypass road intersection. There maybe opportunity to have four TAG members tag along with Nina, if Nina was to do her behaviour study on the road; however, we don't feel comfortable bypassing any blockades for that. We made a decision tree, which is as follows. As always, it's a group discussion on how we proceed with these but here's our proposal from our side. So today is Tuesday morning. This is where we're at. Is the road closed? Yes, it is. We don't proceed with site visit today. That would have been the scenario if the road is open. Road is closed so I propose we stick with the original agenda and wait until Wednesday to reassess. Specifically, Wednesday at lunch as the Raglan visit is scheduled for Wednesday morning. Unfortunately, it's kind of the nature of this unique TAG meeting and the caribou migration is that we need to be flexible and plan last minute. While the crew is in Raglan, I'll be staying behind and assessing the feasibility of the site visit. The question is, is the road open at lunch or noon on Wednesday. If it is, then we do our site visit. Are the roads open, no blockades ideally. We do as propose and go out and do some exemplification of the caribou survey and behaviour studies. Get up to the high points on the WRSF and the points that Helene was reviewing yesterday and give the TAG members a first-hand view what we see when we're monitoring behaviour and presence. That's the ideal, is that we end up in that box there. However, if tomorrow at lunch the road remains closed, the question is, is there a blockade in place, because four people can go out with Nina and do a behaviour survey with her. It would provide no further risk to caribou. If there's no blockade in place, Nina would get on the road in her truck with the TAG members and do a survey as usual. And the remaining TAG members, we can set up a viewing point based on where it's safe to go. Maybe they go to the bypass intersection of the shoreline or wherever we are authorized to go based on TEMMP conditions on road closure with those people and get a spotting scope. But really, the focus would be on the selected TAG members with Nina. If there was a blockade, our proposal would be not to cross the blockade without permission of the blockade owner, the GN or the HTO, and again, just have Nina doing her regular surveys with those four selected TAG members. The rest can get a spot and view caribou from wherever they can, the best they can. Where we want to end up is this middle box here, doing a site visit with the road open tomorrow afternoon. I think likely we'll get four out with Nina. And the least favourable option is that there's a blockade in place and we need to discuss with the owners of the blockades if they're comfortable with us going in and doing our normal work. I just said a lot, but it's all in the decision tree there. I hope we end up in the middle one there and can follow the agenda as per the plan. Thoughts?

RA: Any questions on this? The decision tree makes it clear.

MG: We would like to do what we were planning and get on the road with the whole group and see height of land surveys and behaviour surveys and get to site. It would be greatly beneficial, so we don't want to push in the abridged survey today. We should hope tomorrow clears up and tomorrow afternoon, work with what the caribou present us, with the best of the three options. But fingers crossed tomorrow works out, and we can follow the agenda and intention.

CB: I can take four other TAG members as well when I do my caribou monitoring if that would help.

MG: That's a good point, Craig. If you were really going to be on the road, that's what we want to do. Not a tour specific for the TAG, but if these are activities that we would do if the TAG wasn't here and they're just coming with us, that's acceptable. It's about not creating additional traffic, that's the goal.

EE: Why can't we get escort to go view the camp?

RA: Because Agnico has rules to follow.

MG: The other thing to be cognizant of is we don't want everyone stuck on site. If we couldn't get back to Rankin, that's not a favourable scenario either.

EE: I can shoot and make supper. I bet local people would be happy to have country food up there. Does HTO Rankin have a road monitor?

RA: Yes. He's on the road every day. That's why he's not here because it would be better to be on the road.

EE: Okay. Thank you.

DCh: You know, you want to make that decision at noon tomorrow, but really, we could probably keep the whole day open after noon, and if something develops not necessarily in the first two hours but last four hours, as long as it's light out, I don't care if we get back at 9 or whatever. I'd like to keep that option open if it gives us the opportunity then.

MG: Yes. I agree with that, Dan. If the remaining TAG members would be open to modifying the agenda tomorrow afternoon to a later site visit, if it looks positive, we would be open to that. It's a good point.

BP: I'm just wondering, with all these road closures, how are you getting crew changes done? Are people just stuck out there or are you using the air strip?

RA: There's no air strip at Meliadine. For example, today, the crew change is cancelled. People at site stay on site; people down south stay down south. Last week we cancelled three days.

MG: Monday, Tuesday, Wednesday was cancelled. We condensed two crew changes a day into Thursday and Friday to make up for it.

RA: With the monitoring, so the window was called open because of what we saw, so we just shifted the crew change to later in the week. No fuel convoy, no nothing. There's no crew change if the numbers are within the TEMMP restrictions. Unless there's an emergency.

MG: One distinction between Meliadine and Meadowbank that we're fortunate here, we have fuel tanks on site that have 30 days of capacity, so we don't have convoys really when the road is closed. Crew changes are priorities, but when the road is closed under the TEMMP, we don't follow through with those. So really, there's been no traffic on the road over the past two days and last week on Monday, Tuesday Wednesday. There was no traffic aside from the monitors, KHTO, GN, KIA.

RA: We have some time as people are in town all Wednesday also.

EE: They're not even walking, so I think they're going to stay for a while.

RA: It does give a perception that they're milling around, it's been called before. Maybe if the wind dies and the mosquito are more numerous, then maybe they'll move, but right now, they seem to be happy where they are.

HP: There's mosquitoes here?

RA: Less than Baker, but some.

RM: It says drone demonstration at the Meliadine site. Are the drones up there at the camp site, or are they here in town?

HB: No. For the drone, what we wanted to do is present the way we do it. We want KHTO and Baker Lake HTO to see what it is, what the drone looks like and the noise, etc. We wanted to do a quick demonstration, but the problem is we cannot do it south because of the airport. We need to be a certain distance from the airport. The closest we can be is Kilometre 6. This one will be very tricky tomorrow. We'll see the condition tomorrow if we can do it or not, but the plan will be to do it at Kilometre 27 or in that area if we can reach it.

RA: The drone is at site, Raymond.

RM: Ok. Thank you. Just wondering if the drone was already up there or not. If it was in town, if we could go to whatever kilometre if allowed by the caribou to do a demonstration up there.

End.

3. **Community Elders – Items of interest**

Supplemental Material: None

Presenter: David Kritterdlik

RA: Next agenda item, committee elders, and our IQ advisor, Mr. Kritterdlik. John should be joining us very soon. We'll give him a chance to speak when he gets in. In the meantime, I'll leave the board to my friend David so he can speak his mind and provide us from his IQ experience and advice. It's your chance to speak, David.

DK: First, good morning. [Speaking Inuktitut]. I've been working with the Agnico for close to six years now, and from that time on we've -- I've attended a number of TAG meetings and TAG group meetings from four or five years ago. What I've been seeing a lot is that for the technical people that we have in the group, that's not a problem. But what I've been concerned about is the continuation of local members in the TAG group. Because the way it is set up right now, is that the government department runs the group, and the department makes invitation to local Hunters and Trappers Organization every time for meeting like this and every other meeting. Even though that happen every meeting, almost every meeting, invitation go to the communities to attend the meeting, but what has been happening is that there has been no continuation of local members on the TAG group. Because HTO are elected every once or two years. When that happens, the board appoints -- the board members appoint a person to this group, and the way it's been happening is that it's not always the same people that come from the community. And that's a problem I've seen over the years because even though we have technical people at the meeting,

almost every meeting, including our cohort from Agnico, GN, KIA, NTR, we don't see the local appointees attend two meetings. They will attend one meeting, yes. The next meeting is usually after 6 months, and between there, the local appointees may have gone over the term as a board member, and that has been a problem for Agnico really. Agnico Eagle wants the local people involved along with the local knowledge to put into the guidelines that we got this group put in place, and it has not been happening. There are a number of things involved. The first one I just mentioned. Not the same people attend the meeting every time. When they go to -- when the new board member comes in, everything is new. They never heard it before. So that's why they -- we don't hear very many comments from local people because they don't have the ongoing information that the rest of the group have been going to. So along with that, language is another step back. Because a meeting like this involves a lot of technical language. Technical language which many of us don't have any knowledge of it, even though we're bilingual, there are a lot of words that we don't understand. We have to try and make it understood to the local Inuit people to get some information from them. Because of the problem of communication between, let's say, technical language, plain language, Inuktitut language. That's very complicated. You have to go from Step 1 to Step 3 to make sure the person understands, and it doesn't always happen. That's where we don't -- that is why we don't get very local input into the system like this, because a lack of understanding. So that's what I have been seeing. Like, good for Baker Lake to have been to two meeting. The last two meeting I've attended, Baker Lake been there. But the last meeting, I didn't see any other community members. Although this group, Meliadine group, the TAG group is for the area, we don't have very many local people from Rankin. And that has been one of the things that -- for myself as an IQ and wildlife advisor for local or for Agnico, I've seen that something has to be done in order to continue local information into the group and into the guidelines. That's what we have been asking, and we don't very often get that. So that's a situation where local appointees, I think, have to be considered. Appoint local appointees to this group so that they can be on this meeting and the next meeting and the one after that. I don't know if that is possible, but our goal is to go to the Hunters and Trappers Organization for KIA. This is the step that I've been sort of encouraging our -- my coworkers like Robin and other people in Agnico. We need to get it straightened out. Because Agnico is very anxiously looking forward to getting some local traditional knowledge into the system, where we are trying to guide the environment, wildlife in the area, as well as protect. So that there's good communication. Language is a big part of making sure that they understand. And because we've attended, people attended so many meetings, including inviting local people, local elders go to a big meeting, and at that meeting no comments came from local. Why? Because they didn't understand the technical language that was brought up at the meeting. So that's one situation that I've been trying to bring out to a group like this, also with other groups that we work with. Technical language is helping a lot, but we are also encouraging local traditional knowledge into the system where we're trying to have something ongoing. Very important for Meliadine area, for this area. For the next so many years that we're going to have to stick with this, make this TAG group work, or -- we don't want to end up having less and less members on the group. It is information given or heard to -- by the community that has to be understood. That is my elder part that I wanted to bring up. I have attended a number of meetings in the past four or five years. TAG meetings. We go down to Ottawa sometimes, go to Winnipeg, and go other places than that, and for local people, it's always something new. Okay? There's nothing ongoing. So that's one situation or problem I wanted to bring to this group. Because this group is a new group, TAG group for Meliadine. Meadowbank have been going for a while now. From that TAG, Meadowbank TAG, I've learned what I'm saying this morning. I think we need to look at appointees to this TAG group for -- so that we see the same person every meeting. That's a point I wanted to bring up. John

was also going to have some comments but, as we all know, now is a bad time to go to a meeting.

RA: Thanks a lot for the comments, David. On the Agnico side, we've been working together and something we want to be sure we facilitate looking ahead not only within the TAG but all the processes and consultations we do for our project, we've created the Kivalliq Elders Advisory Committee. It's one channel that has shown to be successful and has brought forward some valuable sharing of information and IQ, but Agnico needs to be sure that's integrated with all our groups. I feel, and Matt feels also that the TAG is one of the best channels we can integrate community members and elder knowledge in the process. It's done unofficially in the sideline, but we believe there's a way we can include it a little bit more and include it in some fashion towards the TAG integration, since there's now one going for Meliadine site and Meadowbank site. As David said, having consistency and presence means we will be able to build that relationship and help Agnico integrate concerns and answer concerns to specific groups in the community. That will also help the HTOs and make sure the message is spread after the meeting also. It's not only on the HTO shoulders; it's also a community thing.

RM: Listening to David talk and mentioning the HTO, local HTO turnovers with elections and all, perhaps it would be beneficial for Agnico Eagle to do a one- or two-page orientation package, sort of something -- I'm not trying to put David on the spot, but something coming from an elder going to another elder, I think that might be pretty beneficial, if he was to do one up and Inuktitut or coming from him as an elder to another elder explaining the TAG. I think that would be beneficial for everybody included in the TAG. Thank you.

RA: Thanks a lot, Raymond, for the comments. Very good point on how the TAG is a hard beast to explain. We need to simplify things and make sure we can explain it in a way that speaks to people, and that's one of the things working with David in plain language. Okay. It's not easy to explain but there's ways for sure. It's not an excuse but we are trying to find the best approach to explain the hard to figure out groups. We try to define, but as we've seen with the TEMMP group, it gets very, very technical which makes us forget the community knowledge part. It's not easy, but we're working at it for sure.

MG: And there's one thing we would like to add. I agree with what you're saying, Raymond and Robin, and to add to that, we were discussing one commitment we would like to make to facilitate that. It may not be feasible for this TAG meeting but at least to start in October, to have an executive summary of the TAG minutes that are sent out both in English and translated to Inuktitut so that those minutes can be read and understood in a digestible manner. It may not be feasible for the timeline of this TAG meeting, but we'll try to have that in October or the meeting after this one. An executive summary, a plain language summary, of the meeting minutes that are sent out in English and Inuktitut.

DCh: Thank you, David. I sense that always when we as a technical person try to discuss something, I get the sense of course there's not words for or translation of things that we talk about, and I find in my relationship with the Dene people that I work with, Jeff can actually write things down in syllabics and many times after these meetings if he's not here, I will call him and explain something and he'll ask further questions about what that means. I kind of wonder if certain areas of technical language start coming up that always are discussed if there's a plain language way of talking about that and putting that down. And if they repeat over these periods of time, maybe there is something that could be put together that everybody can then -- you know, if we as technical people continue to talk in that fashion, it can be explained a little bit better. I'm not sure. But from the point of view of a plain language Inuktitut summary, I could suggest that

even for this period that we could talk to Jeff and see if he could do that for our people. And I also agree with having somebody appointed because they're a consistent person. I know that I've talked with Goeff and Benji and they're always asking somebody in the community if they would like to be on the TAG, and quite often the answer is, it's quite technical. So that is the sort of a thing, plus the travel, I guess. But regardless, it does make sense locally to have people that are appointed, then they can be consistent in explaining those things to other local members. Thank you.

RA: Thanks for those comments. Dan. We're trying to work on a lexical definition of terms that we use frequently which we feel will help. We're working with people in town to see it from their perspective. Just things like what waste rock is, those simple things that we take for granted but aren't easily explained. Making sure that they speak not only from a southern perspective but also a northern perspective. Not translated by the south but have a north perspective on how we do things and shift away from the southern perspective. We're working on those tools and that will help everybody have that basic technical language that we can all use and understand. That's where we would like to go. It's not a quick one, but we're definitely picking at it for sure. We're miners; we like to pick at things.

MG: This is a bit unconventional but maybe it's not. Helene has some items of interest that she'd like to get David's thoughts on, just feedback and his input as an elder, and it would have been for John too if he was around, but do you think we can do that right now. It kind of fits in the agenda.

RA: I wanted to add that we also have the Baker HTO, so we can ask the advice of Inuit knowledge.

HB: The first question is about the male caribou. At this point for this year, most of us have been seeing female and calves, but we're not sure exactly where are the males. How long does it usually take the males to join the females and the cows.

RA: Questions on the bulls. Where are the bulls?

EE: Behind the herd.

HP: Bulls are usually behind the herd.

EE: Like I said yesterday, IQ elders are happy there's only calf and young because during summer, they know there's going to be caribou. If bulls come first then these, we know there's hardly going to be any caribou during summer or fall. That's all I know, and I learn that from my dad. With IQ, I'll try my best to answer you. My dad has taught us, us siblings, right now these herd in Rankin, elders are happy because there's only females, young males, calves, and all that. If the bulls come first, it means they're going to have a hard -- not hard, but according to IQ, they know they're not really going to see caribou during summer and fall. If the bull herds come in first. So according to IQ, elders are happy these herds are in Rankin. Because they know they're going to have caribou all through summer and fall. So don't ask where the bulls are. They're right behind them.

HB: Related to climate change. For the timing of the freshet, now it's getting earlier and earlier, is this something you've seen in the past? Freshet is snow melt, when the snow is melting and turning into spring. Now it's getting earlier in the season.

EE: I don't know. But when I was a child, I used to hear [speaking Inuktitut] talking to my parents and my aunts and uncles. One day, one year, some day. They said there's not going to be winter. But that was 40-plus 50 years plus ago. I don't know. Yeah, the -- as soon as the snow melts, it melts. It usually moist and then freeze and then slush. The slush is deeper than the --

[speaking Inuktitut] -- I don't know how to say that in English. It used to be like that, springtime. Starting to melt as soon as when the elders say there's no drop, knowing it's going to start melting. But for a few years, as soon as it starts melting, it's gone. Just like two and a half, three weeks, dies, is gone, but I was so surprised when I was in Chester in May. The lake used to be the -- not the sea. Right now, if I was a child, we would still be driving on the sea by skidoo. But I was -- when I keep asking, why are the lake still solid and the ocean is so danger? Why is it? Is it ocean warmer than the lake now? I don't know because I keep asking my nieces, you know, this is supposed to be the last one, then the lake we went. The lake was not -- it was so safe for us to drive it, but when we went down to the sea, lots of open water, the ice was soft. That's so strange to me this year. Maybe it's from climate -- I know it's from climate. By -- when we were young, by the edge of the hill, they would still have snow by the time the fall comes. But nowadays, it's completely gone. I know the weather change so much. And I don't know why the herds are here early. They usually have herds in July. We usually have herds in July. We have Beverly herd across the houses. We were surprised when we heard they are right across the houses now. That's all. That is how much I'm going to give you guys information.

DK: Just add on to my comments about having an elder in the group. We have elders' group in each of the five communities in Kivalliq: Arviat, Whale Cove, Rankin, Baker Lake and Chesterfield. We have four local elders in these communities and whenever we need local information or traditional IQ knowledge, we collect from traditional knowledge from those elders. We get them together and ask them about some complicated questions that we may have so that we can build our working relationship with communities and the mine. One of the suggestions that we came up with was, can we have an elder from Baker Lake be observer member in the Meadowbank TAG group. The other one is that, can we have a local Rankin Inlet elder in Meliadine TAG group to be as an observer. That's one idea that we came up with, to have someone local in a continual meeting of a group like this. That's one. The other two are during the main caribou herd migration coming through twice a year. The monitors, those monitors are people that everybody listens to. A lot of times, those monitors are young people. A lot of times, they don't have the traditional IQ, traditional knowledge. When it comes to a situation where they find it hard to make a decision, it's hard for them. One of our suggestions was that, why don't -- can we have elders from the community to be along with the road monitor during the main caribou migration coming through? Not only that but also with the convoys. Convoys between Baker Lake and Meadowbank, between Rankin and Meliadine. Convoys, where the road monitors have a main -- main job to be there to look after the group using the road. Those are the only other two I wanted to bring up. Thank you.

HB: That was very interesting. Thank you very much. Was it common for caribou to be in a very large group?

EE: Yes. I don't know about David, because he was in the residential school, past Chesterfield Inlet, like I said, I was born in Rankin, raised in Chester, moved to Baker Lake 1975. Past Chesterfield Inlet, my parents, or other families, we used to be across Chesterfield. My dad always respected an elder, even though an elder is not related to my dad. But my dad used to tell my young cousins, my older siblings, he used to tell us there's herd because he's watching the sky. Smoke. It's not a forest fire smoke. It's not -- it's not a cloud, but it's different. He said by next week or at -- he used this language. Or 13 sleep, like a child, so we can understand. Or 13 sleep, they'll be across where we're camping. The elder would tell us to move elsewhere because the caribou are coming. This is how much my dad learned. This is how much my dad teach us. But most of my siblings were not like our cousins. My late uncle Norman Attungala, you guys probably know him. He would go to meetings a lot, talk so much, but he was younger than my

dad. My dad was always quiet. But he would tell us what he knows because he learned from his adopted father. His adopted father was raised, and my dad was raised in Rankin, local, Chester, and along the shore of Baker Lake.

DCh: Eva, when that elder from Chester looked into the sky, he was maybe seeing a reflection or something. Did he do it when it was cloudy or when it was sunny?

EE: But when he used to tell my late husband, when there's huge, huge herd, it means he's worried. Winter is coming. I finally asked my husband, you should ask my dad why he's worried, because there's huge herds. Because they're going to have hard time finding caribou. If it's less than -- if it's less than 100,000, they're happy. But if it was over 200,000, 500,000 herds, elders are worried about winter. And then I finally ask my dad, why? Are they coming back? Because they ruin their vegetation from their feet. They have a hard time feeding themselves because they ruin it themselves. They have to move somewhere else. That's what my dad used to tell us. This is how much my dad teach me and my siblings, but people tell us we don't know. They tell me, you don't know, but my dad taught us. Because there's other people who likes to talk so much and they believed them and telling -- they don't know. They have no clue. This is how much knowledge my dad gave us, to me and my siblings. My mom had 13 kids. I'm the 8th one. There's elders know my dad used to live here with his adopted parents at Meliadine. Most of my uncles are not alive. They know. They were raised around my dad. But my dad used to tell us when he was young, pre-teen, he never used to see so many caribou. He was told the caribou moved somewhere else for so many years, 50, 60 years. They all come back. They all come back. When we first moved to Baker Lake, there was no caribou. My husband used to camp a few days, five days, and then finally come home with meat. But nowadays, young people say, no more caribou because expiration because of mining company. Too much traffic. There are elders that know, even though they talk to radio when they were a child, pre-teen, teenager, there were no caribou in this area. Now that they're old enough, they can see caribou and they're surprised, which they were never told caribou moved and wait for the vegetation to grow so they can feed again. I'm telling you guys, but I know only so much. And I learned so much from Baker through my husband, my late husband has knowledge.

RA: This is the time of our meetings where we have a gap in the agenda. We could do a roundtable, see if there's anything particular. With the Commitment 38 that's planned for this afternoon, we're waiting on the permitting team that's the owner of that file. We can't shift that one ahead too much because they're the one doing it. It's been revised, and we want everyone to be in the room to allow us to revise it properly. So that's why we're waiting for Commitment 38 to be this afternoon, which we can't really move too much. We can have some discussions at the next TAG meeting. We could have the discussion now; it would be done. If not, then it would be an early lunch, and we would reconvene later this afternoon. We could do a quick roundtable, discuss the intention and planning for the next TAG meeting, and we'll see what happens.

EE: What is Commitment 38?

RA: Commitment 38 is a commitment Agnico made when we were discussing the Meliadine Extension and waterline process. We made a commitment to revise the project. We were waiting on all the collar data, so we were missing one piece of the equation, the collar data, for a while. We've got the collar data and Agnico has revised the memo and we want to show it this afternoon. It's a commitment Agnico had made, and we want to discuss it through the TAG, but the owners of that project are not in Rankin yet. So that was a commitment for our previous TAG, so we'll discuss that this afternoon.

RA: We discussed last time in Winnipeg when we were there, we discussed and all agreed how Agnico and WSP would do the analyses and agreed how to do it, and now Agnico and WSP has done it and we will show it to the group. Quick roundtable.

BP: I don't have a lot to discuss right now. I haven't heard back from the wildlife team about the Qamanirjuak.

RA: It would be nice to hear those numbers.

CB: Hopefully we'll get a chance to look at the caribou all together and see the behaviour so everyone can see the deal of how everything works around here, and I'm excited to go to the Raglan mine and go check it out.

DCh: When I heard Eva mention about large caribou herds that came early and then the fact that they kind of eat a lot in that area and then they have to leave it because there's nothing left and they got to go somewhere else, was there ever any IQ talk about where they went? Meaning, when they went somewhere, was it consistently to a specific area? And I'm just wondering if at times they went further south, when they left in the summer they went further south. Because I know from some Dene people, they talk about how certain years, caribou don't stop at the border, they go into Manitoba. At times they go quite a bit south. Certainly not lately, but just wondering if they ever talked about when the caribou in large herds went somewhere, where did they go?

EE: Probably Alaska. That's -- my dad said we can wait 50 to 60 years for them to come back to the area where they were before.

DCh: That's a long wait.

EE: With the vegetation you have to wait long enough for the area so many years. Even sea mammals. That's what he used to tell me. Even sea mammals go somewhere for so many years and then go back. I don't know. That's what they used to say, elders. Even one -- like, 60 years ago, there was starvation because there was no caribou and no fish. They disappear at once and they come back all at once. Land and water animals.

RA: At the same time?

EE: I don't know. They probably communicate with each other like we are. By the time my youngest granddaughter is 20, there probably won't be no caribou. That's what that knowledge Inuit knows about land and water and animals.

DCh: Would there have been knowledge and background from times when this kind of herd would go into the -- into the forest in the winter, but would there make any migration changes occur when you had heard maybe there was lots of fires in the -- just on the north part of the range? What happened to the caribou up here after those fires? Anything? Did they stay up north longer or did they --

EE: Caribou doesn't stay in one area. They can walk. Walk. Some days, Kivalliq area have -- like right now, we have herds, lots of caribou. By five years, we will barely have herds and barely have caribou. Like, scientific people say animals are gone. In my head -- with elders' knowledge, they would tell animal is somewhere to get their feeding grounds grow again and come back. See there's so many bears and they used to talk about bears are falling. They don't live up north like us, living with animals. If they ever do that, they'll be surprised. This is how much we know.

DCh: They move. Yeah. And I would think that, you know, seems to make sense and of course it does because that is exactly what you said. I guess I always wonder about generally, is that the

whole herd, or would they -- would they all move together to the same place or maybe some would go to a slightly different place? They would maybe break up.

EE: Some will go north, some will go west, some will go east, some will go south.

DCh: They'll just go somewhere different.

RM: I mentioned it before, growing up here in Rankin, I remember the big herd migration used to occur roughly every seven years and then it went down to every four years, and for the past few years, it's been every year. Just my thinking that they're passing through because in the past, the vegetation, where they used to feed from years ago is probably low -- gone or low, so they're just moving this area for a bit until other areas of their vegetation is grown back again. I can't say when, but I'm thinking that they will be -- you know, cycle again where it's every so often, not annually. Other than that, not much else to say. Thank you.

RA: Raymond, you feel that we should go back to the cycle and add more years. So been every year now and then 3, 4, or 7, you're thinking?

RM: That's sort of what I'm thinking, but I'll let you know about the Agnico mines lifecycle.

MG: To Eva and David, thank you so much for being open to the questions, and you made Helene's day, and we enjoyed it as well. I have a question for Brad about the caribou collar maps that we're viewing. We're curious, we've heard different answers, but it would be great to hear from you if you're comfortable providing it. When we look at a updated collar map and some data is from the 25th and others are from the 26th, we just wonder why they're not all from the same time stamp. Is it because they're not able to communicate with the satellites or they update at different time frequencies?

BP: It all depends on when they've been set and turned on because they have time intervals. They'll try to ping the satellite as they go by. They are not all pinging at the same time every day. It all depends on when they've been affixed to the animal, turned on, and then they'll ping a few times a day after that. Sometimes this far north, when they send out that signal, there's no satellite to pick it up. The collar will hang on to that data, so the next time it connects, you'll get the last 48 hours of data, all the location points will come in. But sometimes you're going to have collars that will have different dates because that's just the last time that they sent out a signal and there happened to be a satellite available.

MG: That makes sense. That's kind of in line with what we understood as well. Thanks for confirming. Thanks again, everyone. We'll reconvene in the afternoon, and fingers crossed that we can make a site visit happen tomorrow or some visit on the road, if the caribou allows.

MN: From those satellite collar maps, are there any individuals in this big group here that are collared, and does it look like they came from the northwest of Meliadine Lake or did they come from Chesterfield Inlet?

BP: I'll pull up yesterday's map. We were discussing.

RA: Could I show it on the screen?

BP: We were discussing this yesterday, that it looked like the group from two days ago now seemed to be some type of a break-off group and there were five collars amongst it whereas most of the collars seem to be going in a circular pattern northeast of where we are now. These groups are heading due south.

MN: Most of the herd is still northeast right now.

BP: Yes. The majority of the herd is. That may change soon, depending on the movement. I'll know when we get today's collar map sometime after lunch. You see those five down to the southwest, that was probably amongst the group that was heading by two days ago, and you can see the majority of the collars are to the north and to the east of us.

MN: This looks like that big group from two days ago was coming along the coast to the east.

DCh: That's what it looks like to me.

CB: I think the first herd is the top one that came through and the rest came from.

DCh: From the blue ones didn't looks like they're coming from the coast.

BP: The blue ones are the end point, so the red squares are where the walking interval starts, and the blue is where they finish.

RA: Sorry, Dan, I'm not sharing because it's more about the NDA. Since Brad has authorized for people in the room, I'm just sharing it here.

GS: They came through, hit the coast, and now bounced back and heading back west.

BP: It's hard to tell because it's so busy in there, but it's almost like this reverse 6 pattern. They come down the coast and start to sort of swirl, and then this other break away group on the other side that's heading south.

DCh: So those red squares outside the circle to the south are a group of another --

BP: Yeah. The red squares are where they started, and they've been heading down south.

DCh: Makes sense. The coast keeps the bugs away and good forage there.

MN: It shows two days of movement on it, or how many days from the start until the end?

BP: 24th to 26th. The dates refer to where the collar was -- the blue circle is the end point. Prior to that, I think it's maybe -- it's going to depend on the interval and when it connected last time. Some walk lines are going to be longer than others. I forgot how often they ping, every four hours or something like that.

DCh: I think we talked about that. Four hours. Especially when they're within the regional study area. They ping more often than outside it, apparently.

BP: Yeah. I don't know if we have these ones geofenced or just set to go off quite rapidly. I know a few years back, they were only going twice a day, and we've increased it significantly. They do have the ability to be geofenced, and we could set it up to ping every hour, but this far north with satellites, we might not get much actual benefit from that. We're kind of at -- signal-wise we're kind of at the furthest we can go without launching our own satellites into orbit. We just need more communication up here.

NM: Why haven't you done that?

BP: If AEM would like to fund us to the tune of half a million bucks.

DCh: The thing is, in the south of the area where there's forest and terrain that's deep valleys and stuff, that's the general problem with collecting satellite information because there's blockages and stuff. Up here, it's wide open, but you're telling me that the satellite routes don't come across the north as much as the lower belt of the whole world, between the two Capricorns.

BP: Most of our communication satellites are meant to fly over the more populated regions of the globe.

RA: You'll see sometimes the satellite is not online. Starlink works well, but the satellite goes off. You'll have five-minute gaps.

CB: Those are all just females.

NM: Do you have collared males?

BP: We do collar males as well. It's a mix. We try to get a mix through so as much demographic as we can so that way the collars are spread through the herd so we can get a good idea -- a representation of the herd for its locations.

CB: I wonder if they can switch the colours to the male and female.

RA: To know which one is which.

BP: It's possible. They probably have that in the metadata.

CB: I haven't really seen any males come through here yet.

BP: The ones going south are females and the males are all to the east there.

NM: You're getting another map this afternoon?

BP: Should be sometime after 1 or 1:30. They tend to work on it pretty early in the morning and get it to us, even though they are based in Vancouver.

DCh: There's no collared ones outside of this image?

RM: This data is all nice and great but last year or the year before, everyone thought the migration was done and a group of 20 or 30,000 passed through that nobody had any idea about because they didn't have any collars on them.

BP: We had the same problem with the Meadowbank. It just happened that the collars were in the back of the herd, so a bunch of caribou showed up at the Meadowbank project and we just didn't get any warning about it. All the collars were still 100K back. We do run into that. And again, that's why we collar as much of a spread of demographic as we can. In the past, we have tried targeting the lead males to try to get the lead caribou collared, but we found that just because a caribou was in the lead one year, they're not going to be in the lead next year. The only way to do that would be to increase the amount of collars we have spread through the herd as a whole and hope that gives you a representative idea of where the herd overall is at.

NM: Right. But this time of year, it would be cows in the lead, wouldn't it?

BP: Yes. The only way to really guarantee that doesn't happen again would be to collar at orders of magnitude more than we are and at that point it would do more harm than good, we'd be disturbing so many.

RA: Thanks for the input, Brad. It's nice to get the input from GN on how that's done. We're able to look at the map, so that gives us an input on where we're at. If there's nothing else, it will be lunchtime, and reconvene at 1:30.

End.

4. **Commitment 38 – Update Collared Caribou Analysis Memo**

Supplemental Material: ppt files titled: "Commitment 38 Caribou Analysis Update – Terrestrial Advisory Group, June 27, 2023"

Presenter: Meghan Beale

RA: Good afternoon, everyone. I see that Meghan has connected. Is it all good on your side?

SS: Meghan, we're very happy you were able to join us. The study design that we're going to present is the one that was approved by TAG members on April 13th of this year. Since then, we've been working with WSP at completing the study, and today we're very happy to be presenting the results.

MB: Sara provided an introduction, so I'll give a quick overview of the study design that we agreed upon in April, and then I'll get into the results. The Commitment 38 study was brought up in the December 2022 TAG meeting and the study design was developed collaboratively on the 13th of April among the TAG members, and today I'll be presenting the results from the Commitment 38 study following these methods that were approved in April. The 2 objectives for the Commitment 38 study were as follows: To evaluate caribou movement behaviours, including speed and directionality in response to the AWAR and mine, to evaluate caribou response to the AWAR and mine, including deflection, crossing, and paralleling. Objective 2 was to evaluate the presence and if present the spatial extent of a zone of influence around the AWAR and mine.

DCh: Just define NDVI for all of us.

MB: Normalized Difference Vegetation Index. I think of it as a measure of greenness.

SA: It's a satellite-based spectral.

NM: I'm just wondering why do you think the movement goes back down? Daily movement goes back down around 75 days after calving.

MB: We're seeing a peak at 37 days here. We're seeing a peak in daily movement here and then seeing it slowly drop off, and we're not sure but this might have to do with the green-up and where we're at with the vegetation. If the caribou are trying to seek out vegetation where the green-up coming in, they might be moving more, and if everything is greening up and the forage becomes a lot more plentiful, then they're not moving as far for the same resources. It's a hunch. I'm open to other ideas too. We're seeing the same trend regardless of whether they have calves or not.

BP: As you get later, you can see the peak there. It goes up -- what we found in previous studies; I know we've come up with a lot of movement of caribou is based on insect harassment. As you go further into the year, the insect harassment will drop off dramatically starting in August through September. So that means there's less motivation for the caribou to move around.

GS: It could be bugs, entirely bugs.

MB: That's a good point. All the green points are informed directly by the day the individual calved and the orange points are the mean calving day. The orange points, those caribou didn't have calves, so in order to get them on this X-axis, I had to give something in order to calculate calf age. The orange is based on mean calving. What that means is mean calving falls June 6th, so where that puts us in time on June 6th -- we're looking at beginning of July here and another 12 days, so this is usually about the peak of greenness too, the second week of July. It's somewhere between the 10th and 14th of July based on the images that we pulled and when we were creating the greenness layers. If this puts us mid-July, we're seeing later July, another 25 days, end of August, and then this would be into September, so I think this makes a lot of sense. I just had to think of where we were in Julian day not calf age.

SA: Clearly this is a strong relationship you're presenting in terms of change in daily movement rate with calf age or day of year, more or less. You were mentioning that you were going to use cumulative green-up instead of calf age, but what happens when the study window goes to the end of July?

MB: It's August 22nd.

SA: That's beyond that peak, so how well will cumulative green-up describe movement beyond that peak?

MB: Yeah. The goal was mainly to account for the differences in movement as a function of where we are in cumulative growing degree days. We were going to use just Julian day, but cumulative growing degree days is highly correlated with Julian day, so I realized that as you get further into the summer, you have more cumulative growing degree days. I just wanted to be able to understand that there are going to be differences as a function of where we are in the year and to account for the general differences we're seeing from insects or green-up or location, and then hopefully when we account for that in the base habitat selection model, and that's where these variables go, once we account for them in that base habitat selection model, then we could test our questions related to our Commitment 38 objectives.

RA: One of the big periods of road crossings seems to be in July. And depending on the year from my recollection from some of the animations, it was mid to late July, there's that crossing going from east to west. And that seems to be the largest period of road crossing. Now, during that period, that puts us on the downward slope, so I'm just wondering how cumulative growing days describes and how that variable describes that change in the slope of this relationship. Because up until day 40 or so, 45, it's a positives slope, then it switches to a negative slope.

MB: I think the goal here would be a very minor tweak in order to answer your question, you would just include a negative quadratic term. Right now, a linear function would be these lines, and that would do a really good job of fitting the data up until day 37, but if we were to replace that with a quadratic and it would end up being a negative response, then I think you would fit this nicely, and it would just be a tweak to the base model.

SA: Great. Perfect. Thanks.

MB: I did test it. It was sort of in the beginning of my code. I had tested it, but it didn't make it through, and I'll go back and check it, and I think it was because it didn't explain much more than the linear relationship. But I think it would be easy to just force that, and I know when I tested it, it didn't have a difference in AIC to the point where I don't expect it to change anything. I just think to answer your question, a negative quadratic would be what would fit here.

SA: I'd be interested to see if it did change or not.

MB: Yeah. I know the reason it was dropped is because it added a parameter to the model where we're dealing with some sample sizes that are small and reducing parameters where possible was important in order not to overfit anything. I'm not suggesting what it does is it fits this relationship, but I'm not suggesting that it necessarily changes any of our outputs because the base model itself was doing just as good of a job at explaining as the quadratic I tested. But what I wonder is when I show you the base model structure, I wonder [AUDIO CONNECTION ISSUE] more important. It's ultimately the other variables that are driving things so ultimately when we pull that through, the base model with or without the quadratic, presumably is an equally good model, if that makes sense.

SA: With the step length being off the chart, so to speak, indicating a large response, what you're saying is that caribou that are more likely to cross have much longer step lengths. Correct?

MB: No, not actually. This is where the interaction term comes into play. We're using the interaction term and the candidate set is designed in that each one of the models has the interaction term. This should be crossing steps, just for consistency. Crossing step, we're interacting crossing step with different things that we think could be causing the caribou to cross. In this case, the model is looking at whether days in the vicinity and cumulative crossings interacted with a crossing step. Some of the other models in the candidate set which I didn't lay out in the table, but I can show you a slide at the very end, there are other models in the candidate set that test something like would the caribou be more likely to cross if they're closer to the mine. Would the caribou be more likely to cross in nonvegetative habitats. There are lots of models tested but they don't come out as the top model, and that's where we would see all these other tests or interaction terms being put. What this big step length estimate being off the charts, and I should have clarified, the estimate is off the charts, but the confidence interval is massive too. We're not sure if that step length estimate needs to be out here or here. What this is telling us is that we're seeing individual variability, but the estimates for step length are very similar among the two treatment groups. And the step length and turn angle components of the model when they're not interacted with anything, those are usually just an indication of general persistence in directionality for turn angle and general trends in movement. They're not necessarily able to answer questions about movement as a function of land cover if they're not interacted with anything. Does that make sense?

SA: Looking at those last two, treatment group 1 is the pre-operational period and treatment group 3 is the operational period for the mine. Do you think there's any interpretation there that would suggest that there's been a change in behaviour with phase of the mine?

MB: I think that's hard to know for sure but thank you for bringing that up. And this is a great thing to bring up because here, yeah. We are at a place where the AWAR traffic was mostly public use at this time in treatment group 1, and here, although we are in construction and operations phase, the AWAR is closed or there's a restriction going on, which is giving us treatment group 3. It's interesting to note that out of the treatment groups, 1 and 3 are maybe a bit more similar which is what I would expect if the caribou were still behaving similarly, if that makes sense.

But we have to be careful because I don't know if our analysis was designed to test that. I think it's something we can hypothesize. We didn't design a test of caribou behaviour switching, but I do think it's important to note and interesting that of the three, the two that should be more similar are more similar. But all throughout, I'm not seeing major differences. Like for example here, this yellow estimate falls completely within purple. Ultimately, these are not all that different. The only place I'm seeing maybe a difference is this yellow to purple. What if over time the caribou have just learned to just get through the area. It's the opposite. What this means is over time, the caribou are potentially hanging around in the area for longer, but we cannot say whether that hanging around is due to habitat selection. They may be choosing to stay because of forage. We don't know what it is that's causing them to stay, or we do in the sense that we know what they're selecting for. We know they're avoiding lakes and selecting greenness. We just can't interact that many things together. It's too complex in the model. There's a chance that the number of days they've been in the area is related but we should examine what it is about the area, why they're staying, and I think it's most likely availability of forage or greenness. I just don't know if we can get as far as behaviour switching.

DCh: Just on that one where you have the purple on the right and the yellow on the left, is in my mind, more about how comparable pre-development traffic to development, closed road traffic, if those are similar. Because if it's closed, that's the whole point is having a closed road to allow caribou not to be disturbed, and I guess I'm not just sure if there's a comparability between those two.

MB: Yes. I agree.

GS: But just to go back, the road route was an ATV trail, so there was ATV traffic before road construction. And then the road was constructed and there were no rules on the road, and then the mine was built and then the road was closed to mine traffic so there were just ATVs on it. ATVs, no rules, ATVs.

DCh: Oh, okay. You're comparing ATVs there, really.

GS: It's ATVs to ATVs.

MB: I think that's good to bring up because these days in vicinity and treatment groups, we can try to sort of contextualize what that treatment group might look like, but you're right. There's probably a lot going on with these spatial windows that unless we have data to support how many ATV trips are going by and what times, unless we can get that data at the same scale as the collar data every four hours, it's going to be very hard to tease out what exactly is it between these time periods that we're seeing differences. And another thing is if we were to increase sample sizes of how many used points each caribou had, this could change a little bit. So just to give some context, the individual caribou with the most used steps or the most GPS coordinates within each treatment groups was 44 or 43 steps. It's enough that we can look at the trends and make inferences, but it's not the same as individuals with thousands of steps. Right? We also have to recognize that just implicitly in the way that we define treatment group 3, the closures are not months long. They are a day or two here and there. It is limiting in how much data we can throw into this treatment group. I think my takeaway is that you're right. There are differences going on with ATVs and types of traffic between the treatment groups, and most likely there's a lot of things at play, and I think it's an interesting result. I just don't know if it's -- if it's a big takeaway if that makes sense.

DCh: Yes. No, that's helpful, Meghan. Thank you.

(BRIEF ADJOURNMENT)

SA: I take your point in that the overriding drive for these caribou is habitat selection itself for greenness and so on, forbs and so on. That doesn't surprise me, that's what they're doing out the window. They're mowing machines, basically. But I would be cautious in the interpretation of these results for two reasons. There are these sample size limitations, that perhaps there are other models that might come out better with larger sample sizes, and I think that's important to emphasize. I'm trying to rectify these results with what we see when you animate caribou collar movements, and you can see that some but not all are deflecting or paralleling the road at times. When we're talking about monitoring thresholds, one of the thresholds in the TEMMP was a 10% deflection. Now, so even if 90% of animals base their entire behaviour on just straightforward habitat selection, is there evidence in this analysis that that 10% threshold is possibly met or exceeded? If you go back to your results for the deflection, crossing, and paralleling, where your top model is habitat, you had other models that also had -- so for crossing, for example, if you go back to those bar charts or histograms. You had -- where are we here? Oh, go back to deflection, that's probably the one to go to.

MB: Yeah. Okay. I'll just recap. This is the exact figure for deflection, but they all look very similar to this. What you're getting at is, how do we know these other models down here aren't telling us something important?

SA: Yeah. Even though the habitat model comes out as a top model 40% of the time, is it significant that a model that includes deflection came out 10 or 20% of the time. I don't know without looking into the results, and that's something that I would be curious about. I haven't had time to digest all of this, but my concern is it's important to put some caveats on it. Our initial interest was to look at the behaviour of these animals relative to some of what we've observed in the collar data through animation and what people say they're seeing, which is not the majority behaviour. We all know that. All these caribou eventually cross, but the concern is that there's a proportion of them, whether it's 10% or less or more, that their behaviour when they get to the road is influenced by proximity or traffic.

MB: Yes. It does make sense. When we dig into the models that don't come up as the top model, usually the reason for that is because you're seeing a lot of what you're seeing is the estimates for the variables used in the model are usually intersecting 0. There's very little driving that model to be a good model if there's no variable in the model that's just all the sudden, boom, explaining a lot of variation. I understand what you're saying, and I guess I think the only way. And one of the things that I'm hoping to put in the appendix of the report and boring to put in a presentation. I think having some sort of big summary tables, which will ultimately summarize for these individuals that do have a top model or that -- how do I put it? I'm going to backtrack and talk about the process for a sec and then come back to this. The process is we take this model and then we force the model that has the highest proportion onto all the other individuals, and then what we'll see is some of those individuals may not -- if like you're saying, a couple individuals were to deflect, then the base model may not be the best model for them. You'd expect that their estimates are just wonky and imprecise and quite wide if you were to force the base model upon them. When we look at some of these more complex tables, we can look at how the actual estimates on a more individual level for when we force that population level model on. And I think what that would do is give a better indication of what percent of the population have a positive relationship with this or with that. And would it break the information out further than this. This gives us where the estimate lies, but it doesn't tell us how many individuals in the population, or the percent of the population align with the responses we're seeing here. And if we were to look and summarize that information, you would be able to see how many individuals or what percent of the population are responding a little bit differently than the rest.

SA: Right. And that's what I'm getting at. I like the analysis, but it's describing the predominant behaviour. These caribou primary goal is to eat and move. But it's that minority of animals or minority behaviour that we were trying to capture with things like a 10 % deflection threshold. I would like to see the report look at what are some of the responses that we're seeing even if it's not the predominant one. It's hard to reconcile this interpretation with what you see when you look at a collar track when they come up to the road and go along it. I think it would round out this analysis a bit more to do that, dig into some of those alternatives.

MB: Yeah. I should clarify. It's not really an additional analysis, it's just another way of presenting the information. We were just able to have a table where we can break out the percent of individuals that are well-explained by this and you would see more than just the breakdown here. You would see per variable, are they responding positively or negatively and what percent of those respond that way and it should help identify whether we have some outliers or not.

SA: Right. That would be an important part of the discussion, I think, in the report would be to do that.

DCh: I'd like to see that too because if you have an N of 47 and it shows that there's 43 % of those -- not doing the actual calculation -- it could be the ones of how many individuals are represented by that top model out of the 47. It would be nice to know what the breakdown was of some of the other models are showing up and the other individual caribou and maybe some consistency there.

DC: Yes. The one thing to keep in mind, Stephen, is that in terms of the animations, you're only seeing the movements relative to what is on your map. And that might be some lakes, Rankin Inlet, the AWAR and the mine, but what you're not seeing are all these other things that have been modelled to all the collared caribou. What you might be concluding from the animation might not have the full picture of everything the caribou are responding to.

SA. I get that, Dan. I'm thinking about some of the more obvious examples of animals that come right up to the road and just parallel that. It's hard to explain it for any other reason than that the road is there. I just think it's important to look at this as not necessarily just the majority behaviour and the model that best describes the pool of data that you have, but also what are the other models to emphasize also that there are a portion of individuals that are described by a parallel or deflection model, with reference to the fact that one of the TEMMPs monitoring thresholds is no more than 10 % deflection. I'm not saying you will have that information from this analysis, but it's important to keep that in mind in that discussion. And again, I really do think you have to acknowledge sample size is likely a big factor here and that that uncertainty that's created by low sample size needs to be acknowledged. And that's fair enough. There will be more data in the future and similar analysis can be done at that time.

NM: My question is, can you just recap for me and maybe everybody how deflections were defined was it a certain number of steps had to happen in one direction and then an angle of a specific magnitude had to be; what were the specific criteria that you used to define that.

MB: Yeah. This is just straight from our April meeting. A picture is a thousand words. Deflection is defined as a turning angle greater than or equal to 60 degrees between the heading of a step and the average heading of the individual caribou's movement, or general direction of movement is what I put here. That general direction of movement is the unique thing that we decided as a group, and that's where we took the general direction of movement, I guess, like, the mean turning angle over a whole bunch of different steps so that we weren't looking at it at like a 4-hour interval. We were looking over approximately a day and a bit. What I ended up doing is I calculated these moving windows and then for every single step in question we had this general direction of movement associated with it related to the 5 steps preceding the step, the step itself, and the one step following it. So that smooths out where that caribou was going over a 28-hour period. And then we measured the angle from north, so let's say this is 45 degrees, this one's 135, so it's absolute value of the difference between the 2 angles. In this case, it's 90 degrees, 90 is greater than or equal to 60, we call this a deflection. It's important that when we define it, deflection is deflection in relation to the general direction of movement, and this is applied only within 5 km of the mine and AWAR and Rankin Inlet. But deflection is not based on this definition, we can't always say that deflection. When we include deflection in our models and we include a spatial covariate like distance to AWAR, that's when we try to understand whether deflection is a function of where the caribou is, in terms of proximity to AWAR and mine. The deflection step itself is not defined in terms of AWAR and mine. It's defined in terms of difference in movement. When we stitch in the land cover data and add it in to the model and interact them with deflection

steps, that's when we ask those valuable questions about how the spatial landscape influences deflection.

NM: So just a follow-up question. Did the general direction of movement have to be towards the road slash mine, or it could be that a caribou was moving -- it had to be within the 5 km, but there could be a scenario for example that a collar is moving away from the road and then it deflects or has an angle that categorizes it as a deflection even though it's not from the road, it's just in the range of 5 km?

MB: Exactly. We couldn't define deflection steps kilometers and kilometers away. We all decided that 5 km was the relevant vicinity we would expect that caribou could respond to disturbance and change their movement pattern. The key thing here is that we're taking the general direction of the caribou movement and whether the caribou suddenly makes a hard turn, whether they make a hard turn. That's really what we're doing. When we interact them with information like, is the step also a crossing step, right? This step can also be a crossing step. Crossing is simply defined as, does the step either pass through, go into, or cross -- basically does it interact with the mine or AWAR disturbances. When we start interacting something like a deflection step with crossing steps or distance to mine that's when we start answering the questions about how the mine influences deflection and how the road influences deflection. But you're right. We could have a caribou move, move, move, general direction, and then this is a lake. And they can't do that, so they deflect. Or move, move, move, and then they want to go here because it's green here, we want to select forage. We're trying to allow the other possibilities for what could predict deflection to come through, but we're designing the candidate sets in a way where we're asking questions about what we think is causing deflection, like the road. Maybe they're moving, moving, moving, and get too close to the road here, got to move away, they deflect. I don't know, right? There's a lot of hypotheses of what could be going on here.

BP: Looking at this angle change, it seems to be only instantaneous changes. How are you approaching circumstances of a gradual turn? Like multiple smaller turns that end up over time equalling more than 60 degrees?

MB: The best way that we're accounting for that is by including a 28 hr moving window which defines the general direction of movement. The idea is that a step itself is a deflection to the general movement. It's kind of the opposite of what you're asking, but I think they're related in that if you have a general direction of movement and the caribou, moving this way. Let's say they go here and here and here, but ultimately, they're going from the bottom left of my screen to the top right. That would give us this line like this if that's over a 28-hr window. And then all of the sudden -- [AUDIO CONNECTION ISSUE] -- my bottom right. It is a measure of a somewhat instantaneous deflection but the general direction of movement itself is informed by over a day's worth of movement. We're asking, does this step suddenly drastically differ from where the caribou was moving over a 28-hr period.

BP: Ok.

EE: Change of direction, the caribou must have saw fox or something in front of the caribou. They can change direction. Or see some animal in front of them. They would smell that. Whatever they smell. Or they can change direction back if there was no wind at all. I'm not surprised by this because they always change direction. We think they're going that way, but they're turning always because they saw something or smell something ahead of them.

MB: The caribou will change direction when they smell something. Maybe it's from the wind or they'll scent something.

RA: It also could be predators or things like that that would make the animal shift.

MB: Yeah. That's a good point. I'm going to answer Eva and say that predators were not included in the model because they would be nearly impossible to include unless we had collar information for predators. But it is valuable information to know that that the caribou could be responding to something that we may not see or be able to detect. With that same idea the smell is something that's very difficult to model and, you know, by trying to incorporate things like insect harassment, which uses wind speed and temperature, we're trying to include as much as we can in terms of the IQ and important knowledge, we're getting from people observing caribou on the ground. And with the variables that we have, I think we're at the best place we can be for including things like wind whereas smell and predators are very tricky.

SA: A couple comments or questions. First one is, when you're talking about this deflection, to me that is the type of sudden change in direction that we observe, again, if you just review the animations, you observe that typically when animals are right next to the road, so probably within 500 m or a kilometre at most. What I'd be interested in seeing would be seeing-- if there were enough data, would be seeing -- if you use general direction as they approach the mine from many kilometres back, but you only use the data within a kilometre of the road because that's where I think you'll see the drastic, uh oh, that's the road. The sudden response of the individual to viewing or hearing the road. So that's the first sort of modification I'd be interested in seeing. The second one is, I don't know if you took this take into account, but if you think of a caribou as it approaches the road or mine, it's behaviour is more likely to show deflection or paralleling and so on, but once it's crossed the road, it may be still within 5 km, but the collar data now represents something completely different. That animal is not going to deflect because it's moving away. Its angle of turn may be a lot less. I wanted to ask, did you exclude from these deflections, crossing, paralleling analyses, did you exclude data once the animal had passed the road or crossed the mine site? In other words, their general direction is moving away from sources of potential disturbance.

MB: So, no, we did not, because there are individuals -- and I think we brought this up in April -- because we also did not want to exclude individuals that crossed the road multiple times. That does happen and an individual could interact multiple times. If we were to exclude every individual that -- after they cross, you lose some data from the individuals that are crossing. But I also want to add that when you interact something like a deflection step with a variable like distance to mine, the distance is being applied within a 5 km buffer. If there was an effect of, at closer distances caribou are more likely to deflect, that would come up with a very strong response, and that's what would drive us to see the model would come up as a top model. There's no need to constrain the spatial extent any further because we're within a sweet spot. Sure, if we were going up to 50 km from the road, you wouldn't want to apply a variable that far because caribou aren't responding that far away. But based on the IQ and our discussions in April, we thought that the caribou could respond within 5 km, and just because we're including the information from the 1 to 5 km doesn't mean that we still wouldn't see the response come through the way we've done it. And to touch on what happens once a caribou crosses the road, and they continue moving, that would strengthen our results. If we see the caribou cross the road and they start moving and stop having deflection steps as they leave the proximity of the road, that would strengthen our results. That would cause our estimates and data coefficients to be more precise.

SA: I don't think they would though. We talk about upstream, downstream. The upstream being the approach to something and the downstream to be leaving something behind. I think by including collar data within the X kilometres either side of the road or either side of the mine, you're getting a whole bunch of data in there for animals that -- their direction of movement or

migration is away from something and their behaviour as they move away is going to be very different. While you're finding that caribou are more likely to deflect as they approach, when leave, they're less likely to deflect. If you mix those 2 data sets together without the covariate that take into account whether the general direction of movement is away from an area versus towards, I think you're losing a lot of detail. And for the sake of keeping a few collars that maybe cross multiple times, I think you're adding a ton of data that we wouldn't expect to see the responses that we're concerned about because these animals are already crossed and they're moving away.

NM: While I'm thinking about this, I keep thinking about how this isn't like a particularly directional time of year for caribou. It's not a migration, technically. And like Eva said, and Eva was so right about this, this is a time of year where they are changing direction so much based on so many different reasons. We see that, there's no clear rule of caribou is approaching the road or going away from the road and which direction that would be from. Because it's coming from all directions and sometimes, they change direction a lot. It's the post-calving season and summer and calving. This is the squiggliest you'll ever see the collar data, is during this time of year. It's just a comment to say what a challenge it is to identify a deflecting step here.

SA: Well, if you look at the animations, again, it's a really good way of looking at this data, and reviewing them, you do see mass directional movements, especially at the end of July. That's a big period. They are all heading west and south. They move across the road and once they're gone, they're gone. I recognize that during that immediate post-calving period, there's a bit more swirling, but there's a period where those animals are motoring. So once again their behaviour, we know from looking at the studies in Whale Tail for example, as animals approach the road they slow down, the take more turns, and once they cross the road, their movements are more directional and the rate of movement increases. I think the problem is we're dealing with a time of year where you've got our study window and dates, we're using is some periods where we do have large herds moving in a sustained direction and other times, we're dealing with data where they're not doing that. If we chunked all this data together where we're looking at collars within 5 km of the road that have crossed and have no intention of coming back because they're migrating, we're really muddying the waters here.

NM: My guess, and, Meghan, you can jump in and corroborate or not, is that we don't have a ton of data from that more directional time of summer. I guess most of the data from that close site within 5 km will be from post-calving because it's really.

MB: You're correct. The data is from right now. We all know they're crossing right now, but the calves are like three weeks old usually when they're crossing, around that age.

NM: It's just in the last handful of years that they crossed in the summer season in that more directional way. Do you have the sample size to partition it out the way we're talking?

DCh: Upstream and downstream.

MB: I was just going to say I can't speak for sure to the sample sizes.

SA: I was trying to pull up the animations again. I've looked at these so many times. There are probably four or five years of mass directional movement across the road in late July and I think it would make for a much more precise analysis to try to tease that particular type of behaviour out. That's really what we're most concerned about here.

DCh: Just that the mixing of the data of caribou that are approaching versus crossing and leaving, and so we consider the approaching as the upstream and the crossing downstream, I would like

to see that if you have enough sample size to see those separated out, to see what the speed of the direction of movement, that sort of thing, if there's any differences there.

MB: This is a highly tortuous time for movement, swirly and curling. They're not just moving in a straight line. That was the whole reason why we kept deflection steps not specific to the road because we had explicitly talked about how the paths are not clear-cut and there is a lot of back and forth, and I think that that again is still extremely important because it is not easy, and I don't even know if it's biologically appropriate to just discount any of the more tortuous or convoluted paths or crossing that's happening. If you go searching for individuals that are moving directionally and potentially parallel the road for a period of time you might find a result, but I also think it's important to acknowledge that what we're doing here is taking fine-scale movement data and not just looking at an animation related to a disturbance. We're plotting down those points. And those animations and what they provide are incredibly valuable. It gives us questions to ask. We see something and we want to know what's happening. In this case, we're digging into it, and how do we know that these paralleling or deflecting movements are not simply a result of forage on the landscape. And that's what some of these things are telling us, is that when you really dig into and contrast where a caribou moves versus where it could have moved, like these used and available steps, we're finding that generally the caribou are seeking out green areas with heath and forb, and their step length changes based on the time of year, and they're avoiding water. It's just tricky because I'm not positive that the more you try to separate the data out and look for individuals that maybe move through in a more directional way, I'm not certain that we still get any results that are applicable at a population level.

DC: The results already show this. The results already show that there are individual level variations. You're right, Meghan, that if you dig deep enough you will find some individuals that are responding in a different way than others. The results already show that.

SA: Right. But I disagree that it's biologically inappropriate to dig out these subsets. We're clearly pooling collar data over a period of time, over seasons where the animals are making less directional versus much more directional movements across the project, and I think it's perfectly biologically appropriate to tease out the time where there's more directional movement and utilize that data set in order to eliminate this issue. If you're treating an animal that has already crossed the infrastructure and treating that set of data on it's behaviour in the same way and the same variables as an animal that's approaching it, the two data sets are going to be quite contrary to each other and they won't model very nicely because all of the sudden once they cross, you'll see few deflection behaviours versus when they are approaching, and therefore the model comes out very imprecisely. It doesn't describe that individual animal very well because it doesn't take into account the time at which it crossed and left and is moving away from the infrastructure. Once they cross the road they aren't coming back. They're not going to make a sudden deflection, they're more likely just to head off. Isn't that the behaviour you see? They stir around then go across, and then they're gone. If you put those 2 sets of data together, you'll have a hard time describing that behaviour.

RA: We haven't done the assessment, so you are making the conclusion ahead of time.

SA: No, but I'm just saying it is a fundamental weakness in the analysis.

DC: Remember, Stephen, that you contributed to this analysis, right? Why didn't you bring this up back in April so that we could have that result in.

SA: I apologize for that. It was an exploratory discussion. At that point in time, there were many other parts to this. It was a bit of a brain burner.

EE: The road is really impact the caribou.

MG: I'm just going to chime in. I'd argue that the previous discussion in April was not exploratory as an agreement on how we conduct the analysis. Also, I think if we start applying constraints limitations and assumptions that aren't factual and confirmed into this analysis, we're taking away from letting the data speak. We have to let the data speak and not apply confirmation bias to the assessment. I think that's a very key point of this.

SA: I would argue that it's not bias when you have people that live here their whole lives that tell you this is the behaviour that they see. There's a big difference in how they approach versus how they leave. If you're not incorporating that into the analysis, then it's a major problem. And everyone is nodding. It's not confirmation bias. We're creating a very reasonable biological model, which is that whether they're approaching versus leaving infrastructure affects their behaviour.

EE: Like I said before, the earth is made by Creator and an animal. That animal is going to use what Creator gave them. But who made man? The animals impact to those. Like, we have seen so much animals since 2007, caribou movement is so different from what we learn when we were children. It really impacts. The road impacts the movement, of the roads. Like, we used to get this herd right cross the town. Even crossing the Thelon River but they don't reach to the shore of Baker Lake anymore. That's why I always ask, where's Qamanirjuak herd? Where did they go? They used to reach the Baker Lake. It really does impact caribou movement. Like, they stop, look around, what's this? Where did it pop out? And start looking, how we going to go through again. That's really like movement in the tundra, they'll move because their so used to it. But man-made, it changes so much. In the future, they'll get used to it by the time when dead. I don't know. You never know. It really impacts. Caribou really impact. So much.

RA: Thanks for the comments, Eva. I feel like this discussion is becoming very technical, which is part of the memo. The commitment we made is to revise the memo to the discussions we had in April. We've had a path forward in April. We agreed to a certain way of doing the revision. The version was made to which we presented the results. Now, what would be the best way forward on everyone's behalf? We can discuss this I feel for hours and hours again, and right now, we have consultants exchanging, so not necessarily a proponent. Not necessarily agencies and not necessarily the Baker HTO also. I'm not saying that's necessarily bad, but I'm trying to think of a path forward, how we can resolve that. I see no end point right now, and I'm trying to see how we can make that work, seeing it's the end of the day. How can we have some time, so I don't want to rush. But how can we approach this looking ahead.

NM: My question was to Stephen. Which were the 5 years that you saw the more directional movement, was that the last 5 years? In the animations, the directional -- you said there were 5 years, was it like 2018 to 2022?

SA: I just literally pulled up 2017. It was the first one that came up, and I wish I could put it on the screen, but you tell me this is not a directional movement. I'll play it here. This is the first one I pulled up, and it starts in early July and there's no collars around, and then you see them all appear, and they all move straight through the project. They do not move back once they cross, and that was just the first one I pulled up.

DC: No one online can see this.

NM: I see it. I guess my only comment about that is, this is all operation phase of the mine and the road is already there, so we don't really have control data, do we?

SA: Part of the issue is that the herd has come into great interaction with the project in those last five years because of the calving ground location, post-calving area. But there is that period in July when they've gone through this milling about and their all heading south. That shows -- that was one animation, but if you look at the others, you'll see the same thing happens in late July. The reason I looked at it was, I've always wanted to come at that time of year where they're making those directional movements. It's important to tease out that fact that biologically speaking, a caribou is going to act differently once they've crossed a potential threat or disturbance and are moving away from it in their intended direction versus when they're approaching it.

NM: Would you suggest that a solution could be a subset of data only on directional moving in this period of summer or whatever? Exclude post-calving and only look at that? Is that one thing.

SA: Yeah. Something like that I think would be useful.

DCh: That was going to be my suggestion. A subset that could still be analyzed with what we have here. And I see the directional movement. This has all been passed around for everybody to see. That's what we've always asked, what's the difference in the movements and activities upstream versus downstream. Let's try to put it into a bit more perspective.

RA: I think we can refine those and keep having those discussions in the TAG setting. Does that mean we have to change the memo as per se, or we can still address comments or concerns on the memo itself.

SA: I just think it's a lost opportunity to conduct this analysis and remove what I see as being a point of weakness. And I think intuitively to you guys, it doesn't make sense either, to ignore that fact that the animal's behaviour differently as they approach versus leaving. I think it leaves the analysis in a compromised position.

RA: Which is what we don't want.

SA: It's up to you. I mean, I'm not insisting on it. I'm just recommending that you do it. I just looked at 2018. There is a clear directional movement towards the end of July. They all say, right, let's go south, right across the project. I think that's a time period that people are particularly interested in.

RA: End of July.

SA: I don't know if the other way of doing it. I don't know if it's possible to incorporate once the animal has crossed infrastructure that it's coded differently, but the problem is, if it's moving in squiggly ways, it may cross and recross and it's hard to do that. But if we want to get at this behaviour we can see, we have to pick a time when the animals aren't milling around, and that is that later in the summer.

RA: At least look at it.

DC: I think I need some clarity. Maybe the GN could provide in writing what they're asking explicitly to be done so it's clear for everybody.

SA: Sure. Right, Brad?

BP: Yeah.

MB: And these things, we can do them. Is it something we can keep talking about in future meetings or is it something that Agnico Eagle needs to complete for this memo? That depends. These things are possible, it's also difficult if we dig a little bit here and then come back and then

there's more to dig into, and then it's just a never-ending loop of digging and digging and digging. I guess I just wonder where we want to draw the line and just report the findings and then pick up and dig a bit deeper as a separate undertaking. I'm not saying it isn't valuable. I can see where you're coming from. I completely understand, and I just wonder because I can think of a million ways that I want to improve every analysis I've done.

RA: I agree that there's something there that's worth a look into. It's just a matter of what's the end point of Commitment 38.

DCh: Yes. I mean, this Commitment 38 is a little bit different from the origin term and condition related to the fact that caribou will move across the road the same way they will when the waterline is in place. That was the original reason for this analysis, to see what caribou will do crossing the road. There's this variation and we're looking at it in more detail. This is still a commitment, at least the Dene people had asked to have analyzed prior to the waterlines being constructed. Now, those are getting started already.

RA: We agreed on that.

DCh: We agreed to talk about this further. Here is just one little thing that we could ask you to look at, a bit more detail on that, because it still is related to movement approaching the road and then crossing the road. What if you start adding the waterlines? We just want to see first of all what is going on now because it seems to be just a bit of a discrepancy between collar movements and this analysis. We're asking upstream versus downstream analysis and I think it would be reasonable to try to do that without slowing down everything. It still does require some time. I understand. But we're still in the middle of talking about the whole process, and the extension and everything. I have to agree that there's an opportunity here that we should try to continue to pursue.

MG: What Dan is saying, I'll circle on that first and respond to it. I think it's a bit difficult to validate something that doesn't exist yet, but with the design philosophy that the waterline will be covered for 80-90 % of the road, it essentially is the road. It's a slight widening of the road. I think the logic that they would behave in a similar manner to what the analysis we looked at today is showing is a valid statement to make. Because in terms of superficial topography and aesthetics, the waterline will look just like the road. My proposal on your original question, Robin, on the path forwards is essentially that it's kind of the point of the TAG, is to talk about the impact of the project on the caribou and caribou migration and caribou behaviour, the project and the road. This discussion doesn't stop with Condition 38. It's a much larger discussion than just the commitment. Everything that's being discussed today is not going to stop when we call an end to Commitment 38. It needs to continue, and it will. That's the point of the TAG, is to explore those interactions. What my proposal would be, and I'll be direct with it, is, we agreed on the methods and had that discussion in April, and WSP followed through on that with their analysis they presented today. And through that, Agnico is considering Commitment 38 complete. However, I would suggest that one thing that's added to the memo that we would like to provide a final version of July 17th is a "limitations and further work required" section within the memo that outlines what we heard today, and in that section, we highlight what the TAG will explore going forward. When Stephen is discussing directional movement and we're having agreement that that's something the analysis should explore, that doesn't hold us back from finalizing the memo. Because as Meghan has said, where does it end? The balance moving forward is to have that "limitations and further work required" section that lists what we heard today so that we can continue to explore these questions through the TAG over the next years and months as the project develops without trying to rush it into the current analysis at hand in its current state. I'm not sure, WSP, what you think

of that, Meghan and Dan, but that would be my proposal for this analysis and its place in Condition 38 and the TAG.

MB: Your point about rushing is really key. I could see being beneficial is what you said, just because we finish up one commitment does not mean there's not more things to think about and do more analyses or whatever the TAG decides needs to be done. I think the discussion of the April TAG meeting that got us to here, where there are some pieces we can improve on and there are people that agree with that, that's perfect. That's what happens in science. We can always look back on our work and say maybe we can improve this. Maybe we submit this, let people read through it, and then come back to these questions and, you know, like you said, come back to it and if we need to tackle them or ask more questions or find out answers to these pieces we're talking about now. If we tried to fit this in right now, it would be a rush, and we could be missing other interesting or compelling things that would be valuable to look at. And if we were to rush it into this version, is that the correct move? I don't think rushing is ever the best move.

RA: We're just trying to get on track and determine our way ahead.

SA: I think the work you've done is great, and I wasn't trying to be destructive. Again, I just looked at the last 6 years of data. The strength of those directional movements, the predominant movement is so clear that if you do not account for that even in this current analysis, it simply will be an identified deficiency in the analysis. And in terms of whether C38 had been met, I wasn't aware it was a one-shot deal that we talk about methods, get given results, and the report's done without the opportunity to do any kind of tweaking. Nobody ever told us that this was how it was going to go. Second, I think in terms of determining whether a commitment has been met, I think that would be up to not just Agnico but also the people who the commitment was made to, to say whether it satisfies the issue. I don't speak to that type of issue. That's not my job. I'm not trying to be overly critical, but I just think it's a fundamental flaw in the analysis. You should review these animations if you haven't already looked at them again. Just look at 2022. From July 15th to the end of July, there was a mass movement going from east to west across the road. Everything moving in one direction, and they don't come back. And that seems to happen every year. There's 2 major points of interaction, post-calving and then the summer when the animals are on their way south. That's probably the time of year we should be looking at the type of analysis that you've designed is designed to look at that type of movement.

DCh: And I support what you're saying because that's the interest of the interested parties, Dene and Inuit people. There has always been that concern of the directionality of movement approaching the road versus on the other side, leaving. Seems to me we just have to do a little more tweaking to look at this further. This has been very enlightening, and I thank WSP and Agnico Eagle for all that's been done to this point. We're learning more all the time, so thank you.

RA: And that's the intent of the TAG.

SA: In terms of a checked box. I think that even if you were to report that the initial analysis has been completed, I think all parties would be more than happy with that versus an analysis that is concluded with a final report when we've discussed that there are some things. In terms of making progress that everybody can look at and acknowledge for the purposes of ,even the Meliadine Extension review, it would be a better approach, in my mind. That would be my recommendation, would be to say we're not finalizing the report yet, but we've had very constructive work to date.

DCh: The information here presented will have a factor in our decisions, the wording that we may have about the Meliadine Extension. It was quite clear that before the waterlines came into place, that was a concern about whether the movement of caribou would be different just crossing the

road versus crossing the road and waterlines. And as Matt indicates here, he feels strongly that there won't be a difference. Well, that's the reason why we wanted this analysis to be done, to start looking at it before waterlines got put into place, so we can detect something down the road. This additional analysis would be very helpful over the next little while. Thank you.

RA: Message heard.

MG: It's loud and clear on this end. I just want to make one point. This analysis is initial but the memo that it's going to is not. It's had a couple iterations. It's been discussed since January 2021, so two and a half years that this memo has been on the table. And it is a group discussion, and we need to agree on how we move forward and when we close it. It was a proposal I made, and if the TAG is not in agreement with that proposal, then that's the point of the TAG. I appreciate all the feedback, and I'll leave it at that for now.

RA: Which leads us at right now. We could keep discussing. I think it will lead to something that will bring added value. But trying to see it from our angles and see how can we check one box and move to the other box? I just wanted to see it from the perspective of this TAG meeting and how we can look ahead at the other steps that we have to do within the process. We can keep discussing, and that's one way of making sure that we bring science to the table and integrate IQ. I think we're heading in the right direction.

MB: To circle back to what Dan Coulton said. I think having a couple of these suggestions in writing would be helpful. Just some clear expectations or some clarity on exactly what it is we're hoping to continue investigating. I don't know if that's something we can agree on.

SA: I agree. Giving you something in writing is perfectly reasonable. What I suggest, though, is it shouldn't be a GN or Atkinson suggestion. It would be nice if those of us around the table could look at these animations and you see what I'm talking about, and perhaps collectively come up with a suggestion for the additional analysis as a group, rather than GN.

SA: We can throw them up on there.

NM: How far back do you have them?

SA: 2017 to 2022.

NM: Would be good to have before that too.

RA: We can do that now.

NM: Okay. It's just useful because it gives an idea for how the timeline, we've seen caribou in which season here. That's where I was basing off -- the summer thing is more recent.

SA: No I think we've gone back a bit further in a different presentation, but the summer crossing has always been the main one. It's the post-calving, calving interactions that are new. That shift in the calving grounds getting closer to the project, but if you look further back, it's typically in that July period where the animals have turned up around here and crossed over in a more consistent interaction.

DCh: Just backing up a bit more. From our point of view, this all started back when there was a question about how caribou cross the road now versus when the waterlines are installed. And as mentioned, Agnico feels that there will be similar crossing movements. When I looked at that image from the other day of the AWAR with caribou on either side, that road looked very flat. Extremely flat, like no variation. So maybe could you explain a bit more, if that's going to be flat like that now and you put two 16-inch waterlines adjacent to the road on the downstream side and they're covered, is that going to mean that you're going to raise the level of the road to the

waterlines or is there going to be a flat road and then a covered waterline making a little hill and they'll cross that too? Is that how they'll be installed, or are you going to trench and get them in there so they're at the same level as the road? So that it would be nice to have that clarified.

RA: All those discussions were done through the waterline process and amendment.

DCh: If that's the case, the maps that were drawn of the schematic of how a waterline is installed and just about every case that I've seen, the road's higher and the waterline is lower. They'll be covered, there will be a step process, they approach the road, the waterline, that's a little lower, then the road is higher and then down. In this image, the road is very flat, and if you're going to put the waterlines adjacent to it, how can they be lower. They're going to have to be covered so there will be a flat stretch of road and then a hill of coverings over top of two waterlines. It's kind of opposite what was shown in the schematics. If you don't understand what I'm saying, please ask me, but I'm just going back to that image shown the other day of the caribou next to the AWAR, which is very flat. I'm wondering how those waterlines are going to be installed in there and still be lower than the road.

RA: Some of it could be dug. We're not digging into bedrock. Some of the subsections could be imbedded into the soil. Not all the sections are necessarily deposited on top.

DCh: If it is diggable or trenchable, you would want to make them lower.

RA: I don't have the full layout of constructions, but some of the sections, you could see some of the levels were below the soil, some were on top.

DCh: I'm sure there's some stretches where the road is higher and some lower. But that piece, how the waterlines will be installed in that area to not be a barrier. The road is flat. If those could be trenched in, it would be nice to know if that's possible. Probably has been discussed.

NM: The road is like a metre high usually. It's got a little bit of height to it everywhere. It's not flat. The image made it look like it's completely flat, but even there, it's a metre above the road. We did a survey of the road height every 100 m from the mine site to Rankin Inlet, and that section is certainly the lowest to the ground, but it's still and maybe it's because it was a massively zoomed in lens, makes it look like it was just completely flush with the tundra. You've got at least I think a metre of height there.

RA: It's never level. We did have to come back and put boulders and material. That was the intent of going to the site.

DCh: That's why I ask questions. The original intent of all this stuff is that we needed to look at caribou movement as they came to the road so that we would know once the waterlines are installed, if there would be changes and differences.

RA: We all have the same end goals. It's the way to get there. We're downloading the animations again.

SA: Just see what happens. I don't know that I've looked at this one. When it flips to orange, we're getting to summer, sort of July. Mid-July now. See them all moving across? One of them bounced back. There's that pulse, and if you go to 2022, you'll see the same thing. Green is calving; yellow, post-calving; orange is summer. A lot of interaction. If you go past the post-calving period which is the yellow. Now if you watch, this is where decide they've had enough and they're going south. Summer. Is that not directional?

NM: I never said that summer wasn't directional. I was just saying that post-calving is not directional. Summer, I agree with you.

SA: 2017. And the reason you start in summer is because there were no caribou within that circle during calving, post-calving. These guys all come down and in various ways, they come across the project, and there they go. It's in all the animations. It's that summertime when they're starting their migration heading south. That's kind of the key period where it's possible to tease out the data for caribou that have crossed and are leaving a disturbance versus those that are approaching it.

RA: So that's the part we're missing.

SA: I think it cuts toward the waterline issue primarily.

NM: What I would like to know is: in that data set, the 5 km radius, how much of it is, I would just like to see a table, how much of it is post-calving, how much is summer. What are the time periods? That might help understand.

SA: If you do that, I think you'll find that the bulk of the data is coming from the summer.

NM: My only counterpoint to that is that during that time, they do move through so much quicker versus post-calving when they're around a little bit longer.

RM: The thing to consider too in summer, which is post-calving, is ice, or lack of ice.

SA: I can make a written suggestion, if people want to review it tomorrow.

RA: I think that would be a good starting point. We need to kind of see an end point to it. We're willing to come in to discuss and that was not the intent. We are willing to improve and see how things are done, but we also want to see how we can fulfill the Commitment 38 while still having improvement and discussions through the TAG. Is that possible? Now, I'm thinking of the revision to the memo, the discussion we had in April and the future looking ahead. We are willing to improve and see things are done within the TAG process. Does that satisfy everyone? I'm hearing "no" at this point, but that was Agnico's intent within the process right now. We adapt to what's happening now as we're seeing the caribou. We can adapt to whatever strategy that we set in April within the memo revision.

MG: Just to confirm, the consensus in the room is "no" on your proposal? I was just going to say, it's important that we're all aligned. We don't necessarily need to agree, but we need to understand each other and our stance on this. It was the view of Agnico that we would call C38 to a close and continue with the rest of the analysis through the TAG, and we'd be happy to make that clear in the final memo. What are the thoughts of the TAG members on that? It's okay if it's not acceptable, but I want to make sure we're all on the same page by the end of today.

DCh: Thanks, Matt. I have to go back to original statements that the Dene have made back during the waterline review. That Agnico Eagle felt that the caribou would be crossing the road the way they are now, and they'll do the same when the waterlines are in place. And our statement was, well, you have to put an analysis together to prove that statement, give some sort of basis for that. We now see a lot of information gaps have been filled in, but from what I hear from IQ people as well, our thought is there's still this little discrepancy that I still don't have an answer for, and that is this upstream movement, especially during summer, and animals moving across. I believe that we could tease out the information. We have to make some decisions as well when we're going through this whole process. I would sure like to see it get done without being so rigid as to say that I'm not open to other ideas. But look, this is an issue. It was a term and condition to analyze the data as it pertains to the road and the waterlines. Got moved around to a C38 and we still identify one little bit of missing analysis, so I'd like to see that done, please.

BP: The GN would just like to -- although we can't speak to whether the term and condition 38 is actually complete right now one way or the other, that I'm not in a hierarchical level to give that, I do support that the analysis should be take into account, upstream versus downstream as Stephen has suggested. We think that that would help illuminate better any potential road effects on caribou deflections.

CB: So what Matt was wanting is everybody to have consensus about the deflection step?

RA: What Matt was suggesting is we would like we've completed the memo. He was willing to add a piece that says, this is one portion of the memo and we'll keep discussing further within the TAG.

MG: It's just like with any scientific report or memo. We state limitations and future studies, and we can put the commitment that we will continue those within the TAG platform as per Condition 132 I believe of the PC. It's not so much about the memo. What we're going to be doing is submitting the final memo on July 17th. We're not asking to confirm that C38 is complete, because this is tied to the extension. The final written statement will be a good opportunity to provide comments on the memo and the status of Commitment 38 and the Permitting team will continue the discussion at that point.

BP: Dan, you asked yesterday about the Qamanirjuak calving survey. I got a very brief response from Mitch that the report is not ready for publishing yet; however, preliminary results are in and are being discussed with the community HTOs and the overall trend that we've seen in the calving amount is a continued slow decline. That's the overall trend we've seen so far. I don't know if Mitch has talked to Baker Lake HTO about the results yet. He didn't say exactly which communities.

HP: I haven't heard yet. The only time we heard from him is when he was in Baker last fall.

RA: It's the same information that's been shared at the BQCMB meeting, that there's a plateauing decline.

DCh: Matt, I appreciate about how you want to frame it without holding everything up, I guess it's just that you will get response back after -- now at this point, with the identification that we feel there still is a bit of an analysis yet to be done, you're going to identify the limitations, but I believe you'll probably receive some comments if that little bit of analysis isn't done before we all go to hearing and things like that.

MG: I think Thursday is a better time to continue this discussion, with the meetings that are already scheduled. At this point, I'm happy where it's been taken. I'm interested in continuing all these analyses within the TAG, but I think the topic at hand in terms of the status of Commitment 38, I think that discussion should be continued on Thursday. That's the more appropriate time than now.

SA: From my perspective, it would seem it would be better for Agnico to not to put in a final report that doesn't have these analyses done and face criticism during the hearings for the extension versus putting in a report that the analysis has gone through phase one and everyone enjoyed it and identified some additional ones that won't be done in time for the extension, and not have to receive written or verbal criticism that might distract from the extension public hearing. That's pure advice.

MG: To be honest, the feedback that you're providing now is quite invaluable and I think the discussion will continue Thursday. But at this point, most of what I said today is a proposal, and maybe that discussion Thursday will change the end point, but I mean what I say. This is very

interesting, and the point of the TAG is to continue these discussions over several years and the life of the mine, not just at the end of when we consider this memo and C38 complete. thanks again, Stephen and Dan, for your insight and hints.

End. (17:14)

Meeting Minutes

Topic:	Day 3- Meliadine Terrestrial Advisory Group - Agnico Eagle
Meeting Date:	June 28, 2023 at 15:30-17:00 CT
Location:	AWAR at Kilometer 12, Rankin Inlet, Nunavut
Attendees:	Craig Beardsall – Kivalliq Inuit Association (KivIA), Land Officer
	Dan Chranowski – Matrix Solutions Inc. Wildlife Biologist (Northlands Denesuline and Sayisi Dene FN)
	Eva Elytook – Baker Lake Hunters and Trappers Organization (HTO)
	Ron Robillard – Athabasca Denesuline
	Louie Mercredi – Athabasca Denesuline
	Daniel Alphonse – Athabasca Denesuline
	Peter Gazandlare – Athabasca Denesuline
	Katie Ramussen – Biologist Consultant (Athabasca Denesuline)
	Brad Pirie – Government of Nunavut (GN)
	Stephen Atkinson – Biologist Consultant (GN)
	Manon Turmel – AEM, Permitting and Regulatory Affairs Superintendent
	Matt Gillman – AEM, Environment Superintendent
	Helene Boulanger, RPBio. – AEM, Environment Specialist
	Greg Sharam – ERM, Caribou Specialist (AEM)
	Nina Morrell, RPBio. – ERM, Wildlife Biologist and Spatial Analyst (AEM)
	Victor Young, WSP (AEM)
	Kaitlyn Paul, Independent Reporters, Stenographer (AEM)

MEETING TRANSCRIPT

An attempt to record the site visit for the purposes of transcription was initiated. Despite the effort, technical difficulties with the recording due to windy conditions did not allow to decipher the discussion. Consequently, it is not possible to provide the minutes to the TAG members.

Meeting Minutes

Topic:	Day 1- Meliadine Terrestrial Advisory Group - Agnico Eagle
Meeting Date:	October 24, 2023, at 9:00 - 17:00 CT
Location:	Marriot Suites, Winnipeg, Manitoba
Attendees:	Sara Savoie (SS) – Agnico Eagle Mines Limited (AEM), Environment General Supervisor,

Jade Robitaille (JR) – AEM, Compliance Specialist

Dan Coulton (DC) – WSP, Sr. Wildlife Specialist (AEM)

John Etegoyok (JE) - Baker Lake Hunters and Trappers Organization (BLHTO)

Jeff Tulugak (JT) – Kivalliq Inuit Association (KivIA), Executive Assistant

Stanley Adjuk (SA) – Kivalliq Wildlife Board (KWB)

Richard Aksawnee (RAk) - BLHTO

Anne Gunn (AG) – KivIA, Caribou Specialist

Luis Manzo (LM) – KivIA, Director of Lands

Jessica Waldinger (JW) - Government of Nunavut (GN), Access to Information and Protection of Privacy Coordinator/Policy Analyst

Dan Chranowski (DCh) – Ghotelnene K'odineh Dene (GKD) , Matrix Solutions Inc. Wildlife Biologist

Goeff Bussidor (GB) - GKD (Sayisi Dene First Nation), Chief Negotiator

Benji Denechezhe (BD) - GKD (Northlands Denesuline First Nation), Chief Negotiator

Greg Sharam (GS) – ERM, Caribou Specialist (AEM)

Dan Routhier (DR) – ERM, Wildlife Biologist (AEM)

Amy Kaludjak (AK) - KWB

Darla Angidlik (DA) - Kaniqliniq Hunters and Trappers Organization (KHTO)

Brad Pirie (BP) – GN, Project Manager, Research and Monitoring – Online

Meghan Beale (MB) – WSP, Wildlife Biologist (AEM) - Online

Victor Young (VY) – WSP, Acoustic Scientist (AEM) - Online

Robin Allard (RA) – AEM, Environment General Supervisor, Meadowbank - Online

Raymond Mercer (RM) – Nunavut Tunngavik Incorporated (NTI) - Online

Stephen Atkinson (SAt) – GN, Biologist Consultant - Online

Kori St Jean (KS) – Independent Reporters, Stenographer (AEM)

ACTION ITEM SUMMARY

Action Item	Summary
TEMMP Revision	Complete the TEMMP revision by the next caribou migration
	Include a section on the calving ground
	Provide a written draft to Parties in advance of the next TAG meeting
	Include a revision frequency of TEMMP and monitoring shared in the Annual Report
Noise Monitoring during the Migration	Provide additional maps and images of the noise monitoring stations and the seacan wall
	Provide a graph with wind speed and directions during the study
	Consult the TAG for future punctual migration noise monitoring campaign
	Provide a comparison of work suspension versus non-work suspension noise
Annual Report Revision	Propose a process to discuss annual report comments
C38 Addendum	TAG parties to provide written comments on the C38 memo and addendum
Calving Caribou	Calving grounds map to be updated
Next TAG Meeting	Proposal: virtual Q1 2024
Use of Drone for Survey	To be discussed for future migration seasons
Wildlife Survey and Caribou Observation VS Road Closure 2023	Provide the following tables in the 2023 Annual Report: • A table showing the number and timing of AWAR road surveys that were conducted during the year. • A table linking all observations of greater than 50 caribou (by date, time, location and distance from Project) to a documented road closure, as required under the TEMMP or mine
Baseline Analysis of Calf Abandonment by Cows	KivIA to provide baseline analysis of calf abandonment by cows
2022 Analysis of calving distribution	GN to provide the 2022 Analysis of calving distribution

MEETING TRANSCRIPT

Note: All supplementary material referred to in the meeting minutes is provided to the TAG Members by email for review.

Slides were reviewed by the presenter as indicated. Supplementary discussion and comments for each sub-topic are documented here.

1. **Meeting Greetings and Roundtable**

   Supplemental Material: ppt file titled: "October 2023 TAG Meeting Introduction"

   Presenter: Sara Savoie

2. **2023 Caribou Migration Update**

   Supplemental Material: ppt file titled: "2023 Caribou Migration – Terrestrial Advisory Group, October 24, 2023"

   Presenter: Sara Savoie

   DA: I met up with the HTO board before arriving yesterday, and they had a couple concerns regarding the caribou migration. One of the things was the roads to be less angled, like, when caribou are migrating and trying to cross from one side to the other, they find it some parts of it too steep. They start walking longer to try and find less angled roads. That was one of the things they came up with. They also mentioned for the radius to shut down up to 10 kilometres instead of 5 kilometres when they are migrating. They mention no blasts when caribou are going through. One more thing was we heard the gate house, is going to be moved from where it is to further near the camp. I know vehicles can only drive to that gate and turn back to town. If that gate house is moved to the mine camp a lot of people from Rankin will drive to the camp which will cause a lot of disturbance to the migrating caribou. Those were some of the things that they brought up.

   SS: Some of them I can address right now. Others, I will have to get back to you. Related to your third point on blasting, there was no blasting done during the caribou migration in 2023[1]. Related to your last point on the road and the gate house, something to mention is that we have very good collaboration with the local community and local authorities, which help monitor and enforce road closures. With regards to your first two points, I believe the first one was with regards to the slope of the road. Greg, based on the studies you have done, if you would like to present the highlighting of the monitoring done so far.

   DA: Also mention maybe use more gravel and less rocks because of the hooves, it will be less painful for the caribou.

   SS: We'll start by addressing the slope of the road.

   GS: Was there a particular place you were thinking in terms of the slope being too high?

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[1] During Level 3 the caribou migration

DA: They didn't mention a particular place, but, like, the second bridge, like, by the waters a lot of caribou migrate there, and that is steep going down.

GS: We did do a study back in 2020, and we had someone measure the road every 100 metres all along the road to get how high it was, how wide the sides were so we could calculate the angle, and then work at what material it was, whether it was esker or whether it was gravel or whether it was rock. And then we put out I think 35 cameras and then we compared, like, is it a steep road or a low road, like do we have more caribou at one or the other crossing the road with a camera. And we didn't find any big differences. The only place that were sort of steep, was right at the bridges. Most of the rest of it was between 3 metres to 1 metre. So 3 to 1 or 4 to 1. It's low for a road. I know that back in the day, when people were looking at road like the Ekati Road in Northwest Territories, it's a big, high road, like, big rocks but things have gotten better over time. We haven't seen any difference in the number of caribou crossing sort of steep versus low slope. At the bridges might be one of the few places where it is steeper.

DA: The radius instead of having 5 kilometres to shutdown, they considered maybe 10 kilometres radius to shut down the camp.

SS: I think that's a question that we can discuss later when we are going over the TEMMP revisions at this point. Our data shows that the current radius is working but we are happy to have that discussion.

AG: Can I ask just a question about the annual report. You said it's underway. Will it be an opportunity for us to have an input to the annual report rather than waiting to review it when it's already a done deal? Will there be a chance for us either in the next couple of days or through written comments to provide some suggestions based on what we have heard from people who've been involved with the actual monitoring and seeing what's happening on the ground?

SS: There are several components to the annual report. One of them is the TAG annual report. As per our TAG terms of reference, we aim to submit it to the TAG members by February 1st for review and feedback. For the rest of the documents, there are a few things to consider here, and something I would like to share with the TAG members as well is once we submit the annual report to NIRB, there is a review process by NIRB. Most of you will be solicited by NIRB to provide comments on the annual reports through that process. So should we be able to provide the annual report draft earlier to TAG members, that will duplicate the revision effort for most of the parties involved. I think the first thing we need to consider is this something we want and the other thing is, is it feasible. Because for some of the programs, the data is still being analyzed and processed and needs to go through revision and translation. Everything is mapped out very tightly in Q1 and it's something we would need to discuss internally and with the consultants if that timeline can be pushed. I'm not sure it's feasible. The first thing to put out there is do we want to have duplicate revision efforts.

AG: I understand that NIRB does send it to all the organizations every year to be reviewed and it seems like in some cases we make the same similar comments year after year. What we would like now is to be able to make suggestions while the data are being analyzed as to some of the tables and some of the presentation of the information at a much earlier stage, so we are not left asking for it at a later stage. The intent is to be helpful, but it's to clarify some of the relationships between the monitoring information that's collected and it's to also include things that would capture the changes, for example, in calving distribution.

SS: Something that is, I believe, feasible within the TAG setting is as the annual report is being reviewed, we could set up a TAG meeting to review the results of the annual report and gather the feedback and then the question you mentioned about the recommendations would be become part

of the TAG annual report which is submitted February 1st. But for 2024, I cannot provide an answer at this time whether we will be able to share the report in advance. I will have to get back to you.

AG: We are not asking to see the report in advance. Based on the annual reports from the last few years, that's where we have suggestions that we could bring forward.

SS: Yes. And those suggestions are captured both in the annual report and the TAG annual report. We keep track of all the parties, comments and recommendations and we provide information throughout two tables, on how they were addressed. But we're open to having a more formal discussion on that front if that's something that TAG feels would be beneficial.

DCh: You are suggesting we review the annual report and provide suggestions and changes and comment comes back we will take that into consideration the next round. Those are things where we might want to say for this new annual report coming up, could we be sure that we get these ones addressed in a way that we have suggested, is that about what you are saying Anne?

AG: Sort of.

DCh: Some of the things seem to be incorporated into the next iteration of the report. The next could be addressed further. If you are in that point now you are still not got it all together, maybe there would be some points that we'd like to raise to make sure that they are covered when we see the annual report. I don't know where that would fit in, but the sooner the better, I guess.

SS: Yes. That's something I can share maybe to reassure TAG members that the inputs provided on previous years are being accounted, that's an integral part of our annual report preparation. Before we started our 2023 monitoring or as we were going through it because the comments sometimes arrive a bit late in the season, they are incorporated in our annual reporting process. But what I am hearing here from the room is perhaps we'd be interested in having a meeting where we'd go over the recommendations from the previous years and explaining how they were accounted for this annual report.

AG: Yes, it would be useful because there are some graphs or some tables that we would like to see in there. And in a couple cases we have asked for them previously. So it's a way of, say, showing the caribou site, this is a specific example, but showing the caribou road survey results on a daily basis in the same table as when the collars were seen to cross with is the traffic levels and the group sizes so we start to see the information coming together at the moment, you know, we get one table that will have the daily sightings with the road surveys, another table with the camera results, another table with the collars. There are ways of creating figures that will bring – integrate some of this, and that's just one example. There were some excellent figures done in the Meadowbank TAG that showed the size of the caribou, the group size threshold and on a daily basis. If you can add the traffic to that, even though the road is still closed there is still traffic. It's bringing the information together so people can get a better overall picture.

SS: I think those are all interesting points. What we'll have to do, is confer and come up with a proposal on how to address this.

DCh: Just with what Anne said is just integrate this a bit so it flows, all those information areas.

SS: Perfect. We'll get back to you with a concrete proposal on what's feasible on our end. Are there any other questions or comments on 2023 migration and ideas for next year's migration?

DCh: Just wanted to go back to the very beginning of the presentation and there are some dates, I guess maybe you can help me clarify. Goes your Level 3 shut down to July 11th and the next slide shows monitoring start and end. The days seem to be okay. You continue to monitor after July 11th is basically what you are saying.

SS: That was the last Level 3 shut down. Yes, we do gradually decrease our monitoring as per the protocol up to July 25th was the last day of caribou migration monitoring. On July 26 was the resuming of our normal operations.

DCh: Thank you. You are saying the total overall impacted was the 31 days, but as you can see there was these overlapping. I was hoping there would be some other column in there where you have days and hours don't seem to, you know, add up but it would be something where it was AWAR and working restrictions, number of hours, number of days that would sort of then be able to add up to -- because 367 and 261 doesn't add up to 479. That doesn't add up. I would kind of like to see that clarified more.

SS: Last year we shared a detailed memo with that information to the TAG. Do you recall it?

DCh: I maybe did.

SS: Okay. We're working on producing similar one for the 2023 annual report. These were key highlights, but there will be more detailed information in the reports.

AG: I have a question about migration readiness. If the calving ground has shifted and so there may be cows arriving at the mine site or identified from the mine site, the fact it's going to be cows with newborn calves, does that make any difference to how you prepare, what would be enhanced preparation to provide the protection of the cows and calves or am I kind of getting ahead of things here because there were implications for discussing the TEMMP, the terrestrial monitoring plan that we are going to do today, there are implications if those cows with newborn calves for the TEMMP but also migration readiness any changes to migrate cows with newborn calves?

SS: We can discuss this as part of the TEMMP presentation. For the moment the caribou readiness plan is our internal Agnico preparation tool. And it's based on our current TEMMP requirements. Should there be adjustments to our operational TEMMP those would be reflected in the internal caribou migration readiness plan. That's something we can discuss in our later presentation today.

AG: Does migration readiness include sort of the mine daily organization, like, in terms of stockpiling mill feed, if that can be done (groceries and stuff for the people) does the mitigation readiness include that component? Does the migration readiness include the fact that it may have a shut down, and shut down of both the road and the mine site so stockpiling food and stuff?

SS: Yes. A clarification I can add to that is caribou migration readiness plan is done with each department. We conduct an assessment, for instance, you are talking about food we conduct an assessment with the camp department and plan for shut down or a crew changes issues with the camp. What will they need, how can they handle flights being cancelled, etc. That's done with every specific department. We do it with the mining departments as well. Every mine department goes through this exercise.

AG: You would be agreeing that the possibility that it's cows newborn calves, calving ground kind of changes things that require a higher degree of protection and therefore organization?

SS: If the TEMMP protocol measures the change, we will adapt our caribou migration readiness, yeah.

AG: Okay. Thanks.

DCh: You mentioned there is staff turnover and people that work on the field. How extensive is the training for people that come on new versus maybe that had been involved and then weren't involved and now involved on all the things that you would want them to be aware of and how is the training conducted. What I'm trying to say for the new staff, that your people get involved in that. I

know there are experienced staff, but what is the process of training? Is it in the building for a while or is it just all right in the field? Would you explain that a little bit more, please.

SS: Yes. Just to clarify training specific to the caribou migration?

DCh: Caribou migration monitoring, yes.

SS: There are several components to training. There is some general onboarding that all new staff on contractors coming to site need to take that has a wildlife component, a general wildlife component to it. And then related to the caribou migration as part of the caribou migration readiness plan, we conduct meetings with all of the department heads to go over the high level items, reminders, see if there has been any staff turnover, who's going to be involved in what part of the migration because there is different aspects of it. As Anne was mentioning, there is camp, there is logistics, we map out who is involved in what. Then our environment department conducts toolbox meetings with all of the departments. All of the involved people within the migration are informed of what they need to do, what they can and cannot do, and what's going on more generally at site for the migration.

DCh: So does a new person get a one- or two-page manual that you should or shouldn't do, that you should be aware of? I know toolbox meetings are standard in industry everywhere. You turn up on site and there is a new person out there, you talk to the person, verify if they've understood what's going on at the toolbox meeting. It's having a certain person, three or four of them come to a meeting and they talk individually so they get to really ask question, do you have those meetings?

SS: That's the department head that will meet with their staff and map out the migration roles and responsibility within that specific team. And should new staff be involved, let's say once the migration is ongoing, it's the responsibility of the department head to onboard this new person and the environment department will provide support to that person.

DCh: You have a number of departments and if it was a different person onboarding, but environment staff would be at that meeting with the department head to keep consistency going?

SS: The environment department is available throughout the migration to support the different departments. Something else to mention is during the migration we have a daily meeting before the day officially starts with all of the departments present. KivIA has been on site since the COVID measures allowed them to be back on site with us during the migration and participated in that meeting. All the departments meet every morning to discuss the caribou migration that day and any changes or any special consideration that needs to be taken for that day. For instance, as we had discussed during previous meetings, sometimes we'll decide to close the road preventively because there is a risk of people getting stuck. That's during these meetings that these decisions are made.

JT: Also before that meeting happens, there is a road survey that's done to get an idea what's going on along the road, and the manager meeting happens in the morning before operation starts.

DCh: Ok. That helps. Thank you.

LM: I have two things here. This meeting is to revise the TEMMP. What can I expect from the proponent as before we can have anything happen that demonstrate you can complete by that time the guidelines for the HTO, for the KivIA, and for the communities in the town before that happen. Because what mention of the fact that when you submit the report expecting those comments and you integrate those comments, those make it to mediation, and that will happen. For the TEMMP meeting is concentrate on the TEMMP, see what problem to the TEMMP are, fix it, send a review TEMMP to us as soon as you introduce those or you incorporate the comments for us to feed back to you. Because on the report you have to submit, because this is the year before this. When we

are talking here is how are we going to address the overlapping between caribou migration inside of the original study. You will probably hear that we recommend to have a caribou migration plan into the TEMMP for you to have some considerations to the cows and calves when they are approaching. Because that's a very sensitive item. That's just the more important, very important time. And it has been sensitive, because the calves are feeding when they are moving. And if they don't make it, you will have high mortality. On top of that, you have the pressure of different systems in it already. We are asking to have these ready, the TEMMP ready with the guidelines and procedures to be handy for all who are going to be effective, and that include shutdown times, that includes stockpiles, light duties when it's going to be triggered. Because those light duties are today and the TEMMP, they will have to move. No way around it. You have now an issue between calving and you can't avoid it. We did an analysis, and I don't know if you heard before comments, have we sent the comments? So we will send you that information. That is 10 years for calving. And this year, I'm assuming you are going to have more calving inside. The approach now is once you see the map, it's going to be a shutdown. Otherwise to look after the calves, which is very sensitive at that point in time. When those move forward into the other side, then you can continue with the rest of it. This is a TEMMP document. We need to concentrate on those changes, make it as soon as possible, and work on the changes to be effective. But eventually during migration you have to stop. You have now calving grounds earlier. And that's sensitive for the calves. And if they don't survive, since 1994, I believe, we haven't had an increase in the herd. So those are different factors, not much but different factors. To be effective, we try to take care of those calves to push the herd off and down. That's the concern we have today. I hope that this meeting is concentrating on the TEMMPs, and we have a TEMMP finalized before migration. Otherwise, we have to do other things that people don't like. And you know how difficult it is to deal with people when you have calves. We have a deal of operation internally with hunters, with people who are unhappy, and we want to be able to manage the herd when actually approaching. And we have a benchmark, which is 10 km. The 10 km is very small, very small time for you to prepare and be ready. The herd moves very quickly. Those 10 km doesn't give us that opportunity either than shutting down without light duties. It's only 10 km. You don't expect the caribou. We want to have that time to start moving down to closing them. I want to concentrate on TEMMP to have ready those procedures by the end of March. Because the first meetings we have in April, May in Rankin. And I would like to talk later on to explain and probably take that consideration.

JT: I think what Luis was also saying is that 10 km we rely on, it moves very fast, especially with the GN data being that they are so latent, we don't have real time collared data. We rely on the day before or two days before to see where the caribou are.

LM: You have 5 to 7 days delay when using the GN data, give or take. You make the best guess. They stop for grazing, we are lucky. But if they don't, that's when we don't have the time. And then you reaching light duty, reaching to shutting down, because we don't have the time to do it. We want all those shutting down areas and light duties, actually in time.

SS: Thank you both for those comments. They tie with the intent of this meeting and the presentation that we will have this afternoon on the TEMMP revision. Our intent with this first day was to give you a preview of what was coming up for the 2023 annual report. Then, Victor will speak about the additional monitoring we did this year following the TAG recommendations. Many of the points that Luis and Jeff mentioned will get to circle back on them later this afternoon.

JT: I am just wondering the Version 5 of the TEMMP, will it have the operation of the waterline also if there is an effect on migration due to vibration or noise of the water during the operation of it.

SS: Greg will be able to speak to a bit more this afternoon. We did make quite a bit of progress on Draft Version 5 accounting for the comments that were provided to us throughout the year in this TAG setting. We have some questions for the TAG as well in order to polish that version. And that is on the agenda.

JT: Is there a deterrent for the pipeline during the operation if there is going to be shut down protocols for it, how that's going to be handled. Is that later on?

SS: Yes.

GB: I am just wondering about doing some calculations on the restrictions, hours and days. It looks like it's 14 to 16 hours per day by the calculations. I'm wondering at what time does the monitoring start and sort of is it eight until midnight or does it go on at night too. The other question is: does the mine continue operation at nighttime? Is it 24/7 mine operation or does it stop.

SS: On the monitoring during the migration, we have some surveys that are done in the very early morning. What we do is send updates 3 times a day: morning, lunch assessment, and evening. If at the evening assessment the data indicates it's a Level 3, it's Level 3 for the next 12 hours that means at a minimum until the next morning. Then as for our operational hours, in a regular setting the mine is a 24-hour operation. During the migration, if we are in Level 3, we are in Level 3 during the night.

DCh: No monitoring at night?

SS: We have early morning monitoring.

JT: There was no question whether a helicopter was operational from Agnico. It was based in Rankin so it helped a lot from our point.

3. Noise Monitoring During Caribou Migration

Supplemental Material: ppt file titled: "Meliadine – 2023 Caribou Migration Noise Monitoring (23 Oct 2023)", Technical Memorandum: "Meliadine Gold Mine – 2023 Caribou Migration Noise Monitoring"

Presenter: Victor Young

JT: I just had a question about locations on Site 1, 2, and 3. Site 2 is behind the tailings area and the rock piles. Site 3 is behind quarry 27. Would those sites be deferred from noise by the piles and what's the criteria of selecting those locations and the elevation of the monitoring sites. And I'm not too sure on Site 1 where the location is, also if it's within the quarry, if it's down lower or if it's at level of the camp.

VY: Sure. I can't speak of that. We weren't involved in the study design. Sara, is there someone in the environment that can speak to the location and how they were selected?

SS: I'd have to get back to you on the selection.

AG: As a follow up to Jeff, it would be nice to have an expanded diagram that shows Site 2 relative to the rock pile Site 1 closer to the accommodation unit but also to show where the sea can wall is because it looks like it falls between on the mine site between Site 2 and 3. Where would its impact most likely be? Because it's the validity of the sea can wall to reduce the sound is, I think, the thing we are most interested in. It's difficult to see on this figure.

DCh: My thought process on this as well is where these are located in relation to height above the ground as well as other possible shielding factors that are out there on the sites so that we can maybe standardize is bit more on the locations of where these sites are so that we are kind of measuring the same things if we are at the same height compared to what is in the surrounding area and their location. That's sort of one of the things that I would like to know a little bit more about criteria used to place these monitors. Because a shield of a large rock pile could cause increased bounce in something like that. I'm not sure exactly what could happen. But I guess that's just comments for consideration.

AG: Just as a follow up, maybe Jess can help. Do you have the sound profile of the backup beepers on the machinery, like as to whether they are fairly high pitched and in fact how noticeable they would be to caribou? Would it be possible to add that information?

VY: I can speak to that. The backup beeper is a standard tonal alarm that you hear on a piece of equipment has a very narrow tone 1 kilohertz so 1,000 hertz. If you looked at a graph, we will get to some spectrographs where we look at caribou and the measurement. And if you look at the emission graph from a backup beeper, you see a very big spike at 1 kilohertz, 1,000 hertz and that's the nature of the backup beeper, basically.

AG: So that would be, for example, Figure 7? (Refer to Technical Memorandum: "Meliadine Gold Mine – 2023 Caribou Migration Noise Monitoring" p.11)

VY: Starting with Figure 5, these are spectral, these are graphs of noise spectra from the measurements and overplotted with the caribou hearing thresholds. We will get to that later on the presentation. On the X axis and where it says 1,000 hertz, that's where you would see a bump from a backup beeper on a piece of mobile equipment.

JW: I just want to ask, if perhaps in the future we have pictures in the inset in the map of these noise monitoring sites, because then we can see the elevation of the microphone or other technologies using to collect these data. That's all.

SS: That's definitely something that we can address and provide.

AG: For these graphs 2, 3, and 4, do you have an equivalent that shows when the mine site was operating that would show the actual sound of the mine site alongside the birds, the technicians, and the wind? (Refer to Technical Memorandum: "Meliadine Gold Mine – 2023 Caribou Migration Noise Monitoring" p.6, 7&8)

VY: I think we could put more bars on this graph. We could, for instance, if we go to this sort of longer one, we could say, like, from 7 a.m. until 6 p.m. it was in a Level 3 situation and then from 6 p.m. until 6 a.m. it was in a Level 2 situation. Is that sort of what you are looking for? Because yes. We have logs from site about what state the different components of the project were in. When the AWAR was closed, when the AWAR was open, when the plant was in Level 2 versus Level 3 and we could over plot those basically. There is no noise data that is just the site absent from the background environment. We could highlight the time periods corresponding to different activities at the site but we couldn't pin point the noise source that we couldn't give you a noise graph that would overlay with that.

AG: So, towards the right-hand side of the graph where it's below 15 wind speed, that's the wind speed, that's not when the mine was suspended?

VY: That's correct. That's when the wind dropped below 15 kilometres. The mine were doing Level 2 or 3 shut downs during this period. But the measurement of the A-weighted noise level is not very

sensitive to what the mine is doing, just wind speed. The first order kind of correlation it's just high to the wind speed. As the wind goes up, the noise goes up.

AG: We don't have a graph that shows the actual sound of the mine when it's pertaining?

VY: That's correct. We have a model that we build based on emissions from the individual piece of equipment, but we can't measure the mine in the absence of the environment basically. When we set up the microphones along the perimeter or wherever we set them up in the environment, you can't separate the mine from the wind. And the wind is so loud, basically, that it dominates everything. If people remember during the hearing the people who went up to the site and stood at where they were proposing to put some of the wind turbines, the mine was operating full scale 100 percent that day, and you couldn't hear it at all, even from where you were standing. All you hear is the wind. This is an inherent challenge of doing this kind of environmental monitoring in a windy environment is that it's very hard to get the noise from the sources that you are interested in, say the mine or the plant or whatever separated from the wind that just constantly is sort of howling up there.

AG: in terms of the effectiveness of the sea can wall, do I understand you that in fact we won't be able to determine its effectiveness in terms of attenuating sound?

VY: I think it's a challenge, for sure, to use this monitoring data to quantify the effectiveness of it. Like I said at first order, all you measure is the wind and the noise from the project is very much secondary to the background noise from ambient conditions. In the later slides we do try and focus on a few periods, a few select periods when the wind speed was at its lowest in hopes of looking at what caribou might hear from the project in those situations. I will just present those slides and then we can maybe talk about the conclusions a little bit. It's challenging to use this monitoring data to do much other than to say when it's windy and when it's not. It's a challenge to get the project data separate from the environmental conditions.

AG: If the caribou have the ability to discriminate between natural sounds like bird and wind and machinery, they may be able to hear the differences that are at the moment you are unable to measure. Is that reasonable?

VY: For sure. The human auditory system and I presume the caribou auditory system is doing a whole lot of signal processing. In addition to the overall level, human beings and again I'm sure all animals are doing a lot of signal processing where they are looking for patterns in the data that are beyond just the total level. For sure there is the potential to hear noise or to be able to identify sources even in a noisy background. Yes, there comes a point where the masking noise becomes so loud that you can't discern it. For instance, just to use the human being case where the science is a little more developed human beings are optimized to hear other human voices. When it's outside and windy when someone is speaking to you, you can hear their voice. If it's too loud, that gets masked. If it's too loud and in a noisy environment, someone has to shout, and it is so loud that the level is masked even by shouting. The level doesn't tell the whole story absolutely. There are subtleties in the signal that can be discerned even when the level is partially masked. There does come a point where the background noise becomes so loud that it's impossible to discern individual sources from within it and you are just hearing the background noise. Some of the analysis we have done, is looking at the quietest period and look at the actual absolute hearing thresholds on caribou.

AG: Can I just confirm that the mine is at full operation? Or is this Level 3?

VY: I have the notes here. This is the Site 1 on the 6 to 7. The AWAR is closed, then the mine is at Level 3 shut down during this period.

AG: When the mine is shut down the caribou won't be able to hear it.

VY: The caribou will be able to hear some of the noise. I have an audio clip. I don't know if this is going to work. There are birds what we think they are hearing. I am going to play this clip. It's about 30 seconds long. It's an excerpt from the same period of time. A human being that listens to this cannot hear anything industrial. You are just hearing birds. I don't know if you will be able to hear this over the speaker system or not. But here it goes. There is no real noise. What the care would be hearing here is environmental noise. Because we don't hear anything in the audio clip and the data is suggesting there is noise the caribou can hear but it does not appear to be noise when listening to this audio clip.

DCh: This is Site 1 which is the closest to the mine?

VY: Correct.

DCh: Victor, for both of those boxes, the one to the left in the lower frequency and the one on the right, they are both those situations the mine is under a Level 3 shutdown?

VY: That's right. Because remember the X axis on this graph is not time, it's frequency. During this whole snapshot, this is the average of one hour of data from 6 to 7 a.m. and during that 1 hour the mine was in a Level 3 shutdown and the AWAR was closed and the wind speeds were very low. This is a sort of a snapshot of what a caribou might hear during that Level 3 shut down from the project. When you listen to the audio, you don't hear much of the project at all. You hear some birds probably this higher frequency noise is primarily the vocalization of the birds and it is wind induced noise even the wind is quite low there is some wind. But the mine is in a Level 3 shutdown here.

JT: I think it's important where the locations are for these monitoring stations, because you could hear the camp humming from quite a distance away on a nice day.

VY: This is another graph. This is from 9 p.m. to midnight.

RM: Just a little bit of local knowledge. But before I get into that, I would like to know which way the wind direction was for, like, 72 hours, 96 hours, the day before, the day of, and the day after. The reason for that is wildlife, especially caribou can hear sounds a lot better than we can. For instance, if the wind is coming from Peter Lake, I will use Peter Lake as a starting point, and it's I'll say 15 gusting 30 or 40, 60, and the next day it's supposed to go southeast from I guess where Discovery is going to be and you see caribou or approach caribou from downwind they are going to when the wind's going to shift. When the wind direction, it shows very little wind but which direction was it the day before, the day of, and the day after. Thank you.

VY: I guess we can provide graphs of wind for this whole June and July if that would help. That data is available. They log it on site. We can produce graphs that show the direction of the wind basically for this whole 2-month period.

RM: It would definitely help. And it's too bad David is not there to confirm what I just said about the traditional knowledge with the wind direction and how animals hear and act towards sounds even if you are approaching a caribou downwind and the wind is going to shift in the next day and they will hear you and they will be jumpy or skittish. But they do know when the wind's going to shift you are trying to approach them from downwind, they will hear you. Thank you.

SS: Thank you for sharing that knowledge, Raymond.

JW: To that point, I'm wondering if there is a way to reconfigure the figure, say, 2 so that we can see how the directionality of the wind changes the measured noise levels at these monitoring stations. I think that would be interesting and maybe useful. That's all.

VY: Overplot the direction on that same graph. We can do that. That data exists, and we can put that line on there. The issue is that the wind noise when you are talking about Figure 2, this is all noise generated locally at the site. Not at the site of the project, the site at the microphone. So what Raymond was saying is a 100 percent true or the traditional knowledge with western science in that downwind conditions enhance propagation. If you are listening to a source far away and down wind from it, that enhance the noise you get from that source, as opposed to up conditions. What this graph is supposed to show or is showing that this is not a propagation effect. This up and down is not because the wind or the noise from the project is getting directed towards the microphone or not. This is just measuring the wind that's at the microphone site. When the wind is high, it's measuring local wind noise. It's not a propagation effect from some far field source that's propagating towards the microphone and now the wind direction has changed and it's propagating away from the microphone. This is just showing when it's windy it's loud with wind noise and when it's not windy, it's quiet. This one is not about propagation at all. It's just about local conditions driving the noise level at a site, basically. The intention of this graph was just to show that it's very hard to measure because the background noise is so loud in this environment, it's hard to parse out the impact of something that's happening even relatively far away, like 3, 4, 500 metres away because the local wind noise is so loud.

DCh: Unless of course you had a downwind microphone that was a kilometre away at low wind speed, would those 2 then show you different levels?

VY: Yes, the Noise Abatement and Management Plan monitoring locations are further away, for sure at locations further from the mine if you look at these blue dots or green dots. In an ideal situation where you had very low wind speed but downwind this would be the best data that you could get. If the wind for instance at this Number 8 here, if this was blowing this way, from the north west at, say, like 1 kilometre an hour, that would give you the loudest noise from the project and the least background noise of this NPOR08. That noise is very hard to get in practice. That would be the best shot at it. Same with this 14. If the wind was blowing northwest at a low speed so you don't get masking, it is this down wind propagation, that would be your best look at the mine and the noise from the mine. Unfortunately, those conditions are very hard to come by. You are more frequently seeing wind speeds like 20 and 30 kilometres an hour in which case you get good propagation from the mine but this local noise that's blasting everything else and making it impossible to hear that noise from the mine if that makes sense. We for sure can add the wind direction to a graph like this. I just don't think it's going to tell us very much, because we don't think the direction is affecting everything. This is just wind noise we are measuring at a particular point in the environment.

DCh: Yes. I understand that the wind speed and the direction where it comes it can propagate further down wind and I guess that's the point I kind of see here is you have these microphones and you are measuring what's there at that site. But if you want to find out, as traditional knowledge says, down wind they still hear it. Maybe the placement of more monitors in all cardinal directions around the mine could then be used to see if there is further propagation in low wind speeds or whether that for a high spike in noise in some location in the north west and having a noise monitor southeast of there under low speed conditions could detect something different that would be actually measurable.

GB: Just want to share noise and impacts. This is something that was shared with me by an elder, Fred Duck, that's passed on, he was up north and there was a bunch of guys with him and came across they were sort of on the edge of a lake and down below is a caribou and trees and a background on across the lake. And the guys got all excited. They wanted to go after the caribou and the caribou started going right away to the opposite side where the trees are. And the elder

says, hold it. Don't go chasing after the caribou. He grabs his rifle and shot up in the air and the echo from the shot from the trees bounced back and the caribou stopped, and they didn't go that way. They ended up getting caribou afterwards and said if it wasn't for your knowledge, we wouldn't have got any today. That shows that there is an echo of the noise from different things. I agree with Dan here that we need to have those monitors in different areas of the cardinal direction.

SS: Thank you for sharing that knowledge.

DCh: We could probably enhance this monitoring to the point where we might start detecting something different on. I understand wind is a big confounding factor. But low wind conditions are when we really do need to find out what is being heard by caribou in different directions. And if there is a way of having something picked up on a microphone in the north west part of the project area and you got a downwind microphone somewhere east that could be some differences that we haven't detected yet but would be very informative to all of us. Thank you.

AG: Would using people at different distances, even allowing the fact that there is neural physiological processing of sound, would that just asking people can they hear the mine at different distances under different wind conditions, would that give you a similar idea as to what the caribou might be hearing?

VY: I guess so. The auditory system of the caribou seems to be quite different from the human one, based on when we compare the curves from Perra et al. To sort of well-established human hearing thresholds, I think there is value in listening to the data. The monitors that are deployed by Agnico record this audio and you can listen to it. I don't know the practicality of just having people out all the time listening and I think there might be some logistical challenges with that. We can listen to the audio data and intention of some of those clips would provide people with some understanding, so they can form their own qualitative opinions about how some of this sounds. Hopefully Sara will be able to play that for you. We can listen to the video, and we can say what people hear. There is going to be some disconnections between what people hear and caribou hear given the differences in auditory systems. We find it informative to listen to the data and tell us what kind of sources are out there. As part of that data processing, we should continue listening to it and making these sorts of qualitative observations what sources can be heard.

AG: Is there a difference between when the mine is full operation and when it's at Level 3 and as part of that, does the sea can wall really attenuate the sound of the mine? Those are the 2 things that we are most interested in. When you look at Table 1, it's hard to figure out what really is the difference between Level 3 and full operation. (Refer to Technical Memorandum: "Meliadine Gold Mine – 2023 Caribou Migration Noise Monitoring" p.4)

VY: I think it's going to be a very challenging problem because of the environmental component. The only thing that matters, it's 95 percent of the noise is just the background environment. It's inevitably going to be challenging. To come up with a way to quantify the impact of the sea can wall is. But from this analysis, the background noise is loud. It's not like the caribou are existing in this very quiet environment and then there is this industrial noise source that's in there. The existing environment being the natural environment there is very loud. Which is why it's so hard to do the relative components of the project. I agree, the monitoring is just a very challenging thing. And that's what we were trying to show with these graphs, especially those wind speed graphs. It's almost entirely background noise, and the project is playing a very small part in whatever we are measuring, even very close. Part of the intention of moving closer was to try to make the project louder than the background. Because all the monitoring that we have done over the course of the Noise Abatement and Management Plan these more distant locations, you don't hear the project at all. It's all just background noise. It doesn't really tell us very much. It tells us the project is not

contributing more noise than we expected based on the Final Environmental Impact Statement. It's not giving the data that you guys were hoping to see, which is how much is the project contributing. Is it louder than it should be? It's showing that it's not, but it's not showing exactly how much it can contribute because you are just hearing the background. Part of the objective of moving closer is to make the project louder relative to the background. Some of the next graphs are going to compare the Level 3 and Level 2. The first graph was Level 3. We had another graph when there is a level 2 shutdown, but it still is not audible. I would say the data or noise at Site 1 even under Level 2. The takeaway is that the project under these shutdown conditions is not very loud and that it's not likely to cause an issue for caribou based on the analysis we have done. I agree, we are not able to quantify, what the numerical impact of the sea can wall has been. I don't think that data exists in the monitoring data. What we can draw is an overall conclusion this project is not significantly louder than the background environment especially when it is in the shutdown stages where the bulk of the mining activity has been shut down.

AG: What appears to be a noisy background in your measurement is how the caribou live. I mean, they are used to the wind noise. In terms of processing in the brain, they probably don't really hear it because it's just totally background. They will key in on any small differences that seem small in your measurements that are normal to them. That's one point. I think that makes these graphs even more harder to interpret. The other thing is given these results that as we say don't tell us what we are looking for, what would you be saying are the next steps? Like, how do we figure out how the Level 3 shut down sounds different from Level 1 or no shut down and either to us or to the caribou and how would we test the effectiveness of the sea can wall?

VY: Your point is well taken for sure, the caribou live in the environment and they hear what they hear. And it's similar to a person. If you live beside a highway and the background levels are high, you become accustomed to living near a highway. That doesn't change that it becomes harder to discern noises in that. If you live near a highway and the noise in your yard is very loud as a result, it's going to be harder for you to hear birds than somebody who lives in a quiet environment and there are birds. It's similar for the caribou. Since they live in a noisy environment, a windy, loud environment, it's going to be harder for them to discern other quieter noise sources in that environment. That's a bit of the issue. I would say with human being, we do this audibility test and that's obviously not possible with caribou. I think that's a challenge. The best we can do is play these clips. There is an audio clip for the human listener to understand I guess what the caribou are hearing. We can play a clip from Site 1 with a Level 3 shut down and very low wind speeds and that's the clip that Sara I think was trying to play before and she will be able to play for you later and the next graph corresponds to Level 2 with very low wind speeds. I can't hear the project. I would argue that nobody is going to hear the project in a Level 3 shut down or in a Level 2 shut down. So even if we can't quantify what that means in terms of how effective the sea can wall is, we can say the shut down in combination with the shut down and the sea can wall is making the project inaudible at Site 1 and to me that seems like a good objective and result. If we can't hear it and our analysis suggests the caribou are hearing noise but no project noise, that I are hearing noise and wind, that's a good outcome even if we can't exactly quantify how much the sea can wall. That's a technical challenge I don't know how you are going to do that. I can't think of a way that we could put a number on the sea can wall. The best we can do is show that the combination of the shut down and the sea can wall makes the project inaudible at Site 1 which is right up against the site of the mine and that's a positive result that suggests that the impacts to caribou are small. But I'm not a caribou expert and it's not possible to interview these animals and figure out what they think about it. If we make the noise levels as low as possible and listen to the data and we can't hear it, the caribou are not going to be disturbed by it.

RM: For caribou noise monitoring, like, how far out are you testing? Like, are you 20 kilometres out, see what they do out on the land and then do more tests closer to the camp or to the mine site?

VY: From a noise perspective, the Noise Abatement and Management Plan is at 1.5 - 2 kilometers from the mine and it is hard to get noise data that represent it is mine at those distances. These measurement locations for this caribou monitoring period are closer and still having a great difficulty hearing the mine or getting noise from the mine at all. As far as monitoring the caribou behaviour which is more the question, I will leave that to Sara and others on the environmental team as to how they monitor the caribou behaviour and that.

RAk: Just listening to this conversation about noise pollution, being from a community that's had a mine for over 10 years now, just based on my own personal experience, collecting all this western science data I don't really trust. In Baker Lake, when Meadowbank first opened, we had a lot of harvesters that go out for caribou and wolves. We have a popular spot near Meadowbank which is called Quggiilik where this hunter's cabin which is owned by HTO. And that cabin is situated about 40 to 50 kilometres away from Meadowbank. But 24-7 they heard trucks going nonstop. There are hills in between the cabin and the mine site but still we could. If a human can hear something 40, 50 kilometres away, think what the caribou is listening to. They have much greater hearing than we do. At the start of the presentation, we were trying to show a recording background noise and we heard nothing, which I don't think is reality to me anyways. I was sitting here trying to listen to that recording. We were warned that we were going to hear birds and maybe a little bit of wind. I didn't hear nothing. This is only a couple kilometres from Meliadine. It's hard for me to trust something like this. Because on past experience, like John can speak on it as well, 24-7, 40 kilometres away and we can hear the traffic nonstop. The weather conditions play a major factor. This past summer, it's been a very hazy summer up in the north because of all the forest fire. On a clear day, it was harder. I have a cabin, which is about maybe about 5 kilometres from town and the road is about 2 kilometres. On a clear day, I could hear tractor trailers going. It would be a very faint, quiet sound. But once it got hazy or foggy, the echo just came right down. It sounded like they were right behind. The weather plays a major factor as well. I just wanted to make that comment. Thank you.

SS: Thank you, Richard, for that comment, sharing your experience and knowledge. About one point you mentioned on the audio clip, we did have a technical issue. We will be trying to solve that during lunch break and we'll hear it again. We'll provide that clip to everyone for hearing.

RAk: I would like to listen to that audio clipping, because watching this presentation, it seems like the noise pollution is not a big factor to the consultant. When you live up there, you are affected by it. We want to try and help minimize every possible solutions.

JE: Even right in the middle of the night, we could hear the noises. They're pretty loud. An active hunter at that cabin is not too far from the mine site. There are a couple hills and they're pretty high too. You could really hear at nights, daytime.

SS: Thank you for sharing that, John.

JW: It was said the caribou's environment is noisy and the mine site is also noisy. So, that's decibels. Spectrally, how is mining activity different from baseline? Maybe that information is presented somewhere, but I didn't feel like it was presented within this memo or the PowerPoint. So that's just what it's around the same decibels but the frequency bands that are being occupied by different things such as birds or cars backing up or whatever, I think that's worth remembering.

DCh: We heard a statement from hunters and trappers about how under certain weather conditions and times they hear the mine from 40 kilometres away. I have been out myself in those kind of weather conditions. I have been out hunting and I relate to this kind of thing where you can hear

from quite a distance away, especially when there isn't really anything in the way like trees or anything. Is there a way that we can measure if somebody was 40 kilometres away, is there a microphone or a noise sensor that can hear the same thing and measure that as what the humans are hearing? If you are opportunistically out there 40 kilometres away and you are by the hunters and they are hearing that noise is there a way of you can actually measure that? I would turn my iPhone on and measure it. But is there another way of doing it that we could then say we are hearing what everybody says you can hear from that distance?

JT: What Dan is saying is when you are trying to talk on the phone you could hear the wind. But in real life, the wind doesn't .

DCh: The wind might affect it but if you can hear that from 40 kilometres, a drone or the noise of the mine, is there a way of measuring that to verify that it's not like they are lying. They actually hear it but there is a way of verifying that spectrally or in some sort of noise monitoring fashion. I don't know if you can answer that, Victor, but give it a shot.

VY: I guess there are a couple things to keep in mind. One is the sound level meters that Agnico is using the Noise Abatement and Management Plan monitoring as well, have more sensitivity than a human hearing and they are measuring at a wider range of frequencies than human hearing. They are accurately capturing the sound that is impacted on the human auditory system and reporting those levels. But the human auditory system is doing a lot of signal processing with the data that it gets, the sound level *meters and computers and instruments are not able to do. When people are able to hear certain things at different locations, there is more to it than just the level. There is a lot of signal processing that your brain is doing that isn't sort of replicable by technology as at least based on commercially available technology. I'm sure there are researchers and artificial intelligence doing studies of machine learning trying to replicate the human auditory system and processing that goes into it. But that's not a tool Agnico could purchase and deploy. The best we can do are sound meters. They are more sensitive at a wider range of frequency. They can get level measurements that are at least as good. But they don't do the signal processing. They can't extract information the same way the human auditory system does. The best we can do is make these recordings. There was some technical issues playing these. But the sound levels it is making are representative of what is happening in the environment at the location they are deployed. The audio clips that Sara will be able to play for the group later on today will show you what the sound was like at the locations where the monitors were deployed and use your own auditory system to parse out what you think you hear and what can be heard at those locations. There is not a tool that will do that for you. There are microphones and equipment that measure the sound as it impacts the ear but not a tool that will do the signal processing of the brain at present. No, Dan is the answer to your question. It just record the signal. The human have to listen to the signal and decide for themselves what they can hear is probably the answer to the question at this point.

DCh: What Anne was saying having human observers at remote locations might be another way of giving us some further information about what's being heard out in.

VY: We have listened to all of the audio that gets recorded. Those files can be listen or just like you said when people are out on the land they can make their own observations what they hear. The analysis we have done of these measurements made very close to the site during the Level 2 and 3 shut downs. Our conclusions are spell out in the memo and in this presentation.

SS: Something I would like to add to Victor's point relative to your latest question or comments, Dan, this was a supplemental noise monitoring event. In addition to the noise monitoring that we already conduct as part of our noise management plan, which has stations at various locations around the mine sites. We do have some complementary data from there as well.

DCh: It just seems it's never in the right location. If you have one at the supplemental one is measuring right at the site. But then we make statements that there is downwind if the wind's in the right direction it would propagate further downwind but we don't have a monitor there to see if we can detect it. I'm understanding more and more about these noise monitors. And I'm just thinking that we might need to come up with some other types of ways of determining if noise is propagating out to where the caribou are. Because traditional knowledge tells us that it is happening out there.

AG: Victor, can you make a relative statement, like going from full operation to Level 3 cut the sound down by half, does the sea can barrier cut the Level 3 sound down by half? Can you make these relative statements?

VY: I think we could, not with the monitoring data but based on our models and our understanding of the emissions from the individual sources. We could do a relative comparison: the noise emissions under site in full operations is X and when they turn off such and such sources based on the Level 2 or the Level 3 shut down it goes down to Y and then if we put a sea can barrier, this is the effect we see in the environment. But those would be sort of calculations based on the emissions, the known emissions so that the amount of sound getting reduced by the individual sources. I don't think that it is analysis that you are asking about is possible with the monitoring data, with microphones set up in the real environment because of the influence of the background noise. We can't parse it out to that level of precision. We could do a desk top analysis from the known sources, but I can't really conceive of a way that would be possible to do it based on microphone and environmental monitoring type data.

AG: Right. But the desk top analysis might be easier for people to understand as to the impact of mitigation so to know that the sound was cut by half or 2/3. So can you kind of commit to do that, to send those calculations?

VY: I can't commit. I would have to speak with Agnico. I think we'll have to get back to you, Anne.

SS: It's something we took a note and we'll get back to you on.

DCh: That even just the basic desk top would be interesting to see what the difference is between full operation to Level 3 based on your own noise emissions.

JT: If the group could recommend locations on monitoring stations before they are set out, that would be helpful just so there is consensus on the locations.

AG: And we would like the relative measures.

SS: That's noted. Thank you very much.

(MEETING ADJOURNED AT 12:15 P.M.)

(MEETING RESUMED AT 1:30 P.M.)

VY: There are basically audio clips that correspond to each of the graphs, each of the slides. I think the point with these clips is even when the wind speed is low, the project itself is pretty tough to hear especially during the Level 3 shutdowns. During the Level 2, sometimes, you can hear backup beepers which we noted in the memo and also in the slide deck. But it's primarily natural background noise sources during both the Level 2 and Level 3 shut downs is what you are hearing in the audio data.

SS: Thank you, Victor. And what we will do to make it easier for everyone, we will identify the audio clips with the number of the slide it refers to. So you will be able to go and listen and have the slide open at the right page number at the same time.

4. Kivia/HTO/Sayisi Dene/Northands Denesuline/Elders – Items of Interest

AG: Thanks. We have a couple of things we would like to comment on. One is it was disappointing not to get the TEMMP ahead of time. It would have been more efficient if we could have had it ahead of time so we could have reviewed it, talked about it, and then we are in a better position to work collaboratively to hear what other people are saying and be able to get into further details. And we did write to you earlier wondering about because we have Meliadine TAG and we have the Meadowbank TAG. Now, not everybody has a shared membership but quite a few are concerned. And we wondered about the efficiency of greater collaboration between the two TAGs and the reviews of the TEMMPs, both to save travel time. I know that people only want to be away from home for a short time. But to save air travel in these days of climate emergency is a good thing. But the main reason is because there are issues in common between both TEMMPs and both TAGs because we are trying to manage mine activities and the tradeoff between mine activities and caribou conservation. There are advantages and working together. That was one of our points is not seeing the TEMMP ahead, greater collaboration between the two TAGs and the TEMMPs, acknowledging there are differences but there are similarities to work together. And then our third point we have already raised that we would like input to the annual reports ahead of time, just because it's more efficient for us, Kivalliq association reviewing them but probably more efficient for you to get our input at an earlier stage and then it's easier to resolve any differences. I guess our last point is we are very grateful for the opportunity to be together with you all and to hear the presentations. And we were grateful for the presentation on sound, because that had obviously been an issue that's been around for a while. So, thank you for that opportunity.

JE: This is my first time TAG this Meliadine. I am getting to know what is happening I don't have very much to say right now.

DA: I don't have anything to say also but I would like to thank you for inviting HTO to attend this meeting. I find it very beneficial and something I am learning new too. I will keep the board for HTO or KHTO updated with this meeting. But thank you.

AK: I don't have much. Maybe a learning process. Maybe Stanley wants something to say. Stanley is our chairman.

SA: I am the chair but I direct the coordinator.

GB: We have to leave in a half hour or less and have the auditor coming in. There are a couple things I want to mention that is of interest. It is to do with caribou. Although we are situated way south of you, we are aware of what's going on up there. And we are provided with information too. And we have been told that there is a lot of sick animals up there now. Brucellosis mentioned a possible reason for this happening or for the number of sick animals. But that's one thing. And then whether that's accurate or not is another thing. You know, you have that foot problem, that fungus or whatever it is, the hoof.

DCh: Hoof rot.

GB: I don't know if that's that. But they are saying there is a lot of sick animals. So that's a concern. And being all connected together, the caribou, I think both TAG groups should be able to communicate with each other. I was talking to Richard this morning, and Richard was saying that how Meliadine is not the same as how Baker Lake Meadowbank is. Because while Meadowbank has a longer road, I think but still there are steep on the road and caribou are having difficulty because of that. But, you know, we are talking about caribou, if it affects caribou, it's going to affect

us. I don't know what you can do in those situations but cost savings is what he mentioned is the reason why because the road is so much longer that they can't, you know, fission it as well as the Meliadine. But, I mean, it's a big herd trying to make it across. We should be able to identify the area that they generally cross and then make sure that that area is, you know, fixed up for them so they can go over and make it across. So those are the two things that I wanted to mention. and then the other thing was about that TEMMP. Thank you.

DCh: Thanks, Goeff. Dan Chranowski, Matrix Solutions on behalf of Sayisi Northlands Dene First Nations. Yes. As usual it's always great to be here in person because my experience over the years is that's when connections happen and generally a lot easier to express your opinions and get them out and get more feedback when you are in person. We could have all the TAGs in person, I would probably prefer it. But that does speak to how people communicate and in person meetings tend/can to accomplish more at times. I appreciate being here, talking to people, and getting everybody's perspective. I would have preferred to see the TEMMP version 5 before the meeting. On other committees I have been to, that is generally what is the plan. They allow people who are going to comment about it to see it ahead of time. I don't get everything right the first time I read one document and then, it needs a bit of time to sink in and review again and point out things that you pick up from a second meeting or a third meeting. It would help if we could see that just before as a recommendation. Similarly on annual reports, there is -- just for the couple that I have actually been able to comment on, it is something that I tend to ask for and it still I think a work in progress is the integration of your multiple levels of different types of observations and then seeing them in separate tables and yet not necessarily seeing them -- finding the connections between them as far as timing or mine activity. So those are some of the things I would still like to point out that could probably be improved. There is just things that -- other things that we brought up over the while. I notice that although we didn't talk about it today, one of the noise monitoring sites is the Noise Abatement and Management Plan noise monitoring sites, those human -- well, the ones for human occupation, I notice one of them is actually right down by the southeast part of Meliadine Lake where there is a known important caribou crossing. I certainly think that one might need to be -- well, certainly what's being collected there is useful predevelopment information because we know that there is a road going to be there and waterline and all that sort of stuff. I think it's noticing that it's there. We might want to expand upon the noise monitoring in that particular site prior to the actual development. And so that could very well be something where that particular monitor could have remote monitors in all the cardinal directions to get, again, a sense of how the noise is being dissipated and at that particular site where future development will occur. And also we talked and discuss these looking into the use of drones. There had been discussion about it and I just hadn't heard the status of where Agnico Eagle is at as far as testing them out, potentially thinking about what they might want to be used as. And I know there's concern -- some concerns about that as far as monitoring, but from my experience there can be useful information for detecting what many of the hunters call the early leaders of groups of caribou. It's possible that could be a useful tool for Agnico Eagle to detect when those very early caribou groups are arriving in the general area and being ready for them and that sort of thing. I was hoping maybe we'd hear more about that. But that's probably a topic I'll bring up again some other time. I know as the technology develops while there is some concerns about this being maybe something that could scare caribou, again, just my brief knowledge and experience with them is that they can be placed up at very high levels and almost to the point where be viewed and they can hover and actually still use very strong cameras that can detect caribou for quite a long distance before caribou actually get to the mine. Anyways, I'll leave it at that. But further collaboration here on this information will be -- appreciate the opportunity to give some feedback. Thanks very much.

RM: Hi, everybody. Raymond Mercer with NTI Rankin Inlet. Like Anne mentioned, getting the document sooner, we would appreciate it if we could go over it. For the caribou monitoring and the sound, there is no studies. I think it has potential for somebody to make some real money there or students to do a good thesis on sound for the barren-ground caribou. Thank you for allowing me to listen in.

JW: Yes. I guess the one thing is it would have been seen the TEMMP earlier because it is hard to parse out that information in a short amount of time. That's all I will say. Thanks.

SA: Stanley from KWB. After Geoff mentioned about the Caribou being sick up north we have been told by the elders when it's a dry summer, the caribou tend to get sick. We have known this all their lives. They have hoof swollen or ankle swollen because that's from a dry summer. We know that. I don't know why, but this year the caribou were early migrating north. There is all these we have to look at before we start to blame where they are getting sick from. And there is hardly any elders now today in Nunavut, but elders and Inuit are to their word of tongue that we believe. It's not in black and white. You guys will never see that. Us Inuit, it's word of mouth, and we know it and we believe it because they've used it. They've been through it. It just clicked in my head that when there is some sick caribou up north. They are not all sick. There is some. It happens every so many years. It's not new. It's just I don't know too much of this exaggerating now so we tend to believe that all the time now. I don't think there is nothing to be worried about from our point of view anyways.

SS: Thank you for sharing that knowledge.

RAk: I got nothing really to add. I'm just at my first Meliadine TAG meeting. It's a little bit more, complex than the Meadowbank one. I am just here to learn and report back to our HTO on this meeting.

SS: Perfect. Thank you again to everyone for making time in their schedule to be here away from families and people online to take the time to join us. We can now move on with the TEMMP update presentation.

(BRIEF ADJOURNMENT)

5. **TEMMP Revision**

   Supplemental Material: ppt file titled: "Meliadine Mine TEMMP Working presentation"

   Presenter: Greg Sharam

   DA: Am I able to get a copy of this some time?

   SS: The presentation will be put on OneDrive and we can send you the OneDrive link. And tomorrow we will have a little demo on how to access the different folders.

   DA: Okay. Thank you.

   AG: In the link of the plans, I know you are trying to keep this short and this looks great. Will you have a list tying it back to previous TEMMPs and even some idea of how thresholds and mitigation monitoring have evolved or adapted over time? It could even be an acknowledgment, maybe an appendix. Had you thought about that?

   GS: We were thinking under the terrestrial advisory group, the TAG asked for us to add this section or the TAG asked for a new mitigation and that we would list sort of where that was.

AG: To some extent, the first TEMMP was prior to the TAG being set up. The TAG has a definite rule whether there have been changes in the TEMMP that weren't requested or recommended in the TAG.

SS: Something that we do have in all of our management plans is a document control section. Each time there is an update that identifies the update that has been made, there is not necessarily the rationale behind it. But we will have a document control in this version. As per the rationale on why the changes are made, I think as Greg was saying we thought to include it in the text.

AG: I guess we can wait and see how it looks and if it has that question then we can always come back to it.

DCh: That's great because I am familiar with that too. You continue to revise something and document control and point number, 1.4 and 1.5 changed on this date. It's going to be in this one will it go from TEMMP 1 and then a document control for TEMMP 2 and then TEMMP 3 and TEMMP 4 and now this is 5 or are you just going to do it starting on this TEMMP version 5.

SS: I'm going to clarify. Every time the document is updated, so let's say from V1 to V2, it sets up what the updates were made from V2 to V3. In V5, we will have the list going from V1 to V5.

GS: Possibly not the version you get right away but it can be something that can get added. I have seen when they are done well they are pretty high level. So from this version to this version we added three new sections and addressed comments made, blah, blah, blah. But not getting into all the details

DCh: You can go back to the previous version and go, this has been changed I'm going to find what is now different in the next one and it does help you to just go to the high level points of, like, oh, this is what has changed. It's quite often used in health and safety plans. Okay. Great. Thank you.

AG: Greg, in this section, will it include recent changes in caribou distribution that really change the setting and I don't know whether this is the place to bring them up but Kivalliq Inuit have recommendations on enhanced based on recent changes in distribution. I don't know how you want to work this through. We do have a number of points. I guess there is two questions. One is in your section will it include annual updates on caribou distribution relative to the regional study area and then when you would like us to introduce specific recommendations.

GS: So yes, the TEMMP plan does have maps in it now showing the changes in caribou distribution with time and showing how they are getting earlier and closer to the site already. We hadn't planned on doing an annual update but if that is something you would like to see in the plan that can be discussed. I do have a slide on caribou mitigation and maybe that would be the place to talk about caribou mitigation. Does that work?

AG: Sure. We would like to show our map because that's the background to our points. If you think of the scale of how the clay mat is changing, it may be that you are going to have to think about having the caribou distribution can respond quickly. Maybe annual updates. The HTO might have a better idea of the speed of the changes.

GS: Was that a question to the HTO?

AG: Sort of. If you want to say anything about the changes in caribou, changes in distribution.

RAk: Changes in caribou.

AG: Movement over the years, the last 2, 3 years when it's been warm and dry.

RAk: With the Meliadine site now, we have been saying for over 10 years that we don't see the community of caribou. We used to be able to harvest them in early July. Now this year or in these times now, we are lucky to harvest from the herd Baker Lake being the only inland community. We only depends on caribou and fish. Over time, we have talked about there has been major changes to the migration routes to the calving grounds. It's not all related to mining, climate change as well. I think having something like that in there would be very helpful as well.

GS: Okay. That sounds great and we have included some maps showing sort of the northern movement of the calving grounds over time and post-calving grounds but also how they have been moving to the coast post-calving.

DC: Can I make a suggestion? Rather than have that as part of the plan, it can be a monitoring component that's reported annually so then it doesn't require a change to the plan every single year.

AG: Maybe could just make a linkage of statements and make a commitment that's in the annual report.

DC: Right.

AG: Both documents should be very linked together.

DC: The plan is supposed to describe the mitigation and what's being monitored and then the reporting frequency of that plan.

AG: Sure. Do you think sensory disturbance, it's conventional that we refer to it but it doesn't really fit in this? Because it's an impact whereas traffic management, air traffic management and it's also the one where it has proved difficult to come up with thresholds for it. The way around it, is put indirect has been cat loss because that would solve that problem. We have to make a real effort to be clear what we mean by sensory disturbance, whether it's relating to a scale, to an individual, at the herd sense.

GS: About the wording that this is the mitigation for sensory disturbance as opposed to the management for sensory disturbance which is on the next slide. The mitigation for sensory disturbance would be things like keeping the generators running, having the proper mufflers on the generators, operating, having speed limits on vehicles so that they don't go too fast and make too much noise. Those would be the things you do all the time to keep sensory disturbance down. It might be better to call it noise management.

DCh: Visual disturbance. I like the idea of indirect habitat loss because it can then cover off 3 or 4 topics instead of that generalized one. I can see a slight variation there.

GS: That makes sense. This is just mitigation, things that happen every day of the year no matter what you are doing and then the management is the trigger or what happens when caribou are around. There is new info graphics on how we introduce all those different types of mitigations. You can use them as posters or you can hand this to a driver and say, go drive safely. We start out with different ones for driving and then there is a few for other sort of species here in terms of different driving and vehicle use.

AG: Would you mind if we now give it a background.

LM: This is going to change our presentation. We have a lot in that because the changes in caribou migration. The main point is to mention what that's changing. Do you have an adaptive management before the document is finished. It needs to be completed right and then you talk about all those changes for adapting, which could have been at any time. I will let Dr. Anne Gunn to go over her

review with the old plan thinking that this is in the making and hoping we can finalize it before the migration. That's the whole point of this and be on the same page when we want to monitor in the ground which those graphics are very good. Thanks for that. But we need to do a refinement to that picture today.

AG: Can we show our map that is the basis of our concerns.

AG: We have heard from hunters and trappers about the change in the calving distribution. This map is sort of an averaging of the collar locations during June. It's where the likelihood that you would find most or 95 % of the caribou. This was for previous years and then it shows by 2021 there would be calving within the regional study area. And the regional study area is based on 38 kilometres from the mine site. We only had GN's collar data to 2021. We missed the last 2 years. We know that calving was seen at the north end of Meliadine Lake in 2023. So precautionary wise, we are considering the mine site is on the edge or could even be within the calving distribution. We know that when the cows arrive on the calving ground, when they are about to have their calves, they slow right down. They move less than 5 kilometres a day. There is about a 10-day period when their movement rate is less than 5 kilometres. When they arrive where they want to have their calves, they are going to stay there for about 10 days. When the calf is born, it's very vulnerable to any sudden disturbance, like close by aircraft or something because it can inhale the birth fluids and that causes it to essentially die, to be stillborn. We know we have to be really careful during birth as the calf is born. We also know the calf needs several hours to bond with its mom and without any disturbance. What happens on the calving ground is important to the future of the calf. What we are suggesting is that in anticipation that there could be calving at and around the mine site that we need enhanced calving ground protection. We have taken the precedent set by NIRB for this Sabina project certificate is that there were 2 levels of protection within a year. There would be rapid shoot down. The threshold for that, I think is 50 caribou within 10 kilometres. Which we think is nothing like conservative enough. We do have another suggestion. It would mean that the mine is shut down. And if it was a situation a bit more like this, where there is a high likelihood if it was an 85 % probability that there would be caribou overlapping the mine site that is called a planned shut down. So that's for the following year. There were these two levels, one that operates immediately and one that operates in anticipation. Based on the projects to go for Sabina, that's our suggestion that the enhanced protection for calving for Meliadine would be the enhanced and the planned shut down. I don't know whether we would also suggest that the TEMMP should have contingency planning if caribou panic, if cows panic and the calf can't keep up, there could be abandoned orphaned calves. There needs to be what would be done about those and particularly what would the HTO, what would the elders advise to do in that situation. It's better to have those discussions now before you are faced with the situation. It's wise to think seeing cows and calves is very attractive. Should be some thought about guidelines for photographers that should be actually built in the TEMMP. The other thing is should be taken into account in the TEMMP is the calving ground is often an attractive site for predators. Grizzly bears have been rarely seen at the mine site. The number of grizzly bears has increased in the Kivalliq region. They are usually very interested and will move into calving grounds as consequences. For the moment, we have suggestions for the extra thresholds. There is a chance for feedback for what I have said already. And these are our suggestions open for discussion. The concern is for the enhanced mitigation for the event that there is calving at the site.

MB: Thank you, Anne sharing this. Do you have a baseline of approximate calf abandonment by cows or do you know if there is any literature that might summarize or what would an expected rate be for a herd not experiencing any sort of different or novel disturbances like do we have any information on the baseline rates?

AG: Yes, we do. It's quite dated. I don't have the actual numbers, but it was done in the 1960s, and then we did another study in the 1970s for Beverly. We do have those rates. Then the GN did an updated study for the Qamanirjuaq and the Beverly I think the coastal Beverly calving ground probably about 10 years ago. We have those kind of four numbers that we give a percentage of abandoned calves. I would have to give more thought to the other herd mostly be in Alaska. I can't think of any studies that would provide that information. Yes, there is a baseline and it was before there was any industrial activity on or in the vicinities of those calving grounds. And I can get you the reports and the actual numbers.

DCh: Any range that you have?

AG: No. I don't want to guess but it would be very low.

GS: I'm happy to go through the background what Anne was providing there. Is that what we wanted to do? The big picture is a concern about calving and whether calving overlaps the project and what we are going to do in that case. I guess the specifics of it is the discussion through the review.

AG: We could talk about the big picture and how, there is a 2-year gap other than the sightings at Meliadine Lake. There is also the finer scale that we have suggestions for discussion on the actual thresholds and a bit more on the mitigation. It's kind of up to you guys or we would have a break when in doubt.

GS: I can provide background about Back River. They got pressured into having that 2-stage situation because they were on the sort of western side of Nunavut and closer to the Bathurst herd and that was a concern about Bathurst caribou. And bear calving which they calve about 180 to 250 kilometres north, north west of Back River. There was heightened concern because the Bathurst were somewhat nearby so there was a heightened level of concern there that they experienced. Having worked on both, the mitigation at Meliadine is actually more conservative already because it triggers within 5 kilometres. The actual mitigation itself in both cases underground keep operating and mill keeps operating. It's just blasting, helicopters. I don't know if it actually becomes more conservative to adopt the Back River. It's because the mitigation is more conservative. That's maybe a conversation over the break.

DCh: You are saying that the Back River doesn't have more conservative measure.

GS: It has a bigger trigger number, the shut down. Then their planned shut down does still allow for some operation of the mill and underground. It is similar to Meliadine because Meliadine was a model.

DCh: There is no place that underground (shut down) it's not really a mitigatable thing, is it? Is underground mining has an impact?

AG: Underground mining is far less disturbing of the land surface than open pit. The ore still gets transported out to be processed, so tailings activity, there is still generators for the processing plant, feeding the processing plant.

DCh: There is still surface activities as a result of underground mining.

AG: Yes.

GS: The noisiest on site is still the generators. The generators have to run regardless of what we are doing. Everything is sort of small compared to that noise the generators is making. Just in terms of how far away you can hear it and sort of total volume you can probably have Victor describing that. If for underground mining, all that activity is sort of within the footprint like inside the mine site itself as opposed to driving out or above ground blasting and whatnot. It is a discussion worth having

if it is a change in condition. If the Meliadine mitigation is already of the most conservative on the market, I don't know how much more conservative it can get and still have a project. There may be opportunities to discuss sort of how those pieces fit together that address a concern of sort of calving being closer to the site.

AG: There is a range of mitigation from shut down to suspension with light duties. The suspension with light duties depends on the evidence that shows it's effective. That is really at this point the difference between I guess Kivalliq Inuit Association's position and Agnico's. I totally agree that the suspension mine duties and the thresholds to trigger them compared to other mines are conservative. It's just that given the current vulnerability of the Qamanirijuaq herd and given what we have heard in the communities particularly during the consultations for the Nunavut land use plan we are arguing that the level of protection for the Qamanirijuaq calving ground needs to be as high as possible. The difference is whether the sea can wall and the suspension of light duties is effective and whether the triggers should be more conservative, even the caribou arrive on the calving ground they can be moving at a pretty high. Can average 10, 12 kilometres a day. And I have even seen them trotting to arrive on the calving ground because they know what's going to happen. We need to give some thought to the threshold distances. Given the uncertainty in how well you visually see caribou in the vicinity you think the number of caribou that triggers a threshold like 250 or 50, needs more discussion. We are suggesting much lower number of caribou, like 50 within 5 kilometres and then which is what the current ones are, we think they should be way more conservative, more like 5 caribou, 5 cows within 5 kilometres that would trigger a Level 2. Level 3 would be 5 cows with a newborn would trigger Level 3. The thresholds are more conservative and shut down versus suspension. We should be talking about them.

LM: To add to this is to me it's very simple. I managed that project 25 years ago. The first time I shut down I remember was the first migration in which the mine didn't listen. We knew it but go to inspection. That triggers the whole management of caribou. That's the thing. We need some sort of layman to equate what the time we still have in place. We haven't really because there wasn't this situation. There was a connection, yes. Calving then wasn't as close as it is today. Today what you have is the practical application of a risk. What you have is a risk and how you going to manage your risk is using a precautionary principle which is over and beyond your thresholds because otherwise no precautionary. You have a threshold right now, but you need to think in what is going to be the threshold without precautionary principle to apply. When you see calves coming out from quarters, you see 2, you see 3 but the representation of that collar could be thousands of caribou walking in a very fast distance to the mine site. So having that picture there, you don't want to have the time to apply your threshold. What is required is a precautionary principle plan in how you are going to deal with that and in black and white before you actually start triggering. So that's how the precautionary principle apply in any engineer work. There has been talk about adapting management. Engineering is numbers, only in numbers. If an engineer does the wrong groupings, you lose the number. It's no such a thing with adaptation when you have to design. You don't want to design a dike and change it in the middle of the way. It's not going to work. In fact, it's an exemplary in Meadowbank one of the potential points from the western part which was changed. And guess what, they crack. Now, we need to do the other way in front of Meliadine Lake. This is the type of precautionary to me should be before even they are in place or caribou is approaching the area too. What you want to do there will give you enough time to provide the plan. Because that's, to me, what precautionary principle is. Because we have little information in regard of sensitive impact into caribou, sensitive cows and calves coming out of the calving and to off calving area, which you probably fall into both categories at this time hoping they start moving away from site. That's what is difficult because you have you said you have conservative in those set of rules. In order to approach what's going to happen not having enough information and realtime or enough

studies done to say, okay, then who can use this threshold and use it at that length of kilometres or we mitigate that. It can be used in different formats. It depends how you put the number is how you have the table. This could be argumentative at the end of the day. Wouldn't want to get into that situation when the activities happen. What we are trying to do here is resolving the issues ahead by saying, okay, if calving ground is here, this will be the approach. You are going to have thousands of caribou on your site grazing, and you are going to have to shut down. That's reality. According to what is in the plans right now. If we manage to date move, even if it's slowly and they continue moving, you will avoid the length of time in which you should be shutting it down. That has to be, like, several items. One is identifying the approach of the herd in time, set some rules, many more monitoring on ground, light duties, see what the leads caribou were in that, which is very difficult. Once you spot them, you can watch them in the same location for a long period of time. You can see when they are going to move. When they pass through, all should be shut down until they pass through. We have different videos where it was actually video camera and caught on they stayed there and then they pass through. Once they pass through the crossing, everybody else passed. And if we are able to actually calculate that range, which shouldn't be more than 5 days. That's the idea break, the set of numbers I can give you between 5 days you can spot the leads. From that point, if you manage to have a shorter shutdown, I don't think it will be an issue. The caribou will move through the site controlled without delay. The other component is the calves which is going to walk slowly in the post-calving area, because they are feeding to get stronger and adapting to the new environment. This is the other part which have very little information to say, well, that's the best case. The only thing you can do is best case. If you do it on time, you can manage, like you say, you have conservative thresholds. Now, you have something to change your environment, which shows calving and post-calving. Which to me post-calving is more delicate than the calving itself, because that's when they are adapting to the mothers and moving, sensitive to the environments around them and hoping that eventually, like, they move through there. They start moving around the areas in the future. But you need to have a plan in how you are going to do this. And to me it's precautionary principle only. You have your set, but you need to think in, okay, what if. That's what we are saying and how we are going to apply it. I agree with this set of mitigations we have at this point in time. Some changes based on the last hearing can be done. How we will do with that kind of migration, talking about thousands and thousands of caribou crossing at the same time. You have 45 kilometres of road which is full of caribous at the time. I'm in there. I saw right down and around the road. That's a very key component. Yes, we have very conservative rules and being applied, but now you have another component and have a plan for it and what we think is should be in the text as advisory report to give to you. That's why we do what Dr. Gunn to set up an analysis for us based on the knowledge we have on caribou. We choose some of the GN data to produce those for you. You can see that behind that is quite large when you see it now, which is moving towards the mine site. It's something new, but we mention in the expansion. We mentioned that we should have a management plan. That's different here, conducted in a fashion that is workable for you. It's possible for them to do that without having the back and forth. It has to be the people who really have and set the same goals. I don't think we differ. We have the same goals, and it should be a set of basic rules to capture that.

GS: In terms of this figure, this is the 1995? What's the '95?

AG: 95 is percent.

GS: Are each one of these different years.

AG: Different years. The problem is that we don't have '22 and '23. We have asked GN for the data. You have the data up to '23?

DC: We just got the third quarter of 2023 on Friday.

AG: You could produce the updated maps. This was to give you an idea of without '22 and '23 where there is uncertainty. The fact that there were observations of cows newborn calves at north shore of Meliadine Lake, is what gives us incentive for Water Management Plan we see this in-house mitigation. It would be best if you would do the maps showing '22 and '23 calving distribution. Give everyone a good idea. We would need 50, 80, 85, 80 % for Sabina codes because Sabina term and condition is 80 %.

GS: There is a suggestion, either 50 or 80.

AG: 2023 was the 80 % code overlaps the site then we should be talking about a planned shut down.

GS: When we are talking about specific mitigations and saying things like the precautionary principle, we are normally in a hearing. We have got one set of monitoring and mitigation. Someone else would like a different set of mitigation and monitoring. We have a short period of time to decide what we're going to do. The lead up to the precautionary principle is when there is uncertainty. I would like to unpack that because we are redesigning the monitoring plan here and if there are pieces of uncertainty that can be unpacked and understood better then maybe the mitigation can be better applied based on that. One of the examples, Anne was saying we should have a lower trigger on, like, the number of caribou within 5 kilometres. The uncertainty is how many caribou are slipping through? How many caribou are coming through and not having mitigation trigger would be the question. Wondering whether we can identify what those questions are. If we can solve those problems, it might be better than going to shut everything down.

AG: Right. For the annual extent of calving, to use the precise term the rate would be less than 5 kilometres. The uncertainty is if you see 50 caribou in 10 kilometres what are your chances of actually seeing that 50 if you are in the centre of a calving ground, pretty good. If you are on the edge of a high-density zone and there is a great deal of uncertainty what that 50 would represent. And that's why we suggested conservative you see 5 then if you are more likely to see 5 you are more likely to catch the calving distribution. It's the uncertainty with what the thresholds, how they relate to the probability of the calving distribution.

GS: The uncertainty is where the calving distribution is?

AG: Well, it's the likelihood that if you wait until you see 50, what's the probability that you missed the edge of the calving ground. If you see 5, it's more conservative. That's one level of uncertainty.

GS: There is a built-in piece of uncertainty that we can see beyond 5 and we know members of the hunters and trappers association and the KivIA are out on the land around. We know that's typically how the mine learns they are approaching.

AG: The certainty is sampling and which way, direction, then you start unpacking a great deal of other uncertainties and that's why we picked a low number to have the greater certainty that we would err on the side of caution of picking up calving. Every other way we tried to think about it with all these other uncertainties, the same as the uncertainties with the collars because you don't know to what the degree of representation for collars during calving is high but you don't know on a scale of 5 kilometres or less probably what they represent.

GS: You can separate them to a certain degree. If you know a 100% from the HTO and the KivIA and collars that calving has gone north, say, next year. It's been moving north continuously, then if it goes north and you have 5 random caribou that want to stand around at the mine site, do you trigger for that or if you know well they move north but the calving ground is north?

AG: But if you don't know quite what's happening, then that's when the precautionary comes in. That's why we pick low numbers in close distance to give you know numbers to try and be very cautious. The risk of getting it wrong on the caribou's point of view is greater than the risk of missing calving within the proximity of the mine. I mean, that's where we are coming from.

DCh: I mentioned when there was some basis to KivIA's recommendations based on the Back River, you call it the Sabina location but we are talking same thing. There was the talk that Back River has, immediate shutdowns and as well as planned shutdowns. That's the talk. My thought is in the principles of an environmental impact assessment, when you want to do what you can to minimize impacts, the first principle is to avoid, then mitigation, then compensate. Avoid in my mind is being ultra cautious and thinking the situations that might occur that we could totally avoid. The planned shutdown has got some strong benefits because there is going to be certainties that we know based on even what has been collected up to this point when caribou will start being seen and when they leave. There is a lot of operational stuff involved. If planned shutdowns could be dates picked between June 1st and July 30th and planned shut down was going to be occurring, we'd all be so much better off because you wouldn't even have to worry about mitigating. We would be avoiding in so many ways with a planned shutdown. If we are even thinking about that, that's the principle of impact assessment is to avoid first. We are talking what, mitigation and everything like that. If a planned shutdown was going to be happening as soon as we heard caribou calving, we a way of totally avoiding impacts.

AG: One of the uncertainties is if you could map the 22 and '23. That would give us a better idea of where we are going to be talking next year a planned shut down or whether it might be a rapid shutdown. But knowing which way the calving ground is being, it's moved. The centre of the calving ground has moved about 12 kilometres on average since about 2014.

GS: 65, 70 kilometres so far north, that way.

AG: Right. It's tending to go north, then east, and 2020 it went south. But 2020 was that very big, that light coloured one because it was such an unusual late year that it kind of threw everything off.

GS: But it was generally in shore of Whale Cove.

AG: The first uncertainty is to have those 2 years going, whether it's going east or north. That will give us a better idea of already whether we are planning contingencies or something for next year.

GS: We do have information about the collars getting closer, the caribou getting closer, the project getting shutdown. Maybe that's the process. We have 6 months to spring migration, 4 months until we plan to put the plan in. Is there any unpacking of that data and saying how successful they have been so far in terms of detecting them at far field, detecting them at mid field, how confident of it where they are, because we have the collar data now, how successful was the shut down each year that they did shutdowns so there weren't caribou sort of getting through before the shut down happened. That would be in terms of, like, prepping for this next TEMMP, my temptation would be to unpack that because we have that information. We just never really presented it that way.

AG: I agree. We wanted to get this on the table for discussion. We weren't expecting to have time to talk through this. There are the collar data that we need not just kernels but we need to look at shifts on average it's about 20 kilometres the periphery leading edge shifts. We need to get GN's 2022 calving report because we need to look at the dispersion and densities based on the geography that will give us a means for testing some of these thresholds because we look at the dispersion as well as come up with a probability, sight ability from photographs and the conversation maps. There is a lot more collectively that we can do but we wanted to make it very clear that our position is the enhanced protection. I don't know how much you were involved in the Nunavut

Planning Commission consultations but the key message that obviously Nunavut Planning Commission picked up on was calving ground protection which is now we have limited use for calving grounds. Even though Meliadine is grandfathered, it doesn't apply, we need to be creating something that communities will be able to support in terms of maximizing protection for calving.

LM: I based my comments from the Kivalliq land use map. You go back to that, even it is grandfathered, that means you should shutdown during the calving ground for 1 month, no activity. But that's no what will change. We have a TEMMP. We have conservative thresholds. You should have a plan aside for the existing plan, a practical plan you can use if the calving ground would be on site this year. If it's there, a visual observation, then you use it. If it's not, you continue with the existing. I am talking about a set of rules, this is caribou calving grounds in post-calving area, then we use those in the earlier thresholds. If it's not, because it move this year, then you continue with existing plan. It's very simple exercise in terms of how you will tackle it, because we don't know other than try to get a TEMMP with all the components in it. Put all these elements in there and work out together a plan. Because it's workable if calving ground is there using existing information we have. You are being in biology for a long, long time. All the information presented in NIRB in the last 2 years is excellent information in all the areas of the project including TAG position. You have enough information to create a plan. Caribou is in the section. It should be practical, should be measurable, which is important to be measurable, geographical, and should be useful in the ground. Useful is what will happen. We do all these plans and this risk, assuming that the monitors in the ground will plan perfectly. There is no other way it is, and I have been there. Either we get a plan closest to how the monitor will use it and you can measure when they are in the ground, then you have another set of data you can rely on and say, yes, this is the experience; this is good. The history will be good for future. It will really put that practice. I think that's the approach should be here. We don't want to change the TEMMP. We just want to add in a piece in case if that happen, which is how Inuit work anyway. What happen if, so have a TEMMP plan to present that. The proposal have to have three sets of "because what happen if we trigger". So that's what I'm really coming. I don't want to disturb what you have got, no. That's not what we said. It shows that by doing this exercise during the NIRB hearings and since the beginning of the land-use plan to finally get the data and get something for us is critical. We spoke about calving; it is very sensitive. And we tried to tackle this. That's all.

DCh: We have the TEMMP. We are working on it. But here is the situation: What if 25 caribou cows calf within a kilometre of the AWAR, do we have a plan in place for that yet? No. You are saying let's put one together for those kind of situation so that we are ready and because we can ballpark it a bit but we do also have some very good data already.

LM: We develop the mobile protection measures, we pushed the mobile protection measures 10 years out is for that reason. There was encapsulated in one, which now is an area and now we have caribou offside with that calving ground without protection. If you go back to the Kivalliq land use plan, it only talk about that and there is only apply that. Unfortunately, they switch. It's what we were saying 10 years ago, being in the process of the land use plan. One of the things is how we will be able to change as caribou moves. It moves to the coast. We came out with doing a protection measures. Unfortunately, it was not accepted by the Nunavut planning commission, because they wanted to have that protection. Those things go with the other pieces for yet the plan to economy and environment at the same time. That's give and take. That's the simplest solution. Then you can adapt as caribou moves. Now, we have an example how we can do it. We have rules in place and we did for mobile protection that can be applied here. We don't even have to do a new plan, just take that, analyze it, see how it works. And if it doesn't work, then you put in the numbers if you think it's necessary. We did some procedure for protection, 3-year resolution. It has the photos for

some of HTO. That's something you can use. If that happen, you should apply it just to make sure you don't lose the track of this meeting. I want it to be that's something will give a strong position to the company.

(BRIEF ADJOURNMENT)

SS: I want to thank everyone for the in-depth discussion we have been having. We, Agnico, have heard the concerns and the interest related to the calving grounds We will account for it in the TEMMP so the draft that you will be receiving will have a section related to that.

GS: I think in some of the details that we were talking about there in terms of calving season and I'm really curious whether there is any additional monitoring or reporting that people want to see to trigger that kind of mitigation and just on whether there is anything else that we need to include in the TEMMP plan to make all of this work and to give everyone the confidence that it's all being done. So are there specific types of monitoring that people do want.

DCh: Just wondering the spotting scopes and everything like that. So far, the caribou alert one is just collecting data on the group size and general distribution. Is there any possibility of just making sure you that maybe there can be a sub sample of that that is categorized as to cows, calves, if there is that sort of a thing just might also tell us a bit more about the composition. I suppose that can be done depends on the distance, the heat lines that are in front of the camera and all that stuff. But those are the things that would tell us a bit more about the certainty of information and as well if it is with calving being an issue that we talk about start even noticing are there any of those hoops have calves in them, that would be helpful.

GS: Yeah. There hasn't been a lot of call to report composition, but I do know that it's reported in the driving surveys and height of land surveys there is that information recorded already and reported. I don't know if there is been a call to report. We pick it up on the cameras and during behavioral surveys as well. We record males, females, calves and composition. The behaviour surveys is a sub sample. There is no reason against it. You are getting caribou at different ranges with those 3 monitoring programs, so you are getting height of land, you are getting them at the furthest distance, behaviour monitoring you are getting at the 2 to 3 kilometres and camera you are getting them right on site. Just have to be cognizant that there is 3 different forms of sampling there. And just speaking to the camera data, we have seen calves right from the beginning of that. It's just a matter of how old they are. And whether that's changed in time.

AG: Just to be clear, 0 to 49 caribou probably shouldn't it be 1 to 49? But in any case, it's a cumulative sighting, it's not the group size?

GS: Correct. Yes. It's total number within 5 kilometres, not group size.

AG: If the caribou are there during calving season, these levels could be expected to be changed.

GS: I think that's how it would work would be effected in these 3 steps. All the monitoring starts and then you start seeing them at the north end of Meliadine Lake. You know that tomorrow or the next day they are coming and then planning starts and you are triggering Level 3 when they are still a bit away. It's a lot more planned than it's portrayed.

JT: And the migration is usually on Level 2.

GS: As you are getting the odd straggler come through. There was more early detection we talked about in terms of the number of sightings that are coming in when they are still well beyond 5 kilometres either from the KivIA or from HTO. Jeff could talk about that.

AG: I think that's one of the things we would like to see in the annual monitoring report more display of the data that shows how these thresholds are actually coming in so we can actually look and perhaps have an idea of looking at their effectiveness and that's one of the linkages we would make back to the annual reports.

GS: Ok. Everyone on the TAG is part of those 3 times per day emails that contain all that information because it's a matter of how that information is then reported.

DCh: And, Jeff, you are saying that there are some hunters 15, 16 kilometres away from the mine that they report to you or somebody else is going to be taken verbatim and that's where the caribou are. Then Agnico Eagle gets to use that to implement whatever. They are reporting to you and for precautionary measures, you are putting those implementations into place as soon as you can.

GS: Precisely. It's also in Agnico Eagle's best interest. You don't want them to be within 5 kilometres and not know. Then it's an emergency. You plan week, months in advance for this day. As Sara was saying, those plans they are doing internally January, February making sure this isn't a surprise. Were there specifics in terms of how you wanted that to be? Are there specific suggestions of what you would like to see in terms of that history of seeing them approach and triggering mitigation, for example? Are there specifics in terms of monitoring results like how the different types of reporting led to action?

AG: I think what we'd like to see is reporting on how the caribou are approaching so was your cumulative sighting of 50 caribou was it a group of 50 at one end of the road or on the north side of the mine or was it 10 sightings of 5 caribou? A better idea of how the threshold represents the dispersion of the caribou within the Local Study Area?

SS: And if I may ask, every day, 3 times a day we will send the caribou migration alert email which has the maps of where the caribous are. Are we talking about additional information than that?

AG: We see the maps. Each day they get sent out of the sightings, and they are great. But it would be nice to see somehow captured in the annual report how these are triggered. You don't want to put in as an Appendix every maps. There must be a way of summarizing them.

SS: You would like to see, if the caribou location data came from our surveys or from information provided by the HTO or KivIA?

AG: Just an idea where the information came from, was it one group of 50, 5 groups of 10 recorded during a road survey? There is sort of accountability that's traceable for the thresholds.

DCh: You are not in Level 1. Then what happened that day that was it 2 observations to the HTO, groups of 3 and then height of land and you counted 75. And direction of that information came from AEM or HTO. You are in a Level 1 because you are still within 10 kilometres. It that might be helpful too if it was in addition but we saw another group as 75 caribou 15 kilometres away based on what HTO told us in that direction. Those would then track because what happened the next day? All of a sudden, we're in Level 3 because something whatever, first thing in the morning, there was 1,000 seen coming from whatever direction and they are within 5 kilometres.

GS: Ok. That narrative exists, if you read all the emails. They will say HTO reported 50K. KivIA reported some at 30K.

DCh: A table would be better. I save all those caribou alert things. I don't see the small groups in those emails, they are 200 or 500 or something like that. There must be somewhere it's recorded that you used that information to make the decision. That's what I'm looking for.

GS: Okay. When I read the daily emails, I hear observations seen 3 days ago they were at the north end of Meliadine Lake last night late and the last piece in the email says high alert. We're probably going into Level 3 tomorrow morning or tomorrow lunch because they are coming down the north side of the lake and first thing in the morning says we are in Level 3 or they made it down or they were early or they were late. So that information does exist.

AG: The emails are fantastic. They are incredible system. The thing is to try and preserve that into a table, not to lose because it is such an effective system.

DCh: The maps are getting better too. I like the maps. That's helpful too.

GS: Any other comments on this program?

SAt: . Sorry, I wasn't able to join. I have been listening in for the last 15 minutes. What I found useful for being able to review how the caribou season has gone is the table that's used in the Whale Tail annual report which is put in an appendix which will basically list in chronological order all of the caribou sightings. The table itself specifies the method of sighting, whether it was incidental or road survey or what. It links that to the status of the project, whether the road was closed or the mine was shut down, what mitigation if any occurred as a result of those sightings. To me, something like that would be useful to be able to get a good chronological overview of how sightings are linked to mitigation using the same type of table in an annual report.

GS: Ok. Are we happy to move away from caribou now. We have later today and tomorrow morning to talk about the TEMMP as well.

AG: Just before we move on, how we've introduced our ideas of enhanced protection for caribou. How are you thinking that we were going to move on with that? We talked about need to get maps done. Are we going to leave it, bring it up tomorrow or how are we going to move on? Are we not at the stage for any recommendations. We need a sense of what are going to be the next steps for the material that we introduced before the break.

SS: On the Agnico front, as I was mentioning earlier, we heard your concerns and there is a few things we'll need to confer on. If I may suggest we touch base on this tomorrow.

AG: Ok.

GS: There was that discussion about the mitigation that was suggested. I would like to unpack what data reporting of the data that we already have. Like how successful has been detection so far, how many times has the mine been surprised by the caribou. Those questions that we have the data but just not been asked for in that way. If we can have a list of those things that we can put together, then that data can go into the next part of the discussion about how much more mitigation is required and are there other monitoring that are required or is there a hole in the monitoring program.

AG: Ok. Well, let's sum it up tomorrow what steps will it take for the enhanced calving protection.

DCh: Are these caribou related? (Refer to 0.4 Mine TEMMP working presentation p.15)

GS: They relate to all wildlife. Direct habitat loss is an area. Using the habitat, different habitat suitability maps and as built footprint. In this year the mine added 2.5 hectares and it's now 150 hectares. That's where that's described and be reported.

DCh: There may or may not be a mitigation recommended, it's just reporting information?

GS: Yes, just for monitoring. We felt many of these deal with animals that are interested in using the camp such as foxes etc. They are likely to come in or interact with a site, less about caribou but with all the other animals. Happy to take suggestions. Then, for each species there is sections

repeated for raptors, migratory birds, first go through the Final Environmental Impact Statement predictions, thresholds and adaptive management and objectives of monitoring and different monitoring programs. For migratory birds there are different detailed monitoring. Raptor program and birds program.

AG: Just before we move on, what is sensory disturbance and indirect habitat loss? Thinking the Final Environmental Impact Statement predictions as a pathway, in theory it should fit into monitoring. What your thoughts were on how to fit it in since I don't have any solutions.

GS: Noise monitoring is covered in another plan and in the introduction section about how this plan links to other plans we would pull out the predictions there that there would be some form of sensory disturbance and that's addressed in the noise monitoring plan. We wouldn't have a specific monitoring section here for it because it's addressed in another plan. I wouldn't want it in both plans because they would have to be in sync.

AG: We have the terminology section that would be the place to explain why in some place we refer to sensory disturbance, but we don't explicitly monitor for it.

GS: Ok. I would be curious where to put that.

AG: We have it as a threshold but we don't have a metric for its measurement.

GS: It's a good point. We could add something in caribou which talks about, where the sensory disturbance is and how then the monitoring is done through noise and which plan we refer to.

SAt: When it comes to the monitoring programs, I think of them in terms of some of them have 2 objectives, some of them have 1 objective. If you look at this list, the first 4 of those are forms of monitoring that would be real time monitoring that can lead to mitigation action. You have various forms of surveillance that might locate wildlife to a mitigation action whether it's road closures or caribou related stuff or deterrent at this time. And the last 2 are more monitoring programs that are aimed quite specifically at monitoring for project level effects and for comparison to predictions. In terms of organizing the TEMMP, it would make sense to put all of these mitigation-oriented monitoring programs in one section and then the prediction-oriented programs in another section. (Refer to 0.4 Mine TEMMP working presentation p.15)

GS: Yes. I have seen that done in other plans where you have a mitigation that triggers or monitoring. The triggers mitigation as a header and monitoring is for compliance monitoring or monitoring the tests predictions as another header. The trick is trying to figure out the right way to roll those up so it doesn't become super repetitive. The worst-case scenario you have both those headers for every species. But I had a header for these sections, general wildlife monitor in calling them some sort of surveillance that triggers mitigation, like renaming that section and then going through the other species. So that could be its own first order heading. All of these are only meant for on-site technicians to go looking for problems.

DCh: Mitigate right there on the spot and see those top 4 certainly that category.

GS: Exactly. 5.2 is about testing FEIS predictions which is a different flavour of monitoring. I agree.

SAt: You could have a first order heading which would be monitoring for mitigation, monitoring support of mitigation and you would then have those sub sections which would be the different monitoring programs would summarize all of the monitoring information or data across all species and that would deal with all species in that one section.

GS: As long as we don't confuse the caribou muskox section which has both in it. In terms of the other ones, 5.2, 5.3, 5.4 all the species group and the same 3 headings, predictions, thresholds, management, objective and monitoring approach.

DCh: If you find a migratory bird through site surveillance it will trigger an immediate response of some sort. I still like the idea those top 4 being a monitoring to possibly trigger an immediate mitigation versus these other ones where we are looking at the predictions and see if they are staying within what you believe them to be.

AG: The monitoring approach for furbearers is like incidents, incidents and the wildlife sizings log?

GS: Mostly, yes.

AG: Most of the wildlife incidents are bears and foxes or mostly foxes.

GS: Foxes, yes.

AG: Is there any duplication?

GS: To put these under furbearers. There is a number of birds that are picked up or this animal is like, a muskox started hanging around.

AG: All the fox incidents would be under general wildlife monitoring, not under furbearers.

DC: Anne is suggesting getting rid of furbearers, eliminated that bottom section and reported in the top section.

GS: There is an Final Environmental Impact Statement prediction whether fox will be attracted to the site and we get to monitoring approach and we just say see incidents above.

AG: Ok. Whatever.

GS: In terms of the Final Environmental Impact Statement predictions with the triggers. But I agree.

AG: It's probably better to have it like this because you reduce the length of the overall document. You can afford some repetition.

DCh: This is like a certificate requirement you should harvest survey.

GS: Correct.

DCh: Is it triggered any mitigation? it's a certificate you got to do it. Would it be relevant to further, we are talking about caribou and mitigation that you foresee anything that would come out of it?

GS: I think it's more precipitated discussion with the HTO and KIA about where harvest is happening and what that data is saying.

DCh: Did it have a prediction? Did it have a threshold?

SS: The hunter harvest study referred to some studies conducted and I don't want to misquote the year but I can get that reference to you.

DCh: Yes. I'm not sure where this really fits into the TEMMP.

GS: Happy to have it as an exhibition. We are not writing an American novel. It's a management plan. Just if it's not a lot awkward and norm approximately appendices. We have the Nunavut Impact Review Board conditions, all the different and commitments and then the invasive plant program and the vegetation health program, etc. All the different sampling locations. That vegetation health program is kind of currently being updated as well, so there will be a new version of that with time. But it's not ready to go out yet.

DCh: Could you go back to that info graphic metric, that excellent info graphic. It's so pretty. You are saying this has been in the document before.

GS: Yes.

DCh: But not graphically?

GS: Not graphically. It's in the table.

DCh: Just the comment, it's great because I would have had to search through the whole thing to find and put this list together. I may have noticed that there was a 500-metre setback for swans and loons but I don't recall reading it. This just does highlight how these info graphics can very clearly make it clear to people who are in the field how this should be applied.

GS: I have almost prefer to do is in management plans which list number for a buffer, and if we can't use this buffer we will talk to Environment Canada. Instead of doing that, the way they have been most receptive is having do not go buffer which is like 30 metres or 100 or 50 metres. Then sort of an adaptive management buffer where you can do a risk assessment. If you want to put a container and leave it for the summer, that's fine. There is very low risk of affecting an animal and you can park it at 400 metres versus we want to drill and blast at 10 metres where you say it's high risk. Instead of leaving it open, we will talk to Environment Canada about risk.

DCh: Because you can call them up and they won't know either.

GS: That's exactly. You have to say we have done risk assessment and put a container 400 metres.

DCh: It's not because they don't know. You need to discuss it because there is no guidelines. It is good to have something to work with.

GS: Exactly. Often a minimum and a discussion is the way or an adaptive management area.

DCh: That came up there was going to be an Environment Canada person at the committee from here on in? I thought that was discussed.

SS: We had a request from CIRNAC. They weren't able to attend at this meeting but they mentioned their interest to attend future meetings. Tomorrow, we will be discussing the process for when we get requests for new participants. If you would allow me to circle back on the hunter harvest study, Jade has found the study we were referring to. It's Nunavut wildlife harvest study from 2005. We will be happy to share that by email if you'd like.

6. Roundtable Discussion

AK: I have nothing.

DR: Yeah, I have nothing to say just really enjoyed taking it all in.

DA: I have nothing to say right now.

DCh: Just, yes, thank you very much. It's great to work with all of you. I find that we always learn something every day at every meeting. It all adds up. It's great. Thank you very much.

JW: Well said and ditto.

LM: Thanks, everyone. I know we are asking for too much sometimes, but it's the way it is. Can't change it.

JT: It was good discussions today. I'm glad the calving grounds were brought up and part of the discussions. It's going to be important to keep that in mind moving forward as the campgrounds move over the years whether it gets closer to the site or not, it's better to be prepared than unprepared and deal with it before it becomes an issue.

RAk: I am going to echo what Greg mentioned, with caribou especially and having experience seeing one caribou population calving grow within 10 years, like, it moved from one area to another area extremely. The Beverly calving ground used to be on the south side of The Lawn River. There was no collar data at the time, everything was air surveys to try and find these caribou. Then, one time we were told that there is no more Beverly caribou left on earth. The traditional people, the Inuit said, no, they moved. Their food source was gone so they moved to a richer area where they could feed off from. Eventually a few years after looking for these caribou they were found near Queen Maud Gulf in their new calving ground. It's good to share this experience and to listen to the conversations in this one. I want to thank everyone.

JE: It's a learning experience for me too, joining this meeting. I'm learning something new. Thanks.

DC: Happy to see some familiar faces and hear familiar voices and meet some new people as well. And I really appreciate the local knowledge that's shared. It's often helps my learning. Thank you.

JR: I'm really happy I can be there today and it was a really interesting conversation. I'm excited to do it again tomorrow. Thank you.

SS: Thank you. Online, I will go in the order that we see here on the screen. Robin.

RA: I wish I was there. No over comments.

RM: Thank you. Yes. Good to be here. Sorry I was late this morning trying to log on. Took my third try to get me logged on here. Looking forward to more meetings tomorrow. Talk to you guys later.

MB: No other specific comments. Thanks for having me and looking forward to chat more tomorrow.

SAt: Hi, folks. What I did hear sounded very interesting. Thanks very much. I will join tomorrow but online. I can't be there in person. Is it possible to get a copy of today's presentation forwarded so that I could just go back and have a look at the slides? It might help to catch me up a little bit.

SS: We'll put that on the OneDrive and resend the link to everyone as we have a new participant as well as the audio clips. We tried very hard to play earlier today. Everyone will be able to listen to them tonight. One more try for Brad? With that, I wish everyone a good evening and looking forward to seeing everyone in the morning.

(MEETING ADJOURNED AT 5:01 P.M.)

Topic:	Day 2- Meliadine Terrestrial Advisory Group - Agnico Eagle
Meeting Date:	October 25, 2023 at 9:00 - 16:22 CT
Location:	Marriot Suites, Winnipeg, Manitoba
Attendees:	Sara Savoie (SS) – Agnico Eagle Mines Limited (AEM), Environment General Supervisor,

Jade Robitaille (JR) – AEM, Compliance Specialist

Dan Coulton (DC) – WSP, Sr. Wildlife Specialist (AEM)

John Etegoyok (JE) - Baker Lake Hunters and Trappers Organization (BLHTO)

Jeff Tulugak (JT) – Kivalliq Inuit Association (KivIA), Executive Asisstant

Stanley Adjuk (SA) – Kivalliq Wildlife Board (KWB)

Richard Aksawnee (RAk) - BLHTO

Anne Gunn (AG) – KivIA, Caribou Specialist

Luis Manzo (LM) – KivIA, Director of Lands

Jessica Waldinger (JW) - Government of Nunavut (GN), Access to Information and Protection of Privacy Coordinator/Policy Analyst

Dan Chranowski (DCh) – Ghotelnene K'odineh Dene (GKD) , Matrix Solutions Inc. Wildlife Biologist

Goeff Bussidor (GB) - GKD (Sayisi Dene First Nation), Chief Negotiator

Benji Denechezhe (BD) - GKD (Northlands Denesuline First Nation), Chief Negotiator

Greg Sharam (GS) – ERM, Caribou Specialist (AEM)

Dan Routhier (DR) – ERM, Wildlife Biologist (AEM)

Amy Kaludjak (AK) - KWB

Darla Angidlik (DA) - Kaniqliniq Hunters and Trappers Organization (KHTO)

Brad Pirie (BP) – GN, Project Manager, Research and Monitoring – Online

Meghan Beale (MB) – WSP, Wildlife Biologist (AEM) - Online

Victor Young (VY) – WSP, Acoustic Scientist (AEM) - Online

Robin Allard (RA) – AEM, Environment General Supervisor, Meadowbank - Online

Raymond Mercer (RM) – Nunavut Tunngavik Incorporated (NTI) - Online

Stephen Atkinson (SAt) – GN, Biologist Consultant - Online

Kori St Jean (KS) – Independent Reporters, Stenographer (AEM)

1. Agnico Eagle Updates

Supplemental Material: ppt file titled: "October 2023 TAG Meeting update"

Presenter: Sara Savoie

SS: We had a request for new members to be included in the TAG. We had mentioned to the NIRB that we would propose a vote to that effect. Here is just an excerpt from our terms of references. There is no formal mechanism for when or how to integrate new members within the TAG. However, at the hearing, with discussions with NIRB, we were asked as a TAG to vote on the inclusion of new members. The Athabasca Dene group. At this time, I would like to propose to have a discussion if there is any questions, concerns related to that topic. We can proceed with a vote to share with the NIRB. I would like to check perhaps with parties online or parties in the room here if we need time to confer or if we are ready to discuss this.

DCh: What kind of things would we confer about?

SS: We can pass the vote right now if everyone is ready to do so. I just want to make sure that there is no questions or concerns before moving forward.

LM: You can proceed.

SS: Perfect. We will proceed. Is KivIA voting for the inclusion of the Athabasca Dene?

LM: Yes.

DCh: She wants to know what the vote is, whether we agree Athabasca Dene should join the TAG. And I guess, Benji, you agree to the Athabasca Dene join the TAG?

BD: Yes.

SS: Darla?

DA: Yes.

JW: GN. Yes.

SS: Perfect. Raymond, what was NTI's thoughts on including the Athabasca Dene in the TAG.

RM: Yes. I don't have any problem. Yes. We agree.

SS: Richard from HTO. I think we were waiting to hear from Baker Lake HTO on the inclusion of the Athabasca Dene in the TAG.

RAk: Yes.

SS: Perfect. We have amongst the TAG members. We will be providing that information to NIRB following this meeting. Thank you.

2. TEMMP Revision

Supplemental Material: ppt file titled: "Meliadine Mine TEMMP Working presentation"

Presenter: Greg Sharam

GS: I wanted to put these 3 questions on everyone's radar and maybe we can unpack each one of these questions and make sure everyone feels comfortable about the approach. The first one was: How successful has Meliadine been at detecting and reacting to caribou approaching the mine so far. We have 6, 7 years of data. How many caribou are being observed with the height of land surveys would be one approach and look at whether there were any caribou near the mine when the mine was still at Level 1. What portion of caribou are exposed to Level 1 versus Level 1, 2, 3. Is there a concern to caribou and getting close to the mine before the mine shuts down. The opposite of that question is sort of what's the risk to caribou. The second question was: Does a Level 3 decreased noise from the mine. Victor's presentation yesterday was about try and measure the difference between Level 1 from Level 3. He was saying the wind noise was complicating that assessment. I think it was Anne's question that maybe we could use the models to say this is how much noise a Level 1 is, this is how much noise a Level 3 is and look at the difference between the two of what we would be expecting in terms of a decline in noise due to the project in sort of surrounding area. The next step would be to put that together with some of the existing monitoring that's happened to say can we hear the mine. The third part was about do caribou respond to the mine when it's under Level 3 which the Commitment 38 analysis that we're going to be talking about this afternoon.

SAt: With respect to Question 1, one thing that might be useful to do, since you have access to collar data, is to integrate the collar data with the ground-based observation. You mentioned that you would be looking at what are we seeing on the ground when we're in Level 1 and 2 and 3. It would be interesting to look at when there are collars within a 5 kilometre trigger distance trigger, what are you seeing on the ground. The 2 reasons for doing that, one is to ask the question how useful are collars at detecting approaching animals, how representative are they. The reverse of that, which are ground-based observations detecting when collared groups are approaching. It's been a long-standing request from Kivalliq Inuit Association to integrate ground-based collar observations to get some idea of how those 2 measures together. I'm doing something similar with the Whale Tail Project and looking to present that at the Montreal meeting.

GS: Ok. Given there is a collar a distance away, what's the likelihood of seeing caribou the next day or as that collar approaches.

DCh: And possibly the amount that is in the area when a caribou is in the area too.

GS: Ok.

AG: You will be using data that is from post-calving in the summer. I would be hesitant about how those sighting models will relate to calving early post-calving. During the 10 days of low movements because movement rate will play a part in your detection ability and then movement rate of 5 kilometres, less than 5 kilometres a day is slow. Caribou are likely to stay. Residency time in your detection zone. Those are a couple things, so residency time within your defined detection zone

and the caribou dispersion during calving is quite different from post-calving in summer. Those are things you will have to deal with in your sighting models, that's what I am suggesting.

GS: Ok. I can see there was a suggestion to use height of land monitoring, which is the main on site monitoring, the collar monitoring which Stephen was suggesting, and there is also all of the other information, which is provided by the HTO, the KivIA in terms of land users saying, they are 20 or 30 kilometres away. How good a predictor is that of them arriving soon. The opener of the season, the first time that we see them as they are approaching as a large group towards the mine rather than trying to pick apart the entire post-calving when they are kind of moving washing machine back and forth and whether we are picking them up, those swoops up. That's my take on it would be talking about the beginning of the season as they are moving towards the mine. But I guess we could try to unpack some of those movements within the area as well.

AG: How will you partition your data because it's only relative. You only have the baseline of how many caribou there were in the vicinity. The collars predicting the sightings is presumably what you are going to have to do to reduce that uncertainty because you don't have any absolute measures.

GS: The height of land measurements are starting up to a month before the caribou get there. We'll have a whole series of height of land measurements day after day before the caribou get there indicating that they are not there yet. We have a whole series of zeros before they arrive.

DCh: Are those started when you start seeing collared caribou possibly approaching or is it just a fixed date that you start with regardless?

GS: I think Sara and Jade can probably answer better.

SS: It's not a fixed date. It's informed by the data we collect through discussions with KivIA, HTO and the caribou collar maps. So, it's a combination.

DCh: Sure. If they are 50 kilometres away, we all know they are starting to come. If you start to do the height of land ahead of time, some day in the future you will be saying, we see them now, then that's the approach?

GS: It can be 1-2 weeks before they get on site. Is that accurate, Jeff?

JT: Something like that. It depends how early they get in. The calving area has gone closer to Rankin lately, they settle in a certain area for a time, calves, and a couple weeks later they'll start moving. I'm not sure if you want to collect the data when they are in the area how long they are settled within the study area.

GS: All those event logs are recorded from the mine.

JT: I think it would be a good idea.

AG: The height of land of coverage, it's pretty good coverage. Do you have a sense of how far they see and how they overlap or not, their coverage?

DCh: The height of land, when we last talked about it, is at the top of the waste pile, that's probably the highest point?

JT: There are different parts around.

DCh: Do you believe you get kind of a 360 view?

JT: You get a good view too from the camp, from the office upstairs. It's a good height of land survey because it's a three-storey building and a good oversight.

SS: There are a few different locations across the site and along the road where, depending on the topography, we have a good visual.

GS: There is the direct down the lake view that is further than you can see out on the land just because there is no hills involved. You can see down the lake almost to the north end of the lake; is that right, Jeff?

JT: Yes.

GS: Ok. Would you say that's considerably further? Is that further than land itself.

JT: I think so because all the hills are on site.

GS: You have got that one sort of predictor which would be whether caribou on the north end of the lake of whether they are coming closer.

SS: There are ways to identify the view sheds according to the topography and the terrain, etc. We are working on a map to this effect. So as soon as that's ready, we will share it with the TAG.

AG: How are you going to do this?

GS: Well, if there are suggestions here, I am going to take them and then I think we are going to have to go and figure it out. It may be somewhat qualitative. On the first of June, we had a comment from the KivIA and then on the 5th of June there was a comment by HTO and these are the different indicators that we had and then the mine shut down and then caribou arrived or then caribou arrived and the mine shut down.

AG: We are sort of a narrative approach as against sort of finding a way to estimating the likelihood of the probabilities?

GS: Well, the other way to do it would be to add up the number of caribou observed for each time and then say whether the mine was open or closed. You have a table of whether the mine was open, closed, and then how many caribou are observed on each survey, morning, noon, and night.

AG: That might be easier to compare between years, which is presumably one of the places this will have to go to.

GS: Right.

AG: The likelihood of the proximity of the calving will really change the sight ability of the approaching of caribou. It's the ability to compare between years should help choose the method of doing it. And a narrative doesn't really lend itself to that.

GS: And that would give you the number of caribou that were present within 5 kilometres when the mine was still in Level 1.

AG: That would be one criteria.

DCh: It will take a while to come up with it because sometimes when things get started on these monitoring you can use more fuzzy logic kind of wording like up a little, up a lot, down a little, down a lot from the day before or from the week before are about the same. Eventually, you will be able to target and figure out what those numbers represent on the landscape that you are using. They are representative of that area. It can help in the narrative of talking with the general public instead of just using straight, hard numbers may be saying up a little from the week before. That's an experience we had from doing observations/information to start off and then move forward into some more precise numbers.

GS: I would be curious to look at some metrics like how many indications did we have from KivIA and HTO before the caribou arrived and how many days in advance they were arriving on average, some sort of qualitative. On average we get 7 to 10 indications or 1 to 2 indications from KivIA, HTO before caribou arrive. How certain can we be that land users are going to indicate that caribou are arriving.

AG: How will you use weather that it impacts sight ability? How will you build that in?

GS: It's a good question. I guess you could partition the data.

AG: If you are estimating probabilities, you could weight them by obstructions to view like blowing snow or fog.

GS: Separate them and that data is recorded in the last few years.

Rak; It could be towards Agnico for the KivIA or the GN. Speaking of collared data, how many collars are there on the Qamanirijuaq herd.

JW: I could find that out and get back to you.

JT: 50 collars.

LM: Some of them are not working, so . . .

DC: Can you answer that, Stephen?

BP: It's Brad Pirie. On the number of collar, can I get clarification which herds you are looking for?

RAk: That's the ones that interact with Meliadine.

DC: Qamanirijuaq.

BP: I will contact Mitch. I should be able to get that before the end of the meeting, how many collars are put out and how many are still active.

RAk: Thank you. This brings me to a follow-up question. Having experience with a collared data versus human observation. Right now in Baker Lake, our nearest collared caribou from any population is about 50-60 kilometres from Baker. But that doesn't mean that the proponent is starting to prepare shutting down or slow down production or anything. Human observation, my son just texted me late last night, there's 500 caribou just about 8 kilometres from town. These are no collared data. That height of land survey, does it really work? Are road monitors along that road, are the usually one of the first people to observe this along with Agnico environment[2] and KivIA's, that lands officer, Jamie Kataluk is fully aware. I don't want all this to be based on collared data. We want to make sure that height of land and human observations are taking as priority as well.

JT: I think on top of what Richard said, if we could test out potential for drones, that would be a good way to observe too.

GS: That would be a good question for this analysis when we see collars at 15-20 kilometres, how good a predictor are they that we are going to see caribou on the height of land survey in the next 1-2 days. How good a predictor are they of the height of land or do they just arrived and the height of land is the first time we get an indication they are arriving.

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[2] In 2023, Agnico Eagle's technician was the first one to observe caribou while conducting a routine road surveillance monitoring. The caribou were migrating to their calving ground on April 29th, 2023.

JT: We start talking with the environment crew at camp usually during May long weekend when the caribou are approaching along the Rankin area, just to be aware that they are there.

AG: Once you have done this analysis and you have this sightability, how it could be used to test the applicability of some of the thresholds. If a threshold is 5 caribou within 5 kilometres, what is the likelihood of you having being able to detect that threshold? Is that going to be the logical follow up to that question and therefore in that case does it have any feedback on how you would do the analyses?

GS: That's a good question. I don't entirely know the answer.

AG: You probably would scare me if you do know the answer, you are going to have to do the analyses and then we are going to have to see how it relates to the thresholds and the reliability of them. That's a key question. Once if we get into calving, it becomes a critical question, because the residency time is so much longer for calving. Answering this question is tricky and we should or could be expecting interim reports on the design. As we have an understanding of what you are doing while you are doing it so the outcome won't be a surprise.

GS: That seems straightforward. Trying to unpack that question of triggers, one of the questions would be how many caribou are in the area when it's still in Level 1 before a trigger gets triggered. And are there hundreds of caribou coming through in groups of two and three and then five and ten and then before it gets triggered or do we see all caribou and trigger it immediately.

AG: Depending how you do it, you would be creating isopleths so contour lines of sightability relative to density and dispersion that would then give you a very visual representation of what's happening. They would be presumably not absolute values. If you could do that, then it's very easy to show the group what the actual analyses look like.

GS: Isopleths of sightability from the collar data sort of what the models coming closer?

AG: No, the other data, the sightings by people.

GS: Ok.

AG: And there should be other ways of using the collar data that would fit in.

DCh: Daily, you could have morning exit plans, what's observed, afternoon, evening. I sense that you may need a few more observers than you have right now. There are times when there is nothing out there. Then there could be times where a wave is coming from more than one direction and maybe we are not getting a sense of what is being seen and missed.

AG: Essentially, it's occurrence data and there are fancy ways of looking at modelling spatial occurrence data, but I certainly know there is quite a bit being done on modelling that.

GS: They always come from the same direction basically from a north west, I could see if you drew a transect in that direction how many collars you could plot in time the approach of collars down that transect line and the occurrence of incidental observations along that line as well through time. That would be a visual way of doing it and then overlap that with the on-site observations.

AG: It's going to be interesting to see what you come up with.

DCh: Would it be like getting this sort of sightability index? You got to have consistent spot where you are going to be measuring regularly and comparing with other areas where they are also observed. That might be an interesting way of doing it.

SS: As a clarification, I would like to bring for everyone's benefit is that throughout the migration, the environment department has staff monitoring both site and daily AWAR conditionally with the local HTO and KivIA. There are eyes on the ground during the migration.

JT: During migration you want to limit how much traffic is on the road from the community.

DCh: I wonder if there is an app that would be on your phone possibly all the people involved are all entering the data.

JT: Sort of where you enter everything, the pictures and incorporates it and put in your site.

DCh: Make things more consistent instead of writing what you see down, driving, and I forgot. It's a way of doing it that everybody is consistent.

JT: That's a good idea.

SS: That's good insights. I will add a clarification that there are network issues on the road. We have been working with in the past years. In order for us to work within that contact, we developed a set of measures. Right now, we are working with tablets and we also have standardized observation sheets that we're using. And the information is communicated from the tablet to our database once we have access to the Internet.

DCh: Sure. That's great. I'm not thinking it would be active online but could be an offline app you collect at the end of the day download. And I seem to recall from talking to Nina she had the tablet with the data sheet there for the observations, the behaviour observations. That was fairly complicated. There were lots in there. I was thinking this would be more simplified to address this sightability and observational caribou approaching.

SS: That's a good suggestion and something we can work with local to develop.

DCh: Thank you.

AG: This year earlier there was more monitoring at the mine site and, of course, we haven't seen it yet. There were cameras, the behaviour studies, presumably more sightings. How will the data that we haven't seen yet in the annual report which is forthcoming, how will that help you with building this model?

GS: I guess you are thinking about the cameras mostly that were around the mine site?

AG: Yes.

GS: You could test the height of land how many caribou were in a certain distance by looking at the camera data, then. Since the cameras are on 24-7.

AG: I know they have a limited curtailed field of view but they still are a test that might be interesting.

DCh: Possibly where you see them in the past you'd have to exactly where it would be but generally where you generally see them there was cameras. In this case, we talked about before but a back-to-back or all 4 directions camera that you have something there that you have the complete circumference around those cameras of what can be detected. The ones that face south always get glare. But that's only on sunny days.

AG: What would be the timing of this analysis relative to the next draft of the TEMMP? It will relate to the material in the TEMMP, including thresholds. What will it be relative to the timing, will it be completed before the next pre-calving migration? How it will relate to planning for mitigation in the event of calving, so in other words like a rapid shutdown?

GS: I don't think this is analysis is very complex. Not super statistic, a better representation of existing data, time wise or distance wise. So that can be done quickly.

SS: Maybe we can get back to you with a more precise data? We can confirm it.

LM: It's nice to see new ground with this. It's going to take time before we get it. What I'm suggesting for the next coming issue, or the next approaching year is to have the TEMMP developed. Maybe the biologists need to get together alongside. Then, we can review. The important component is collared data. It's a map that can give you between a interval of 5 days. We can identify when caribou is approaching. Let's be more conservative in what we have. A 50 kilometres from the side that we map up in the office to start trigger monitoring. We can be more conservative, start reporting, and following the monitors in high lands at that point in time. It's more effective to try to make a new will. From now to the new migration, you only have 6 months to finish the TEMMP. We need to be prepared to trigger one faster. My suggestion is let's maximize the tools that we have today and perform better with those tools. It is use the same maps, be more conservative when monitoring starts within a interval of 3 days, 10 days before we usually do. Then, we can have more control when caribou are approaching in the area of interest. Once it's there, then you can start triggering the rest. Sometimes they move back. Or there are 3 groups inside of the study area, but it's not sufficient or not close enough to the site and they are around that. Within those barriers it's better to monitor ahead of the time and have a better control on when it's triggered. That way the efficiency what you have in the TEMMPs today would maximize and be better prepared. That's what was mentioned yesterday, a set of rules observed. Should we separate, there is more caribou than the year before, it's approaching faster or it's coming sooner. When it comes sooner, it pass faster. When it come late, the tendency is to graze around the area. Like Jeff said, it depends when they are approaching. The tools we have today is collars and high land surveys. We need to maximize those tools, human surveys and collars together. That has to be addressed before we usually do it to trigger the monitoring and time. Then, you go to the next set of rules, which is the TEMMP. They use all the time. It's very simple kind of operation.

GS: This would be rules before Level 1.

LM: Before Level 1. To me it is monitor. It doesn't have to be complicated.

DCh: I didn't want to complicate the measures by delaying having the app developed. I agree with you. We have to get ready for this coming spring.

LM: In the future, something sophisticated, grounds or anything. That's in the future. Right now, what we have. I don't see anything new that's going to be able to be use at the next migration. Let's focus and maximize what we have. More coordination with GN, more mapping, more often. That will solve the timing issues. We can map every day, then you minimize your timing in where you are going to trigger the set of TEMMP and the rules. That's the way I see it going forward. I don't have nothing complicated. I don't want sophisticated words. When you start seeing it, that's an important part. You can have this excel and look at the behaviour, it's a female, it's a male and all of that. That's an important data that can be used to then tell us all of this and use personal to demonstrate what actually happened. I see that, that's common. Let's focus on what we have, maximize the use of it, and if you need anything else, let's work and continue within 8 months from now, it's being realistic for what we have today and what can have next year with how you have an agreement in the plan, still have in draft. Let's finish the draft, sit down, tackle it. We have very good experience between the 3 of you or 4 of you, traditional knowledge as well. Let's do it. Let's get it done and be ready for the season. That's my comment.

GS: Sounds good.

AG: When you have done the analysis, rather than wait for the next TAG meeting, which is presumably going to be December or something, is there a way you can share a preliminary draft to be efficient when we get together we have a chance to see it and even to email questions through the group. Obviously share everything to have some online discussion before we actually get together and so that would make it efficient?

GS: Sure. We have to talk about timing I think.

SS: But we will share the material in advance and whether that's something that we'll be bringing to the TAG attention to is whether we want the next TAG to be a virtual meeting or an in-person meeting that we can decide on later today. We will be providing the material in advance.

AG: Right. Because it's to build on what Luis was saying to keep the momentum going is because we really haven't much time to get it into place in the anticipation that we will be dealing with calving.

(BRIEF ADJOURNMENT)

GS: To move on the question, which is from Victor's presentation yesterday about monitoring noise and the challenges in monitoring noise. Anne had some questions about the analysis or monitoring. It sounded like just what's the difference between Level 1 and Level 3. Is it as simple as that or was there more to it?

AG: That would be a starting point to show the relative difference. The problem is the sound recorders record sound, not what we hear. Then, what we hear and what caribou hear is going to be different again. It was very interesting and useful, but how are we going to monitor the reduction in sound between Level 1-3. There are possibly 2 ways of doing it: One is to simply work with some community members, some elders and see their perception of the relative difference. Then, you could use their model sound to come up with the relative difference. The only caveat I would add to that is that the Level 3 is also a reduction in visual sense of any movements that the caribou are very quick to see. It's not just the different sound it's also going to be how the sea can walls impact vision. That will depend on the exact sighting of your cameras and this year's monitoring data. Where are the cameras set up relative to even when they are not picking up caribou, do they pick up movements, how close are they to the sea can walls and where the sea can wall aren't, other cameras during Level 3 picking up movements of people or vehicles. It's a complicated answer to we need the change in the roads of level based on the modelling. We could use people as a surrogate to the difference of what they hear, and then we also should remember we are looking at visual stimuli and we could use the cameras for that.

GS: The camera study was looking at caribou. The cameras are facing out from the mine so looking for caribou rather than facing inwards to look at activity which would be a different question.

AG: Right. The TEMMP is considering future monitoring. Maybe it's a question of adding more cameras in order to be able to look at the Level 3 reduction and visual stimuli.

AG: It's a starting point.

DCh: Sure. That sounds good.

GS: You had a question about whether the sea can walls, like, noise versus sea can noise?

AG: I thought the sea can walls were just to reduce disturbance. I am assuming that they trap the sound. They stop some dissemination of noise. I am assuming they act as a visual shield although there are openings. Is that what you asked me?

GS: Yeah. I guess you were asking Victor whether his monitoring had picked up inside resistance or with and without the sea can walls.

AG: Right, because there were 2 things, there were the shutdown Level 3 in general for the site and then if he had any information on the effectiveness of the sea can walls, which is a trickier question.

JW: Is there a picture you put up with the noise abatement with the sea can walls? I don't remember seeing it anywhere. I am just curious what it looks like. It probably looks like a bunch of sea cans, but I just want to see it oriented. That's all.

SS: We have a picture of the sea can wall we can share. Some of them are in the previous presentation. I can show them to you.

JW: Sure. Thanks.

DCh: Greg, the discussion about the sea can walls was related to at Level 3 there was some activities that were allowed. One of them was moving tailings with front-end loaders and that was the main area where the sea can wall was going to be put into place. I do recall talking about the echo effect of steel against noise on the inside area, whether that may be even amplified noise, not necessarily shielded without unless there was some coverings over those sea cans to cushion the noise. I see a point of the fact that we need to measure what's on the inside versus immediately on the outside to have a baseline measure of what noise is when they are moving tailings around.

GS: Ok. The request there would be to measure inside versus outside to look at how effective the sea can wall is.

DCh: I would believe so, yes. Was there something I was missing, Anne?

AG: Just for point of clarification, what we are talking about is when we get back to the questions, they are not part of the TEMMP, per se. They are information that will be useful for the TEMMP.

SS: We are just sharing this PowerPoint that was shared in our main TAG meeting. It's just to provide an idea. You have a map of site, the temporary tailings storage pad and a sea can wall.

DCh: So that looks like an L-shaped wall. Does the wall face east or more south. Ok. I see.

GS: The purple things.

SS: Is it clearer or do we need more clarification?

DCh: I am wondering about the opening part of the sea can wall. Is it exposed to where caribou might be coming from or is it shielded by more infrastructure?

SS: It's shielded by more infrastructure. The sea can wall is oriented like this.

DCh: I got you.

GS: For context, there was the tailings storage area right behind it, which is a hill higher than any infrastructure on site. In terms of other aspects of noise, was there anything else or are we satisfied in terms of talking about noise and what we would like from Victor?

DCh: I noticed the number of spikes, what Victor called signal spikes, so ATV spikes and other times when it was a beeper backup. I just would like to have those documented. We see where they are in context to the rest of the overall noise. What those graphs showed was the average decibels over a day or week or a certain time period. I thought it would be good to get how many of signal spikes are occurring and at what time period. It would be another form of documentation. It seems that people and caribou notice them and would be nice to track that.

GS: Ok.

DCh: Thank you.

AG: There might be mine safety implications, but can you muffle or turn off the backup beepers?

SS: No. It's a regulation.

AG: Ok. That would be an effective mitigation from the caribou perspective.

DCh: Safety first.

DC: During Level 3, you wouldn't be hearing beepers.

AG: Well, there is one vehicle that operates under the light duties it was specified.

SS: Inside of the wall, yes.

AG: Inside the sea wall.

SS: Yes.

AG: There is a large opening in the sea wall. That's why we need a camera facing it to see how much movement there is back and forward. If you had elders or community people, where they are outside the sea can wall they hear the backup beacon. And there is one vehicle under the light duties permitted to operate.

DCh: Further to that, while a sea can, can be a visual disturbance shield, I wonder about the effectiveness of shielding noise, noise against steel and rebounds with the tailing mine there that quite possibly could be aggravating it. With covering of that sea wall it could muffle things.

AG: When we talked about it before, I thought Agnico Eagle acknowledged the echo effect and I thought they were proposing or used a material that attenuates the sound because it was discussed.

DCh: I remember talking with Matt about it, but I don't recall. I have to look back into the notes whether it was actually recorded. But that was one of the things we talked about.

AG: They were well aware of the echo effect.

SS: I will have to check the exact material. I remember us having the discussion. The study that we conducted was a part of a follow up to that discussion as well.

DCh: Ok.

AG: Ok.

GS: Anything else related to noise that we want to cover?

JW: I have a question about Table 2. Is their modelling results for decibels? There is no spectral information. It would be interesting to note the spectral composition of whole project operations versus project shut down. I don't know how that can be incorporated but it alluded to in these other figures. It's hard to flip between all the figures. (Refer to Technical Memorandum: "Meliadine Gold Mine – 2023 Caribou Migration Noise Monitoring" p.5)

GS: Whether there is a difference in the signature. There is always going to be the generators running making a noise. There would be the other vehicles driving around and trucks on site. When you are talking about having elders come to site and listen for noise, are you thinking that as part of the TEMMP development or part of a monitoring?

AG: I was assuming to be part of the TEMMP monitoring. It wouldn't be only 1 year because it might be windier. It should be done as regular or for 3 years to see what the feedback was.

RAk: Agnico has an elders advisory committee. How often do they come up to the mine site?

SS: I have to get back to you with an exact frequency. I don't believe there is a determined frequency that they might come to site for some ad hoc or some specific site visits, but we will get that information to you shortly. And the information related to that as well.

GS: Anything else on the TEMMP revision to bring up? One note is that we were trying to get the draft TEMMP out. The version that goes out probably won't include what we have talked about here. That would come in the next version. Once we have time to review and talk at the next TAG meeting.

AG: Just the last comment would be the cross linkage to the noise management plan. That's where some of the modelling came from or is related to. So, those cross linkages are clear and that there is no internal contradictions.

GS: Ok.

SAt: What is the objective of the TEMMP revision? Is Agnico looking for a TEMMP that is endorsed by the TAG or based on some consensus or are you just simply looking for input? I am curious as to what the role of the TAG is in this process.

SS: As stated in our terms of references, we want to work collaboratively with the TAG. Our end goal is to gather input and collaborate with TAG parties to get a TEMMP document that is satisfactory to the TAG.

SAt: Ok. In regarding calving, post-calving protections and having some added protocol, I agree with the discussion you had yesterday about a need to consider something. One thing that you might want to consider is having a different type of trigger. There are 2 things, there is a planned shutdown where you simply know that you are expecting the calving distribution to overlap the project. There should also be some rapid shutdown if it happens in a year you weren't expecting it. For that one, you might want to think about using some sort of trigger, like a density of caribou per rate and number of caribou calves per square kilometre. Something that would match the types of densities you would find on a calving ground or at least on the periphery of the calving ground that gives the indication we are seeing densities of caribou that correspond with the fringes of a calving ground so now would be a good time to shut things down before the overlap gets too bad.

AG: Just to reassure you, we did mention that we could use the 2022 aerial photographs to sample. It is not just density, but also dispersion, which is characteristically the animals, the cows spread themselves out at a relatively small spatial scale during actual calving. That's why dispersion is more important than density. But we did talk about that. KivIA has suggested thresholds which very different from the current thresholds in the TEMMP to take into account the sensitivity of cows with newborn calves.

SAt: That's fantastic.

GS: The 2022 data that you are referring to would be the latest Qamanirijuaq populated?

AG: My understanding is 2022 is the latest one.

JW: I reached out to Mitch. I haven't heard back on that. We will provide that.

AG: We keep trying. It must be getting closer. It probably has an analysis of calving distribution over time, which would be useful. We have been waiting to see the 2022 calving ground report. I suspect that Mitch will have done an analysis of the changes in calving distribution over time.

SAt: Right. I'm not sure if you will but I probably suspect you will have done, yes.

SS: To circle back on Richard's question on the Kivalliq elder site visit. There is a minimum of one visit per year for all members at site. Then there is one visits per year for the Kivalliq elderly's advisory group executives that's done in alternates between Meadowbank and Meliadine. One year will be Meliadine and next spring is for Meadowbank. On request, there are some punctual site visits as well.

DCh: We talked about the sea can wall that's been installed near the tailings and then using that sea can wall to shield noise while activities may be going on still even though it's under Level 3. Is there a way that we can determine if that wall, in its current state, without any kind of muffling on the walls, causes any kind of echo that gets amplified to the building and then out to the surrounding areas? What would you anticipate would be happening at that site?

VY: The way the barrier is would screen in the direction the wall is placed. You are correct there would be a small amount of echo that gets reflected back in the direction of the sources that are being screened. If we imagine the wall is on the west side of the [process] plant and the noise on the [process] plant that hits the wall would be partially reflected to the east would be a substantial reduction. It wouldn't be like doubling the noise from the [process] plant. That noise would be on fined to the local area. The risk of the wall amplifying the noise from the sources is quite small. There's been the use of barriers and screening walls to reduce noise propagation off site is a well-established procedure. I don't think there is much risk of that. It would be reflecting the noise back into the site and not out into the environment. It's very likely the wall is an effective noise shield and breaking up noise that it's providing screening towards. There was some talk yesterday about if we could quantify the difference with and without the wall. We had talked about how it would be very difficult in the far field. The intent of the wall is to shield noise. It doesn't make it out into the surrounding environment, caribou or other users of the land. It would be challenging to quantify the effect of the wall with measurements out at those locations. There is the possibility that you could do measurements in the near field to quantify the effect. You could put a microphone on the inside of the wall where the sources are laud and on the other side of the wall where the sources are now shielded and you could quantify the difference that way. People would have to understand what the limitations of that study would be. It would only be quantifying what effect the wall has basically on the emissions in the extreme near field. We couldn't without the use of a model which is contentious to TAG using models with this work but without using a model we couldn't quantify the far field because as I said yesterday the measurements are a challenge. As far as quantifying and evaluating the effectiveness in the wall in the near field in blocking noise in sources, that it's supposed to be blocking that's a study could be done. You could set up sound meters immediately inside the wall and one on the outside and show what kind of noise reduction you are getting on the wall. I don't know if that's an interest. That wouldn't be a commitment. We would have to talk to Agnico about that. That is a study that could be done to look at the wall. Just understand that it wouldn't give you a number in the far field environment unless you were to identify a model, a propagation model. It would show people that the wall is reducing the noise coming off these sources.

AG: Could you use the model to predict the degree of attenuation that the wall should have. Then, you could do what you suggested, put a microphone on either side of the wall and then test your prediction of the model?

VY: Yes. The model would be both near and far. You could put microphones on both in and out of the wall and compare that to what a model suggests a similar size and position wall would predict. Moreover, you could use the model to predict what that would mean in project noise levels in the far field. That's an exercise that could be done relatively easily. It would be a modelling exercise,

and it wouldn't really be possible to put a microphone a kilometre away and pick up on that small level of change. It's a modelling exercise that could be done.

AG: At the same time, you got the speakers out there, you could also have elders or community representatives to see what they hear.

SS: Something I can add, Anne, is we are fortunate to have some KivIA representative on site during the migration.

JT: Would it be easier to put padding on the sea can wall to muffle the noise more?

DCh: The wall may not amplify the sound but padding or cushioning should muffle the sound. That could be an experiment, measuring what it is now, both sides. Then put those on as another mitigating factor. Does that make sense of using padding to muffle the sound? It's likely has an effect on reducing noise.

VY: I don't think that's necessary, Dan. If the objective of the barrier wall was to reduce noise levels on site, then that would be something worth considering treatment to the outside of the sea can so it's absorbing noise instead of reflecting, generating some small echoes. But the sea can wall will be totally effective at blocking noise through it. Since the objective of building this wall is to block noise from getting out into the environment, I don't see a need or benefit to put a baffling or softer treatment on to the walls of this thing because that wouldn't affect how much noise is getting into the environment. That would potentially affect how the noise is in the near field in the inside of the wall so workers would be exposed. I don't think there is an environmental justification for treatment of the wall. The presence of the wall is likely to be sufficient and not be improved in terms of an environmental noise screen by treating it. My suggestion would be to help TAG feel comfortable with the environmental performance of the wall. Maybe do this study that we had discussed, with the microphones and potentially with on-site observers, logging qualitative descriptions of how they perceive the noise on the other side of the wall. Then, the model to show that we understand how the sound is propagating out of the [process] plant. Ground truth the model against these measurements and potentially show what effect the wall is having as far as noise levels as they propagate further out into the environment. That would be a study worth doing unless the concern is worker exposure. I don't see much value in pursuing some kind of acoustic treatment at this point. If the study shows there is some issues or something related to reflections maybe that could be considered. I wouldn't see the value in pursuing that from an environmental perspective.

DCh: These microphones on either side and observers outside could give a qualitative assessment of what they are hearing. The other area was about the measuring of the signal spikes that you had mentioned in your graphs. A backing up vehicle or ATVs that you had mentioned, those seem to all be picked up by people and we're quite sure it's likely the caribou hear these from great distances. Your graphs show the averages over a day or night. If we could track the actual signals where it's a very high one point in time a note that we have a better track on how that occurs throughout the day and night. Where I'm going with that is another way of tracking because we feel that could be maybe more of an issue than just the general noise in the background. It would be given us a better sense how often that happens and that sort of thing. Is that a problem to record?

VY: No. We were trying to make the memo manageable. There was a lot of days where the graphs that are in the presentation and in the memo, (we have 3 periods) where we were trying to show the way the wind speed is correlated with the noise level. We could produce a graph for every single day that was collected in the 2023 caribou migration. We have graphs like that with the noise level for every minute. The annual noise monitoring report as part of that Noise Abatement and Management Plan includes those graphs. If you have a look at the 2022 monitoring report, you will

see there is graphs for all the days that are logged, and that data does exist. We could produce graphs from this most recent round of caribou noise monitoring, like the 2023 migration data. When a study of the wall was to go ahead, we could provide all the data. It runs through a lot of graphs. The idea was not have a memo that was 50 pages long with a bunch of graphs. We certainly can generate graphs that show minute by minute the noise level and where there are spikes. We listen to the audio and we identify where they are, whether it's an ATV going by or whether it's birds or site noise. Once the AWAR open, trucks going back and forth. You can see the trucks in the data minute by minute as they go by. That analysis goes on behind the scenes when we are processing the data and if there is interest in providing graphs like the one that are used in that processing, that's something that could be quite easily done.

DCh: Thank you.

JT: I would like to mention the use of those sea cans and the movement of the ore from that area is on approval base during those times. There is someone [from KivIA] on site saying, ok, you could move the ore from that area. And that observation of the area. It's not ongoing.

DCh: Got you. Right.

LM: Just to add to this. Go back to the principle to catch it before so we don't have issues. We don't need more study. We need to concentrate on how we monitor the caribou approaching to avoid that. We do monitor the sites. We do agree with the proponent to put in the walls to know when there is some caribou, set the distance on site then we monitor that as well. The reason to use the sea can was because it has 2 layers. When the sound hit any kind of wall, it backs a little bit, it's encapsulated in the sea can. That's by the waves of the sound. It's no use unless caribou is on the site. All these issues that we excused, let's do this, can be mitigated by two of the provision can be where it is coming, shut down the period of time of the crossing, and then move ahead.

DCh: That's a clarification for me because you are using the precautionary principle. It's something that we haven't documented. We need to say that is being applied that way, where you are adapting on site, and under the current conditions help to mitigate.

LM: I do appreciate the behaviour data in terms of sensitivity to interpret the sound impacts. I do appreciate what you have on this data. The problem is draw it out as the way you see it. We need to do all the kind of tools to really approach in this. The better technique is use with what we have, maximize it, be more cautious in the time, make the time frame when you need to shut down or we need to reopen and make sure you are on site to do that. Because that's the solution that we find difficult in the timing component. When this is spring, the caribou move very quickly as opposed to other periods. By being inside and seeing physically how caribou will either adapt to the site or go around the site or stay in the site, then we collect what we wish to interpret the things. We just try to make sure it isn't impacting caribou and monitor that for actual rather than correction in the future because we could be missing that window by going ahead. You may not need to do all of these things as we approach it in the field on time and gather to collect when caribou is actually approaching. Thank you.

JW: I have a few questions. There is a sentence on page 8 of this that says during periods when speeds are high, noise from the project activities will be partially or totally masked by wind noise. What's the frequency band of wind? Is there a reference? (Refer to Technical Memorandum: "Meliadine Gold Mine – 2023 Caribou Migration Noise Monitoring" p.8)

VY: Wind intensity, broad band, there is strong frequency component. If you look at the difference between the graphs at Figure 5 and Figure 6 of the memo and compare those to how the graphs at Figure 7 and 8 of the memo look, you will see Figure 7 and 8 correspond to some higher wind

speed than Figures 5 and 6. They are still relatively low, less than 12 kilometres an hour. You can see there is more low frequency noise in the Figure 7 and 8. But it is also a broad band. The whole spectra get raised. And when you get up to high wind speeds, like up to 15 kilometres an hour, then you see this an increase in noise level across the board, across the frequency spectrum. It's got a broad band distribution. There is a lot of low frequency content, but it is a broad band kind of a noise source. If you compare just Figure 5 and Figure 7, there is the energy in the 2 and 3 kilohertz, 2 and 3,000 hertz which is mostly about bird noise, but the rest of the increased background noise from the very low frequency to about 1 or 2 kilohertz is primarily the results of the wind speed being higher at those two times.

JW: Thanks. When you say something is totally masked it depends on the receiver's location, whether it's up wind or downwind from the noise source?

VY: Yes. It is going to affect how the noise propagate. The sound would be relevant to how loud the project is. Let's imagine the caribou is standing downwind from the project, that caribou will get more noise from the project than a caribou that's standing upwind from the project. But the degree by which the local wind speed masks the noise is not sensitive to the direction because that masking background is only tied to the level of the magnitude of the speed and how that wind is interacting with the features in the very local environment. If we imagine a caribou in an environment where the wind speed is 20 km/hr, if we ignore the project, the background noise is going to be the same whether that caribou is downwind or up wind from the project. What's going to change is the project contribution. The project contribution would be bigger for the caribou that's downwind. The point we make is once the noise gets to a certain level 15 or 17 km/hr, the noise from that project no matter where that animal is standing relative to that project is drowned out to the noise itself. Although it gets a bigger dose, that dose would still be too small to be audible above the background noise once the wind gets to a certain level. I agree it depends what level that is would depend on the caribou sensitivity and the even the sort of acuity of the individual animal. Because what that Perra paper showed is quite a spread between different animals. Some animals are going to much more sensitive than others. There will come a point once the wind gets up above 15 or 17 km/hr, it's going to be so loud that almost no matter where the caribou is standing the noise is going to dominate that audio environment and going to be challenging. It would be hard for the caribou to hear the project. When the caribou is close, it might still be loud enough especially in a Level 2 scenario where there is mobile equipment and backup beepers. But the measurements that we have of the sites during the Level 3 shut down when the backup beepers are basically absent suggest that even if that Site 1 when the wind speed is low there is nothing for the caribou to hear in the project. The wind direction affects how the noise propagates. We know that from western science. We also understand that's IQ or traditional knowledge as well that the environmental conditions, there was a discussion yesterday about foggy or cloudy conditions would result in a temperature inversion where you have different levels/layers of hot and cold air in the environment that can change the way the noise propagates and lead to different propagation. When the wind is high enough, the noise from the wind generates locally at the location where the receiver is going to become very loud and hard for them to hear anything more distant above that background noise.

JW: Thanks for explaining that. Can you clarify Figures 5 through 10 is that Level 3 scenarios?

VY: No. Some of them are Level 2. If that wasn't circulated, we can provide that. I will say it verbally now and if there is communication we can send around to the group. It would accompany the audio data because there is an audio file that links to each one of those graphs.

SS: For everyone's benefit that cross rev the document is on the OneDrive.

JW: Ok.

VY: Maybe I won't bother. It's basically during Level 2 and 3 during those measurements and if there are clarification questions needed about that, then please let me know and we can provide more detail on that. There is a file that links those up so you can see and there is also a link with the audio clip so you can listen to what the sound is like at the same time. Because I agree there is a qualitative element to this. There is an expectation we run into in environmental monitoring is that the level goes up with the wind and it becomes very hard to discern anything else. But there absolutely is an audio qualitative signal component of this which I was talking about there yesterday. I would encourage people to listen for themselves. You can hear what it sounds like at these sites at these times and you can form your own opinion or whatever about the quality of the audio and what it sounds like. Because your brain is doing a ton of signal processing that's not possible in a sound level meter.

JW: Thanks, Victor. I think it would be cool to see basically Figure 10 under like Level 1 conditions. But those are all my questions. Thanks for answering them.

GS: Just to clarify before Victor carries on, the project activity at Level 1 and Level 2 is the same. So the only difference when you go from Level 1 to Level 2 is the on-site monitoring that happens.

JW: Ok. Then never mind.

GS: Level 1 and 2 should have the same activity levels and it's Level 3 where it steps down.

JW: You can basically pull those two.

GS: Exactly. So pull 1 and 2.

JW: Yeah. That's all. Thanks.

GS: Ok. We have addressed sort of questions 1 and 2 sort of gone through and sort of unpacked both of those. The third one was really being addressed by the Commitment 38 analysis which we have a presentation for planned this afternoon.

AG: We are going to discuss Commitment 38. As I understood one of the findings was that the analyses could not discriminate between any impacts of the mine or caribou responses to the mine versus the road.

DC: It was treated all as the same thing?

AG: Right. In that case I can't see how Commitment 38, the current version of the report contributes to that answering that question.

DC: Yes. I would agree. Other than to say that during Level 3, you are on the AWAR versus Level 3 on a mine site, right, that's no activity.

AG: No. It's light activities and it's an assumption that the caribou responses are reduced or mitigated. There is no specific evidence or data that supports or doesn't support it. The most monitoring, the cameras until this year and we haven't seen those results but the behaviour monitoring and the cameras were mostly focused on the road and not on the actual mine site. There are counts of caribou from the mine site but in the annual reports to date, they don't really provide that information. I don't think at this stage nothing having seen this year's annual report that we really know how the caribou respond during Level 3 and the mine site.

DC: Yes. I don't think you can discriminate between the mine site and the AWAR. I don't think it's possible.

AG: I suspect with the change, the cameras have been moved or there is more cameras at the mine site and you did behavioral monitoring at distances from the mine site. And those are the data that

should give you feedback on how the caribou are responding. This year, the data exists. Until we see your reports we can't say anything.

GS: The Commitment 38 analysis included the mine, the footprint of development was the AWAR and the mine that was tested.

DC: That's correct.

GS: It does test executives of the mine. It just doesn't test AWAR and the mine separately.

DC: That's right.

MB: Can I provide a clarification. Just another way to think about it would be spatially it's difficult to tease apart the effects of the mine and road. The only thing we have is temporally and that's through the shut downs or through the different levels. It's more as spatial versus temporal.

AG: Thanks, Meghan. I can see that spatially. But temporally there would be differences between when we were at Level 3 for the mine site and the road was closed, they wouldn't always overlap, would they? There would be times when the mine site was at Level 3 and the road was open and vice versa or were they always closed simultaneously?

MB: That is something I noticed when I went through the closure records. I would take the collar data and, based on whether there was a closure in place, there is many different combinations of closure that can happen. It can be aspects of the mine shut down or just parts of the mine. It could be the whole road, it would be everything. And you are familiar with the sample size limitations that we had. Any closure was treated as a closure. But if we were in the future to continue monitoring with collars on caribou, maybe there would be a way to tease apart those different types of closures and then you'd attribute them to the collar data and analyze them in that sense. We are limited by sample size of collars occurring within the appropriate distance during those temporal periods of various closure types.

AG: Yes. Ok.

DC: To add on to that, further taking those sample sizes and further divide them up is going to result in further small sample sizes.

AG: Yes.

DC: Ok.

AG: Have we closed off, do caribou respond to the mine during Level 3? Is there anyone else to add to that. My suggestion is that we can't answer that question with the data that we have, the TAG has available to us but when we see the annual report for this year, we may be able to answer that question. Does that sound reasonable to you?

GS: To explore the behaviour data you are thinking a bit more.

AG: And the camera data.

DCh: That was the genesis of asking to have some cameras assigned then have more observational data related to the mine. We would probably need to see that at least this year before we can address Question 3. Then, it would be more specific to the mine versus the road.

GS: To explore whether the behaviour response is different at the mine compared to the road or control sites. By control sites, I mean the road is closed and animals are further away on the road.

DCh: Where the cameras are near the mine, are the behaviour observations also occurring there?

GS: They are not at the same locations. The behaviour observations are going to be more ad hoc. When you see a group and get as close as you can to them and start the observations.

DCh: But within the main mine building footprint versus the separate ones on the road?

GS: Yes, we try to add as many behaviour monitoring sites or behaviour monitoring instances at the mine as possible. I'd have to check on how successful, how many points we have.

DCh: Ok.

GS: We do have a few scattered through the years of monitoring. They just don't add up to a lot so far. The initial questions are more related to the road.

DCh: Yes.

SAt: In terms of answering this question, you are thinking of looking at collaring data, behavioral monitoring, behavioral observation data, and camera data; is that correct?

GS: Well, when we were putting together the questions yesterday or when we were talking about questions yesterday, I was thinking about the Commitment 38 as answering that question. It sounds like Anne and Dan had wanted to include the behaviour and camera data as well.

SAt: Ok. It's worthwhile looking at the behavioral observation and camera data. But you are observing the reaction to caribou at a local scale and you may be seeing a biased sample of caribou. Those more tolerant of disturbance and therefore approach the mine at a closer range. I will keep that in mind when interpreting the response of those individuals. Once of the best overall picture of how these animals is responding is probably using the collaring data, if it can be done. As far as the Commitment 38, we have had a lot of discussions at the recent hearing, various concerns with the analysis. I am interested in talking about that further after lunch or when the next point on the agenda for sure. But the other thing is that in terms of evidence, even from a purely qualitative perspective, we still do have evidence that at least it may be arguable but there is evidence of caribou are reducing their use of the narrows water crossing, even if you look at just the spaghetti maps of caribou collar data. The recent year maps, you can see there is a donut around the project. And I know we haven't detected that in any analysis yet. But it certainly seems to be that there is some growing evidence of there being a zone of influence around the project. And we have to keep that in mind, those sources of evidence. If the collar caribou continue to reduce or not use the narrow, it's going to be fairly compelling evidence that even despite the 5 kilometres Level 3 shut downs that caribou have changed their use of the study area.

GS: Ok. Were there specific things that you wanted to see included in the TEMMP, Stephen, when you are bringing up sort of the spaghetti maps?

SAt: No. I Most of what I am interested in is potentially resolved in the Commitment 38, the resolution of that particular commitment. That's where my primary interest lies.

GS: Ok.

AG: Just to clarify, the way the current version of Commitment 38, we don't think will clarify or answer that question. But the collars could be useful. It's going to take a separate analysis from how Commitment 38 was done, which included the collar's response to AWAR. If you did a separate analysis for the collars that are exposed to the mine site, which is a subset sample size but I also think you could incorporate the collar pathways for 2021 when you had realtime trail mapping. You could build a special model that would integrate those two data sets. They would give you a better sense of movements in the immediate vicinity of the mine site, immediate vicinity being 5 kilometres. To reiterate, Commitment 38, the current version, I don't see how is contributing to how caribou

respond to the mine site. I do think the collars would be used along with the existing data that AEM has collected that would give a sense of how caribou have responded to the mine site.

DC: Just to back up a little bit to Stephen's question, the Commitment 38 included the zone influence analysis and sample sizes weren't limiting. They were over I think 100 individual caribou years that were considered in those. We did complete a zone influence analysis which was part of the Commitment 38, which we didn't detect a measurable zone of influence, and the sample sizes associated with that analysis were over 100 caribou years.

SAt: Right. But we have already identified again previously that there were quite a number of us have concerns with the analysis itself and therefore at this point in time I don't feel that that Commitment 38's been resolved. That was the general consensus amongst Kivalliq Inuit Association and some of the other TAG members. If we are planning to have a discussion about how to move forward and resolve that commitment today with modifications to the existing analysis or something else, then that's great. That's where we need to be going. If you are looking to basically cite that report that you did as in a revised TEMMP, I feel that that's a big mistake. I wouldn't be supportive of that. Because, again, we have identified some big concerns with the analysis. At this point in time, I don't think we have evidence either way of what's going on.

MB: I think Dan was referring to the zone of influence analyses conducted for Commitment 38, which based on the comments we have received over the past six months or so, most of the comments were related to sample size issues for some of the more specific analyses that targeted deflection paralleling crossing within that 5 kilometre buffer. The zone of influence analyses, may not have been a focus on a lot of the discussion, but we did have some adequate samples. That was the analysis where we looked at that buffer that came out at kilometre by kilometre basis up till 10 kilometres of the mine. And looked at the differences in movement behaviours and habitat selections of behaviours at those different increments and didn't find any sort of influence.

SAt: Yes. But this comes back to the concern I expressed back in June when we were in Rankin, which is you took the collar data for a period that essentially spanned post-calving earlier in late summer. The caribou are behaving differently across those seasons, especially in the summer when we see these large directional column migratory movements versus during the post-calving where the movements are less directional. When it comes to migrating animals, the zone of influence approach is probably not the best one because you have animals attempting to migrate across the road and there is some form of obstruction, some form of disturbance that causes them to accumulate on one side of the road, while they are attempting to cross it, what you end up with is more animals closer to the road and fewer lower densities further from the road. It's going to give you completely the wrong impression what a zone of influence is as opposed to animals simply not undergoing directional movements but are distributing themselves solely on the position relative to the road at a time of year they are not trying to migrate.

MB: Ok. What we are talking about is on the next piece of the agenda. Instead of me directly answering you, I will just leave it there because this is the topic of what we will be getting into.

GS: There has been some exciting updates to exit Commitment 38. There has been some additional work done which is exciting.

AG: Can I just clarify that there's been reanalyses done within the heading of Commitment 38. Is that correct?

DC: What's been done is during the presentation of the Commitment 38 at the TAG meeting that Stephen was referring to, there were a number of items that were identified. We took the transcript

from there to get all of the different issues that were identified and we have done subsequent analyses to address those comments.

AG: So we are now on version 2.

DC: We are on to an addendum of the original report. These are analyses based on the comments only from the TAG meeting.

AG: We will see them during the presentation, my usual thing is it would have been nice to have had a copy ahead of time because it's difficult to react to complex statistical analyses immediately. It's a shame we didn't know this. Just a point.

SS: Thank you for that comment, Anne. We will take note of it for future meetings. We had shared the topic on the agenda but we will make sure to send the proper documentation in advance.

AG: Sure. That's appreciated.

SAt: I just want to echo Anne's comment. I'm happy to hear you guys done more work. Fantastic. I look forward to seeing it. But in terms of moving forward, it would be great for us to have an opportunity to see a documented form of it so we can review it in a bit more detail and then perhaps if there are any comments of substance, we can pass those along to you before something gets set into stone.

SS: That's noted, and thank you for that comment, Stephen.

3. C38 Addendum

Supplemental Material: ppt file titled: "C38 Addendum Draft TAG Presentation 20231018", Technical Memorandum: "Commitment 38 Analyses: Addendum"

Presenter: Meghan Beale

RM: Thank you. Are these all just telemetry viewings, or are they actual on the road viewing, like staff or KIA staff or whoever saw on the road, HTO? Is that just telemetry data?

MB: Yes. It's telemetry data. Only data from the collars were considered here and not ground-based observations.

RM: I think the telemetry data is great. However, seeing it first hand on the road as it's happening while it's happening, why they're turning like that or deflecting, I think seeing it first hand needs to be used instead of just telemetry data because there is so many variables what could be out there. Could be in a sheltered spot where there are more bugs or a windier spot where there is less bugs or there could be siksik scaring them or moving them. There are too many variables.

MB: Thank you for that. When we apply these models, you are correct. It's our best estimate at trying to account for some of these spatial temporal variables like you said insects or could be a pocket where there is no wind so there are more insects or vice versa. If there is a way to reconcile the ground base observations in more of a qualitative way and bring those two pieces of information together with these model based results, that might be how to proceed with it. I don't think the model is maybe the answer to everything. Also, having the modelling information might also help to provide some information that the ground base observations may not have, which is sort of from a broader scale what's happening maybe further away. That is something we are trying to work towards is just bringing all these pieces of information together and try to understand what is happening.

AG: Thanks, Meghan. That was very interesting and useful. Before we get into sort of the specifics of your reanalysis, just for the sake of clarity on the record, I just want to make sure that we have the chronology of this correct. In June TAG looked at a PowerPoint presentation that was a summary. And there were comments raised during that, neither Kim Poole or myself as technical were present but there were comments from GN and the Dene that were incorporated in the report Commitment 38. At some stage subsequent to that TAG meeting, GN provided written comments.

DC: Yes. Anne indicated that the GN provided written comments. I don't think we ever got comments.

AG: Said GN committed to providing written comments.

SAt: We didn't provide written comments. I think one of the things after the June meeting was I wasn't clear as to whether or not the analysis as it was then was going to be put forward in a final report or whether there was going to be an opportunity to consider some of the issues that we had raised. I was expecting we were going to see a draft report to do a detailed review of it. The only thing we had to go on to make comments was the PowerPoint presentation so didn't have a lot to go on. It was the first time we had seen the analysis. What you got in June was impressions.

AG: The addendum was written in response to the comments based on the power presentation in June?

DC: That's correct.

AG: When during the hearing we had a side bar discussion with GN, the Dene, and yourselves, and there was no mention of the addendum at that time.

DC: That's correct.

AG: The addendum is dated 18th of August. Does that strike you as odd? It would have been useful information when we had the side bar discussion to know that you had already done reanalyses that were in response to some of the comments. There is still our outstanding comments from KivIA. The addendum today is a surprise to us. Even though it was dated back in 18th of August. I just find it surprising that you didn't send it earlier and that we weren't aware of it during the hearings when we discussed Commitment 38. So I guess that leads to two things: One is that can TAG have the opportunity to review Commitment 38 because in June TAG only had the presentation summary, which was very well done but it's not the same as the full report, and can TAG review, have time to review the addendum and so that TAG can provide feedback as a recommendation both on the addendum and the original Commitment 38?

SS: The proposal would be to have a review process of the two documents or amended the addendum?

AG: Right. Because TAG did contribute to the design and we appreciate that and that you followed up on some of it, not all of it. The TAG did see the PowerPoint presentation but TAG hasn't seen Commitment 38 in its entirety and it certainly hasn't seen the addendum. When we had the side bar discussion, there was a clearer indication certainly from Kivalliq Inuit Association that our preference was to see revisions to Commitment 38. At the time, the compromise from AEM was to call it version 1. We had some specific suggestions. I'm sure you remember, about the discussion and about the strength of the conclusions that could be drawn. We did have this discussion in good faith to try and get a sense of moving forward. Dan, Stephen, I mean you were at the side bar discussion. Do you have anything to add and about today seeing the addendum?

DC: What I can say is that you communicated some concerns at the side bar discussion in Rankin Inlet, but we haven't received any of the written comments that relate to those. We have no context until we get those, I don't know how we just carry on.

AG: Right. We didn't send them because we didn't realize it was the addendum. We didn't have a sense of what the pathway forward was. All you told us was that you would put a different type of page on the report and we told you that we were willing to share the comments. We would have a round table discussion at this TAG meeting and then we would see whatever else was thinking and sharing your comments. At the time, you were quite clear that although we had detailed technical comments with outside help that the indication was that you were not thinking of modifying the analysis even though in fact you had already done it through the addendum.

DC: We had done analyses based on the feedback we got at the TAG meeting.

DCh: But nobody knew that.

DC: That's right.

DCh: Nobody knew that you did that. We went through the whole hearing that you had done that.

SAt: I'm confused on two points that have just been raised. If you knew that you had done these at the time of the hearing, why weren't you telling us? If we are to trust each other, we have to be able to share this stuff. That's the first question. The second question is, I think had it been obvious or made known that there was an opportunity to provide written comments on the original Commitment 38 report that I think I'm quite certain Kivalliq Inuit Association I suspect GN would have done as well. There is a real kind of break down in communications going on here. As much as I appreciate what has been done and it is interesting the stuff was just presented for sure. It absolutely is. I don't have any kind of detailed questions on it because we have just seen a PowerPoint presentation. It is interesting to say the least. What I was expecting there would be a discussion on a way forward to basically figure out how to resolve this. I was surprised there had been a round of analysis done.

AG: Following on that, we obviously need to move forward. What Meghan had to say was interesting. And I haven't had time to read this. It is a complex analysis. It's probably not a good idea to simply react to it. We should, met the path forward with a commitment that we will send our technical comments to everyone and we have got the addendum to review and that the TAG will be reviewing Commitment 38 the full report because they haven't done that yet, and they will have access obviously to Kivalliq Inuit's comments and whether GN will be providing or Dene will be providing any written comments and the addendum and those three documents for certain and possibly GN or Dene comments that we will review them and come back at the next TAG meeting to have a round table and that that stage TAG can provide a recommendation to AEM or could be a series of recommendations about the pathway forward.

DCh: It's the details of the analysis, some of the areas that just to know how they arrived at. This is a summary. We are still thinking that the data analysis was what we wanted to see how it was done. I would just like to reinforce that to be an interesting part to find out about and then moving forward, it's great to see that there has been some analysis done. I wasn't under the impression that anything had been done based on what I heard at the hearing. We would still like to continue to collaborate, be a part of, and look at some of the analysis and help to see if it corroborates what we're thinking has been done. The devil is in the details and that's what we probably would like to see. Thank you.

SS: We appreciate the comment, and we appreciate that this is a new material for all. We are interested and open to take advantage that Meghan is online with us here today if we have any

immediate questions or comments with regards to the content and also open to receiving recent feedback within the next few weeks.

AG: Before I get into technical detail, I wonder if Stephen has any comments from the general pathway forward, because Dan and I have already mentioned it, whether you have anything Stephen or Jessica for GN.

SAt: The way forward is my view simple, is that the members of the TAG who wish to do so, do a review of the original Commitment 38 report as was submitted to NIRB plus there is an addendum document that be reviewed and that's an opportunity then to submit comments to you prior to any further submissions to NIRB. This is where I get nervous is that my concern is that you are going to submit this addendum document to NIRB and it will be insinuated that TAG has reviewed it which is what happened last time with the Commitment 38 report which quite frankly none of us reviewed. We were presented with it as a PowerPoint. If we can really try to follow an agreeable set of steps, we can avoid all this mess we have gotten into. I would appreciate if it was an opportunity to review both those documents and of course if Anne is willing to share the technical review, that would certainly be useful. We all have our limitations to review these types of documents, and I know Meghan has special expertise on board to help her do this.

AG: Stephen, will you be providing any written comments? Or GN, I guess?

SAt: It is up to the GN to if they want to submit comments. If they do, I will be asked to provide some. I would certainly appreciate an opportunity to provide comments. Yes. For sure.

AG: It's a more technical comment for Meghan. Looking at some of those movements, it was slide 6 with the speed and directionality, I don't think there was really migratory movements in the sense that migration has a destination. Do you think they are characteristic of movements, the increase in the directionality and the increase in speed would be the response to mosquito harassment and had you talked of doing a simple correlation with the days when the mosquito index was high? You'd have to do it on an annual basis off when you saw an increase of directionality and an increase in speed. How much annual variation is there in the increase in directionality and speed that relates or would correlate with the annual variation in the mosquito index? (Refer to ppt file titled: "C38 Addendum Draft TAG Presentation 20231018" slide 6)

JT: Just to add to Anne's comments those are accurate. Raymond's comments there is others incorporated. There could be harvesting done in the vicinity which could also again, wildlife moving, weather conditions.

AG: Because there is information elsewhere that shows under the conditions when the mosquitoes are bad when harassment is severe, the trade-off that caribou make is they will cross a road. They don't worry so much about disturbance in their anxiety to get away from the mosquitoes. I'm wondering if the first step would be to look at the change in directionality and speed relative to the mosquito index and what that means about the probability of deflection or paralleling or crossing the road.

MB: A couple things that I will say. I think that's solid. I want to clarify that these images here and the selection of cutoff date was purely to inform what a reasonable time period would be for these addendum analyses. I think that's slightly separate from your questions and comments related to insect harassment. I hear that we need to make sure that we are considering insect harassment and how that has an impact on speed and directionality in our analyses. My interpretation is we need to consider insect harassment as a variable, which we do have that in the base habitat model.

AG: No. You are correct. I knew there was a covariant. Because you include the overall habitat model, should have tried a simpler model to see if there was a relationship with the insect with the mosquito harassment or whether its signal is overwhelmed by all the other covariants.

MB: The way I interpret this is a request for additional models in the candidate set to cover insect harassment on its own because it could be a very important predictor of speed and directionality in the absence of any other variables.

AG: Yes.

MB: We did not include insect harassment, in its own model as a function or the interaction between insect harassment and deflection were paralleling in their own model. The process that we took for the Commitment 38 was to come up with a list of variables including insect harassment. I call them habitat variables, but they mean variables related not necessarily to the specific questions of influence of mine and AWAR. They are related because if we have low wind speeds and therefor high insect harassment, the caribou may be much more focused on moving directionally and at a higher speed and make incidentally interact or cross the AWAR if they are focused on avoiding insects. It's all very interrelated is what I am hearing. I can't comment as to whether what the next steps will be if we will adjust anything and keep tweaking Commitment 38. I don't know what our next steps are and that will depend greatly on what we decide today and the comments that we receive back. I am hearing that there would be interest in trying to tease apart the influence of insect harassment on speed and directionality and account for that in the overall picture.

AG: Yes. There is interest in the impact of mosquitoes because everyone who is out there with the caribou and mosquitoes, the mosquito harassment is a big driver of the caribou behaviour and their movements. I'm not sure where we are going with subsequent analyses, but looking at the impact of the mosquitoes would be a key thing to do. I think part of the trouble we are running into is how the base habitat model is used and whether there would be analyses that would reduce that so the dilution effect. The base model doesn't have to be included but it would take reruns of data and of the models and I guess maybe that will be result of the next TAG meeting.

MB: I am going to comment on that with the base model inclusion and something to think about. If we were to estimate models with no sort of those base model habitat covariant, the things we know impact caribou from observations, from traditional knowledge, land knowledge, your work and things that we know like insect harassment. If we were to not include things like that in our model and how could we say for certain that a response to mine or AWAR or something we are testing, how would we know for sure if that response was related to the mine or AWAR or if we were to apply a second model that included something like lakes the proportion of lakes in the area and find out that model selection suggests that the placement of water on the land is actually a bigger driver of how caribou move through the landscape and select habitat and like if the introduction of another model that does better than just the model with the mine and AWAR. My concern is that if we don't include the variables that we know influence caribou, how can we be certain that our results are truly representing what influence caribou on the landscape. The whole goal of doing these models is to understand the different aspects of what are influencing habitat selection and movement. If we are not considering things that we know influence habitat selection and movement, which is the purpose of including a base habitat model, how can we be sure that those results are the right thing to use. Dan, you want to elaborate. I have a bit of a problem with not including variables that we know influence caribou if we are trying to figure out what influence caribou movement in habitat selection.

AG: We could spend a lot of time going through this. With respect to the audience, you rather we sent you, Meghan, our technical comments. You can see where we are coming from. Then, we

could have, a side bar discussion on them. We are not saying don't use habitat. Is more a question of how it's used in these particular model runs. We will send everyone technical comments and then we can get some feedback from you on your responses to them relative to the analysis you have done. That will put us in a position at the next TAG meeting to be able to move forward. Does that sound like a plan?

MB: I would appreciate the comment in writing. Something to come up with clear and concise and everyone can understand where I'm coming from.

AG: Sure. That's exactly how we feel suddenly getting your report in this meeting. I guess we both know what we are talking about and we will commit to send you the comments.

MB: Sounds great. Thanks.

SAt: Not withstanding again I'm still digesting today's work, and that's very interesting. A initial comments or questions. When you were looking at the deflection of parallel models you were finding that, I forget which ones were coming out but some of the distance to mining All Weather Access Road (AWAR) were coming out in a manner that would be consistent with hypothesis we put forward you were seeing tendencies for animals to deflect as they approach and also to exhibit paralleling behaviour, albeit there was fairly wide confidence for some of those. You had mentioned that part of the reason for that it would be sample size related, another portion of it will be individual variation. One of the reasons of underlying this type of analysis is to compare what's actually happening to predictions or thresholds and one of those thresholds being TEMMPs and deflection. Let's say you do have even 20 percent deflection and the other 80 percent are not deflecting, you would naturally expect a very wide rate or very wide confidence when modelling that behaviour. We need to find a way of commenting on, there is sufficient evidence here that at least 10 percent of animals would be showing deflection as it approaches the mine on the road. That's question Number 1.

MB: So my targeted answer is what I want to dig into and I can't say right now, like this is a percent or we are here or there. We have to remember the way that the data fall into this or get used in it is analysis is steps. We have got a bunch of steps that come from an individual in one year, a bunch of steps that come from another individual, could be the same individual in a different year. I would want to first dig into number. I didn't report the sample size here but the number of steps that went into these estimates. Just from recollecting what we did for Commitment 38 there is only a handful of individuals anyways that are being used in these models. It would depend can we fit individual models because what you have to do is you have to fit individual models and have a little box, does this individual exhibit deflection tendencies or not or we don't know because the confidence is too wide and each individual would fall into those categories. The key thing is if we don't have enough steps for each individual, I can't force the model to just to come up with an estimate if we don't have the steps for the individuals to begin with. That's my answer in a perfect world how I would tackle this and answer it for you. I just don't know if we even have the capability to do that because we had to pool the data to even get these answers.

SAt: Is this something you are willing to look into?

MB: I won't commit per se however if it's possible that this could be something that's added in writing as an official comment because we are seeking official comments like this. That would be the best way to get it in and then I will we will talk amongst ourselves and figure out what our plan is for the next meeting. That's how I would tackle it.

SAt: Great. Most people can see from animations that those are some responses of behaviour going on here. The question is how many have typically been affected and that's relative to predictions. That would be one thing. The second thing is in looking at way the analysis has been

done as the structure and how it is derived. I'm wondering if it was a wise thing to use a combined mine and road covariant because I think that there is probably a fairly substantial difference in how caribou respond to the mine versus the road, for example. In two ways: I would predict they would have a much stronger response to the mine in terms of deflection and perhaps some other parameters like maybe not so much parallel but angle, movement angles simply because the mine itself is almost an impassable object. It would be hard for one of us to get across it let alone caribou scared of trucks. It's a more substantive barrier and it's not a living feature either. When it comes to paralleling the mine or trying to get across, it's very different from a road. The road itself also has many other variables or more potential factors as was discussed including the presence of hunters and so on. Perhaps the noise in the models might be resolved by having separate or even just literally trying to focus on the approach across the road. There is desire to do in one go. Having that combined distance to mine and AWAR now is probably introducing some noise.

MB: Yes. We looked at distance to mine as its own variable, distance to AWAR as its own variable and a distance to Rankin Inlet at that point that was something that had been mentioned. I have been in these analyses in the last months. We can't include highly correlated variables in a model because the model doesn't come up with trustworthy results. We can't trust the results of a model when there is highly correlated variables and mine and AWAR, if you think about where they are in terms of space are highly correlated or at least they were at the spatial scale of the Commitment 38 study area. What I would examine would be whether or not we can even include them in the same model because we could examine the correlation at the 5 kilometre scale. There is some correlation and I want to provide that warning that it's a low chance that they are not going to be correlated. They are likely to be correlated to a point it may limit our ability to include them. At that point we would want to simply include one or the other.

SAt: Correct.

MB: I hate always using the sample size or the model limitation problems. But I do have to function within the constraints of the model or the results won't mean anything.

DC: To Meghan's response, including if they are correlated, if distance to AWAR, distance to Rankin Inlet, in Commitment 38 all were correlated and distance to mine. If you include distance to mine, if those are correlated, it doesn't change how you interpret it because still saying the effect you are detecting or distance to mine is the same effect that you would detect from distance to AWAR. They are interchangeable.

SAt: Right. I understand. When you have this, I would suggest if there isn't such a correlation that the analysis then be focused on one or the other in terms of you are actually only using data of animals that approach, cross, and depart, say, the road.

MB: The permeability of the mine is different than the road. If a human can't walk across the mine.

SAt: They are not objects in any way, shape, or form. Some of the noise in the models is the result of that we are studying the responses of that space in two very different human entities

MB: The only other thing I worry about is yes, we could constrain our analyses to only look at the crossing of the road, for example, but then again that constraints are sample size even further so just be limited in our abilities to come up with any answer.

SAt: I understand. I am not saying it because I want to push to ridiculously small. If the sample size is too small, it's too small. In an ideal world if the data were there, I would argue that you separate the data into animals that specifically interact with the road versus those that interact with the mine

would be reasonable based on hypothesis they are different structures and animals are likely to respond very different to it.

RM: I agree with Stephen, the AWAR and the location, it should maybe be different research. The AWAR is not a cross, not alongside parallel to Meliadine Lake where the camp, it all depends on ice conditions, weather and the insects. It's might have to start looking at doing two different analyses, one for the mine site and one for the AWAR. We need to come up, observe, and see it, spend the day on the AWAR watching what the caribou are doing and been sort of caught on the road waiting for caribou to cross for 5, 6 hours and it's different. It's definitely different than the telemetry data. Everybody here in this meeting knows roughly when the caribou are coming. There is that time of year there is usually enough hotel space or camp space for people to stay and see what's happening on the road. Thank you.

MB: Thank you. I only wish that I could say that I have experienced observing the migration and something I hope to do.

SS: Thank you for that, Raymond and Meghan.

AG: Meghan, I really appreciate your efforts. It is a complex analysis, and we are limited by the number of caribou years. Now we have seen the addendum and you gave presentation on the results of it. Would it change anything that was written in the original Commitment 38 report because the addendum gives the results. It doesn't give a discussion or conclusion section. Would it change anything that you had written in the original addendum. Now, you have done the addendum results. Does the limitations of sample size in the number of caribou years given the number of covariants and therefore the number of models and you showed the graphs that showed the variation in the beta coefficients, does it cause you to question the strength of any conclusions that the data allow given their variability?

MB: I'd have to go back and read the conclusion because I basically don't have it memorized.

DC: There is a conclusion section. I don't know if you saw it. On page 12 there is a conclusion section.

AG: The question still stands.

DC: I understand that. Yes. Our conclusions were that the update analyses really don't change our conclusions of the Commitment 38 analysis.

AG: I missed those just being suddenly faced with them. The addendum analysis which broke down in finer detail up stream, downstream, given the variation, the number of covariants, the number of models, are data strong enough to draw strong conclusions.

MB: We know with the way our confidence intervals overlap zero, we could use more data to have greater strength on our conclusion. As much as we cannot conclude no impact, we can't conclude impact. The key thing is that the biggest takeaway that I can say for both the addendum and Commitment 38 analysis is that we have to take those estimates and those confidence intervals for what they are, and if there is a positive value or negative value, there may be a positive or negative relationship. When we have a wide confidence interval, we don't have the ultimate strength in estimates. Never. That is how the ecological modelling goes too is that we could take all the data in the world and have a population that's highly variable and that could be what's causing those high confidence intervals. I don't want to bring it back to that thing over and over. I just can't recall explicit sentences from the Commitment 38 conclusions, but we know there is uncertainty because we know that the estimates in our results. We don't always know if it's a positive, negative, or neutral relationship. All we can do is say this is where we are at the current time, this is what the data does

or does not support and seek to recontinue revisiting these analyses in the future when we might have greater sample size or new individuals to help inform different or more robust conclusions.

AG: Right. It makes sense. There are alternative analyses. There are alternative data besides just relying on the collars. We have a lot of data from the road surveys for example. The other thing is that these analyses are constrained by the season and in other seasons would likely be or potentially different responses. Just want to emphasize that the use of collars is a constraint in itself for an analysis because of sample size and the other thing is it is constrained to the seasons that these collars represent.

MB: These analyses are focused on a period of time from approximately or the earliest that a Qamanirijuaq has calved to summer and we didn't look at the other seasons so I can't comment on how what we might expect to see. You are correct in that we've looked at certain time period of the year. And as with any ecological work, there's value until drawing information from multiple sources to reconcile the trends and patterns that are appearing through those multiple sources.

SS: Thank you, Meghan. I think we have an intervention from Dan here.

DCh: The presentation showed a bit of those bars of approaching versus departing and we don't see them in this summary. I just wanted to verify with you, so you got a deflection where there was a paralleling one and was there a crossing one as well? I can't remember.

MB: Just quick check, Dan, are you talking about the images on the screen now?

DCh: Yes.

MB: I am going to link you, are you looking at the memo or the report for the addendum?

DCh: I am.

MB: Just to clarify, I didn't present the beta coefficient as a figure or as a graph in the report for the addendum. They are presented in a table so that the actual values and the confidence interval limits can be shown. I will clarify that it's the same information, I just thought a figure was nicer for visual presentation and I like having the numbers in a table because then you can see exactly what that circle, what the value of the circle is when you are reading the memo. (Refer to Technical Memorandum: "Commitment 38 Analyses: Addendum" p.8-9 or ppt file titled: "C38 Addendum Draft TAG Presentation 20231018" slide 6)

DCh: I see that now. The question is more to do with the covariant of distance AWAR act interacting with parallel in the departing section. We note that's quite a wide range of variation there. It's at this point when it's probably caribou if they are departing much later in the year, possibly more in that July period that you are measuring in this figure, just that it was the wide range of variation could be possibly, like you mentioned other factors in the environment that are occurring. Were we just sort of ballparking it and that certainly might be insect harassment that might have been causing this sort of wide range of variation?

MB: Yes, thank you. I was interested to see what the TAG thought about it and you are providing me some feedback on that now. I was interested too, because here we can see in purple (the value is negative) that as the caribou are approaching the mine, they may be more likely to parallel but again there is some uncertainty there. What we are seeing when they are departing is wide in confidence interval. You made a point that this paralleling movement could be unrelated to the distance of mine and AWAR. I expect it's something else and that's why we are seeing that huge difference. Insect harassment could be a valid hypothesis. I'm wondering if there is any other thoughts on that too as well as the deflection. It could be related to the same thing like insect harassment. That's why we might be seeing caribou increasing deflection behaviour further from

the mine once they have departed. It was an interesting result too and I was trying to understand what it could be related to. (Refer to Technical Memorandum: "Commitment 38 Analyses: Addendum" p.8-9 or ppt file titled: "C38 Addendum Draft TAG Presentation 20231018" slide 6)

DCh: Can I see the figure previous to that.

MB: Similar but not as wide.

DCh: Yes. It's closer to the zero but it does have overlap. Deflection might be shown up a little bit more when it comes to insect harassment. That is the big question there. It seems to have the overlap and that sort of just still leaves us to a lot of further questions. The paralleling one showed something that might give us an indication of another factor that could explain why it's been that way.

DC: One thing to keep in mind is that when the confidence band overlaps zero, that means we can't tell it apart from the fact.

DCh: Certainly, I understand that. I agree with Meghan. It's tough to know for sure whether that interaction term is really what's driving it. It's probably something else as well out there in the environment.

MB: Thanks both Dan for those thoughts.

AG: Meghan, what would happen if you were to rerun this and you took out the caribou year during this particular time frame that you've used, and you took out the days when the insect harassment was particularly high and like average plus or minus two standard deviations the extreme insect years and ran the analysis, would that uncover more of a response to the roads?

MB: That's an interesting question. It's compelling. I don't have an answer what our results would be but I can tell you it's possible to do it. We would have to figure out what we consider high insect harassment based on the distribution or some value or expert input. We'd have a cutoff. And then what I can see happening is just we would be decreasing our sample size further, because we'd be removing or filtering out steps that occurred during a time when we're not interested in modelling. When insect harassment is high, we wouldn't want to model that. We want to understand because we imagine that what I am interpreting is it's a prevailing or is a very important factor for caribou when the harassment is high. We don't expect them to be paying attention to much else. We remove it from the analysis, and we model movements when caribou are not under duress from insects. I think it's possible to do. We just have to see if we have the sample size to pull it off. Again, that's what I would start worrying about with this is as much as we hope that by constraining this noise and the modelling will give us more concise results, I also expect the decrease in sample size will get a tradeoff and we'll still get a bit of noise in our sample size. I don't want you to hold your breath thinking it might be possible. But I'd have to look.

AG: I think the other thing it would do, you end up with essentially three populations, one with them, one just the movements under high mosquito and the movements without high mosquito but if you didn't have that sample size through that analysis, it would give you enough of a refined hypothesis that you could take a different analytical approach and maybe look at the probabilities of movements under high mosquito, high mosquito harassment, it could define the understanding and lead to a different approach.

MB: I think it's possible. There could be different results. I can't speak to what the result would be. I speak more to the mechanics of the analysis and whether it will be possible to even get reasonable or robust answer.

AG: Ok. Well, thanks for all your patience with the questions and I look forward to reading it in detail.

MB: No problem at all. Great to chat about this.

DCh: Just one further question, Meghan. The sample sizes for each of these models, are you going to be able to tell us them when you are giving us the final report?

DC: They are in the report.

MB: I can pull it up here quick or just confirm. It is information that is unclear or there is many ways to report sample size. It could be in years, it can be individuals. If there is any clarification needed, I think that will be something I would ask for when you are compiling your written results to put it there and I can make sure it's included in any future communications.

DCh: Yes. I see the sample size for approaching, departing. I think that's what I'm looking for. I guess I'll get back to you. Thank you.

SS: Thank you, again, Meghan for the presentation and for everyone's questions and comments. Both on the content but also on the format. We appreciate the constructive feedback on the revision process. It's our first year of operations, fine-tuning it can be expected and we have a clearer path forward for the next meeting and next documentation.

(BRIEF ADJOURNMENT)

4. Roundtable Discussion – Day 2

Supplemental Material: ppt file titled: "October 2023 TAG Meeting Wrap Up"

Presenter: Sara Savoie

DCh: Yeah. Thank you, Sara. Just more thinking in the wording of that statement, include a section I was thinking more of a caribou calving protection plan or a sub plan to the TEMMP. Would that be more what the AI was reflecting regarding that?

AG: Yes.

SS: An appendix.

AG: The idea of the calving ground is to include enhanced protection. Those would be spelled out rather than a map of the calving ground it's the increased sensitivity and therefore the need for increased protection.

DCh: That was just the semantics. It was just that this second line in the summary, I thought it should state something like include a section on caribou calving protection plan, like a sub plan of the TEMMP revision which we are working on because it had been requested that it be something that we need to have and ready for the caribou migration season that's coming up.

SS: And what I may add to that is we have consultants who are word wizards, I will trust them to come up with some wording that will satisfy everyone here.

DCh: Is that what you understood was being requested?

SAt: Quick question. Were you guys requesting post-calving, having a post-calving section two combined or is it just strictly the calving period you are talking about? Because I would argue that should have the enhanced protection for the calving and post-calving period.

DCh: That's correct. I'm thinking that calving, post-calving. Is that what you are thinking of?

SAt: Yes.

AG: We were thinking of enhanced protection for calving, additional to the ongoing proposed mitigation for post-calving in summer. We have calving which includes early post calving for the period but particularly during actual calving, so the period of numbers moving less than 5 kilometres a day is a section, particular section for enhanced protection if that answers the question, Stephen.

SAt: It does, yes.

SS: If we move ahead with the noise monitoring during the migration, we took note and appreciated everyone's feedback on the memo and presentation that was shared. We have taken note to provide additional maps and images of the noise monitoring stations as well as of the sea can wall. We will be providing a graph with wind speed and directions during the study. For any future punctual noise monitoring campaign, the one conducted last year, we will be consulting the TAG during the migration.

AG: I thought that there was a commitment to provide from the model that we would be the relative noise change when it's in Level 1 or 2 versus Level 3.

SS: Yes. That would be included. Once again this is why we are doing this round table. We put this together without the meeting minutes being ready and as we went on. So that is correct. That is part of the action item and will be added in the meeting minutes. There is usually a table with the action items on top of the meeting minutes.

AG: There was consideration also using elders and community people for their perception of the change in the noise level.

SS: We will consider that, yes and thank you for those clarifications, Anne. Related to the annual report revision, we heard many comments on the fact that we should establish a process for the TAG annual report revision process. There were suggestions shared and we will propose something to TAG members to this effect once we have had a time to confer.

AG: I don't know how far along the current monitoring report is for 2023 data, but we were suggesting that we could provide the KivIA some written comments on what we would like to see in the 2023 monitoring report that will come out next year unless the analyses are too far along.

SS: That's something we will need to get back to you on. There are several components all at different levels of completion at this moment. Just for my understanding, these would be additional comments than those provided on the 2022 report or they would be on the same line. As we had discussed, the 2022 comments are being followed up on.

AG: That's correct. In our responses to the '22 annual monitoring report we provided comments. Since then, we would have additional comments, largely based on the information that was brought forward in the addendum for the extension project. Our information requests produced useful information that we suggest could be carried forward into annual report.

SS: what you were referring to, were you referring to a permitting process?

AG: Operation.

SS: Operational process?

AG: Yes.

SS: Ok. Perfect. We will get back to you on that.

AG: Sure.

SS: With regards to the C38 addendum, we took notes of the discussions, and we welcome TAG parties to provide written comments on the C38 memo and addendum in preparation for the next TAG meeting.

DCh: Is that after we receive the full report? Ok.

DC: The report was provided on July 14th.

DCh: Summary.

SS: No, the full report.

DC: That was the full report and here was a copy of the addendum. You should have everything.

DCh: I thought you had been asking for a more fulsome report of the Section 38.

AG: Originally when we had the side bar meeting, we had discussed that the current version, Version 1 did need to be revised to this discussion. At that time, we didn't know about the addendum. We didn't know about that you'd already done those analyses. We were thinking we could have input into modifying the discussion and the conclusions for the Version 1. It appears that that's not a possibility.

DC: I don't think that was the commitment that Agnico Eagle had made at that side bar discussion. I think what they said is they would issue it as version 1.

AG: That was what we asked for, and the reply was that the title page would be changed to put version 1 on it.

DC: Sure. I mean, it's nothing else in the report is going to change.

AG: It does raise some interesting questions. Anyhow, it is the same report in answer to Dan's question plus the addendum. I'm assuming that we will get an electronic version of it.

DC: Sure. We can provide that.

AG: Good.

DCh: That helps clarify. Thank you.

SS: Thank you for that. Next on the action item list we had the request to update the calving grounds maps. So that's something we will need to get back to you on as well.

AG: Just as a point of clarification to consider. We would actually like it and not only would we like the maps updated for 2022 and '23, it would be nice if they showed a 50 and 85 percent kernel as part of the maps as well as 95 percent.

SS: We are taking notes of that.

DC: You said 55 and 85?

AG: 50, 85, and 95. Because I think that is consistent with what is recommended for Sabina.

SS: The two last items. I will switch the order. We also talked about the use of drone for surveying or monitoring efforts. That item will remain to be discussed for future migration seasons. It's something that's on our radar. We'll provide progress updates on our findings on that front. We also heard TAG members mention that at this point the TEMMP revision should be our priority. This brings us to the next TAG meeting which we wanted to discuss with you. We wanted to discuss both the meeting dates and how it's going to be conducted, whether virtually or in person. What we

were proposing, considering this would be our fifth TAG meeting within our first year of existence. Knowing everyone's schedules, we were proposing to do virtual meeting and to hold it early in 2024.

DCh: January or February, roughly got an idea?

SS: We were thinking at this point relatively early January. We would as usual it's very hard to find a moment where 100 percent of people are available, so we will second a survey out and choose the dates where the most people are available.

DCh: Thinking late January or mid to late or early February. I defer to everybody else here as far as flexibility and other dates. You have to consider your operational. That was my only thought was going to be early January, maybe, I don't know, that might be the first two weeks of January. What do you guys think? Later January?

SS: We will send a survey with mid to end January date in that case. Is everyone agreeing on a virtual meeting?

LM: It's too close to this one.

JE: I would like to say this is my first meeting with TAG so I am learning something new. It's pretty good thing.

RAk: As for myself, thank you, everyone. Working collaboratively in this manner, not only the people in this room but also the people that are joining virtually. It's a good learning experience, having previous experience from our own TAG with the Meadowbank division, seeing all the stakeholders, all the partners working collaboratively for the betterment of our land and our people, and the proponent are working hard to provide all this information for us to be reviewed and to be screened. I just want to thank everyone. And it's good to see some familiar faces and hope to see you in the near future.

AG: I would like to thank everyone for their patience. It's always useful hearing from everyone, sharing opinions, and I will let Luis provide more detailed comments.

SA: It was nice meeting you people. I have met a lot of people come and go and regarding wildlife, wildlife board. These seems to be more of a technical meeting where a board member should be here. This is probably my first and last time on the TAG meeting. Maybe our technical people. But in saying that, just from experience, I have been in a lot of boards and I have been with KivIA, we are a meeting group like this. I think it should be as small as possible. It shouldn't be growing to other provinces. Saying that, when we are talking about I always protected my land and the wildlife. I'm saying this because if too many provinces or territories joining, we're always going to be to blame. We will protect our wildlife. I just want other territories and provinces to know. We grew up on caribou. We are going to protect them. We have been protecting them. We were them. And we need it to off set our cost of living up north that a lot of people don't know. That's why I'm saying it should be as small as possible. We won't get trapped down or use being whatever we are doing when they find out they are going to use that against us to protect their caribou too because they are migrating that way. I have seen this a lot so I also sit with the BQCMB and I have seen a lot of stuff about Nunavut and they tend to start using that against us, they will use anything against us to protect their caribou which is our caribou too. Other than that, it's nice that you guys will work things out. The only time we work things out is on agreement, not just fighting over this and that. But the guys, like, from Rankin and Baker with the mines around their area, they will be fighting. They will be fighting for their animals too. Other than that, it's a learning experience. But I know it's more technical, so we don't have a technical advisor on our board right now. But we are still working

on it. Whenever we get that, he or she will probably start tagging along with the TAG. But it's nice. I just want other provinces to know we will protect our caribou too. Thank you.

JT: It was a productive meeting. It went good. We have to be caution on how much use on collared data compared to field studies because you don't know what's going on unless you see what's going on. It's important and just keep that in mind for future TAG meetings.

LM: First of all, thanks, everybody for the cooperation. It's hard to get everybody together, to please everybody, more difficult and report to different institutions, but it is important. Sometimes we don't focus on the simple things and probably to solve the problem trying to get more of this or more of that or more specific things. Like Jeff says, it's very important to feel that will give you the tools in future. Remember that's the first mine you have a very close road to a community in the north. It's very close. And you can enhancing those tools there in the field, you probably be far away in having a better system. It's those tools in the field, in the monitoring, in the ground are important to Inuit. That's the data that we provide. It's enough enhanced in the Meliadine project that it's moving as smooth at this point in time. We been calling what's coming. Thank you for the cooperation in the time we say I usually don't come to the TAG meetings. I just come this time to make sure certain things are being addressed that we have in my community that you have and make sure we tackle those commitments as you promise. Thank you to the rest of the members. It is important for the Inuit in this table. It is important to get the perspective even one to one. You have people that can go and talk to people around the community and direct one to one to get information from the people. That's a very important tool. A community can have enough information to be able to move forward. Thank you very much for everything.

BD: I would like to say it's been a pleasure and being among you, listening to various concerns. Sitting here, listening on how these protected measures are being discussed. I was thinking about the mine is going to be another 20 years, and this is just the beginning. There are also other talks about the potential impact it might have, like, fibre optic and we have maybe the potential roads. I'm just wondering sitting here and said, oh, wonder what it's going to be like down the future. Nevertheless, we are out here for the same common purpose is to protect the wildlife, especially the caribou that we rely on. Our relatives in the north are always talking about caribou and how the habitat and how it affects them. We hear stories about that. One of the things that we notice is the environment is changing. I am just wondering, like, what it would be like 10 years from now. Last year, in our part, the snow on the ice melted a month early. In our parts in northern Saskatchewan and all those areas that we see that the river, the lakes are going dry. Right now, in our area it's about 5 to 6 feet level gone down. You travel down south on Highway 6, you also notice that the rivers are drying up. Just recently I saw a post from one of my friends on social media that one of them posted the sea level and says down there this area where my father used to set up a tent and go hunting from here; it's all under water now. The sea level is rising. These kinds of information is very alarming and I wonder what it's like what the future holds for our parts, especially wildfires. There're wildfires in the north, Northwest Territories. People who have been evacuated and all the areas have been burnt down and the impact that is going to have later on in the future especially wildlife. In this day and age, it's very alarming to see all these strange things occurring. This summer it's been very dry. It's concerning anyway. I was wondering if what it was going to be down the road, how our discussions are going to turn out. These are the concerns that was popping up in my head. We have to somehow collectively work in a way that is for everybody. I would mention that especially Rankin I have concerns from various parts, and we all kind of have find a way to work together. Because we are not going anywhere. We have to work alongside each other now and see how we can move forward. I'm very glad to be in discussions. Back home there is only two Dene bands in Manitoba, and the rest are in Saskatchewan. Northlands and Sayisi are the only ones. But we have

other Saskatchewan members that are affected by the caribou, and they are supposed to be involved in here at this meeting. Maybe next time they will probably be representatives from that area. With that, I'll say masi. Thank you.

DCh: Well, thank you. Again, I'm similar in many ways to a lot of people that I find that these are informative and quite often a one on one you learn more. It does give us a chance to parse out some questions. What I find that I appreciate from other members that are out there on the land, because I always ask questions. I probably ask too many times but it's nice to hear from people who are actively involved in these areas and from the point of view of the operations point of view of caribou protection measures, they help to sort of give me a better sense of what is going on out there. And that's probably the biggest thing that I get out of these meetings is a better sense of what is going on. I appreciate the communication that there are still finer details that we need to iron out on those areas. You always learn something new at every one of these meetings. And I thank everybody for being here. Much appreciated. Thank you very much.

GB: Masi as well for allowing me to be here, I guess. I don't know who is in charge here, but I am here and representing our people. Like Benji says, there is a lot of environmental concerns. He is noticing his place is dry but our water level was up the last 4 years. Finally, this year it went down. The reason why I say this is because about 4 years ago my boat ramp, which I have been using for years and years got totally destroyed by ice. I was wanting to rebuild it but the water wouldn't go down. The hell, I was pissed off. Finally it come down. I know about the effects of the water levels, hey. I have been waiting for it. Finally calmed down. But I haven't done anything about it yet. But it's just one of those things you notice and you live. Ice is variation of thickness of ice is one of those things too that's noticeable in our area. At one point I know is anybody from arrest beet here? Anyway, Al Code, he's a videographer, he used to teach at Arviat 6 foot 2 maybe. He was up to here in ice chopping to get through the ice checking back in the '90s. Nowadays you would be lucky if you get three feet of ice in a given year. It's a big difference. Global warming is happening. Noticeable in our area. That's why we decided to go with over land road rather than lake because it's too treacherous. It's uncertain about the ice thickness that we are going to be taken a heavy rig on there and taking a chance. We have had a grader go through the ice and that too. Regarding this meeting, this last presentation on the Commitment 38 is like (speaking Dene language). You don't understand what I just said. What you have on the paper, same thing. It's too technical, like Stanley says. You have to simplify so we can understand. We are here too. That's what he's pointing at. We are not all technical but we are land based and we are all here for caribou. Try to make it so it's understandable for everybody, not make it confusing. That's my thing. There was another thing here. Like, this presentation just mentioned, what's this function of Julian day? What is that?

DC: So Julian days, instead of saying January 1st, Julian day would be the first day of the year, so Number 1. Each day gets a number as opposed to a day and month It's a way of standardizing it. In an analysis it's difficult to analyze days and months.

GB: Just to add the confusion. You can look at it as Julian day. It's just another add on to the fixture of jargon that's incomprehensible to us. That's all from me.

DA: This is my first meeting and there was a lot of things to take in. But it's a great learning specious. I would like to thank you guys for inviting HTO Rankin to come here. I'm looking forward to the next person in meeting TAG just because I feel like when it's virtual, I tend to not pay attention maybe because of the surroundings I'm at. I'm looking forward to the next meeting and future meetings. I'm glad I have met you guys. You guys are all new to me, as mentioned my first meeting, TAG meeting. Thank you. And hopefully I will see you guys in the near future.

AK: Thanks for inviting KWB for joining TAG. This is our first time TAG and it's a lot of information to take in. Hopefully, we will become more involved the more we learn. That's it. Thank you.

JW: It was my first TAG meeting too. I appreciate everyone sharing their thoughts and comments on these really complex matters. Earlier I wasn't sure when to jump in and respond to Richard's question. I know we were just talking about technical stuff. Regarding the Qamanirijuaq heard, in 2022, we deployed 35 collars and currently there is about 30 active. I just wanted to make sure that was responded to and everyone had a chance to hear it. Thank you.

SA: Next year they will do 25, according to Mitch.

JW: According to Mitch?

GS: It's great to see so many folks and meet some new participants in the TAG and hear all the different perspectives. Thank you.

DC: Thank you, everyone, travelling to be here. It's always a pleasure to see and hear from everyone and really appreciate your participation.

JR: It was my first TAG too. I was really excited to come. And it was a really good experience for me and I will be back. Thanks for everyone to sharing their knowledge and their experience with me. Really nice to have this knowledge now. Thank you.

BP: Hi. No more comments to add myself. It was good hearing from everybody. I believe we mentioned that we will have a review of this latest analysis of the caribou effects and get back to you if we have any comments on it.

RM: Hi. I apologize again for not being there in person. But things to say caribou calving ground has been moving. Going to continue moving. One day the caribou might not even go by the AWAR or by the camp when that will be. But it is moving. That's a fact. There was a thought that was impossible at one point in time some people got together and made it happen and we have now what's called the TAG group and the TEMMP group and we're working together. In my opinion, it was getting better and better and then it seems like we took a step back. Things are getting presented last minute or shared last minute. We continue how it was going where everybody was sharing and talking and working together. This has potential to be ground breaking for all of Canada where indigenous groups, leaders are working with mining groups or any other group for that matter. It was good two days of meetings. I look forward to the next meeting. Once again, sorry I wasn't there in person. Thank you, everybody. Have a safe travels home for whenever you guys are leaving and take care.

SAt: Thank you. It was really great to just be in the meeting. I think it was very productive. There is definitely some homework to be done for all of us. One final thought that I have, and it is that in revising the TEMMP one thing that I think is kind of looking at this Commitment 38 analysis is the fact that, you know, we are at the present time faced with some limited data, collar data, the sizes are relatively small. That will change in future. I think as part of the TEMMP it would be nice to see a commitment to repeat some of these collar-based analysis at some intervals during the life of the project. For example 5-year interval the analysis is repeated at which point there will be more data and also there should be a section that would indicate if there is to be a change in the size or scope of the operation and it should sort of trigger an analysis of existing data so that there is sort of a new baseline from which to continue monitoring the project. I just would like to see that ongoing commitment to a collar related analysis in TEMMP. It was a real pleasure to participate. Thank you. I wish I could be in person. I hope to see you at some point in the future. Cheers.

MB: First, I heard the comment about Commitment 38 being technical. I'll work to for future presentations try to make everything a little less technical just to make that a little easier for everyone to understand. The last thing we want is for anyone to, in the same way that I don't have the same knowledge on the land, we do have to come to a middle ground. We will strive to make that information more digestible for the group. The second thing is I want to say thank you for all the comments and suggestions we heard especially for Commitment 38 analyses. In particular, Anne, I liked your idea about separating some of the movements when it is high. I think that's viable. It is biological relevant, and that would be a step forward if we could look into that. Lastly, we come down to these issues with sample size and of course if we as time goes on. We'll hopefully get some more information. This is a question for the Government of Nunavut because I don't know the way the collars are programmed. But if the collars have the ability to be triggered to do finer fixes at a geofence there might be value. I don't know if collars are set up this way but if they are, might be value in triggering a certain distance in the mine triggering to be a finer resolution, i.e., 30 minutes or an hour and that would be a way to increase sample size.

DCh: I would support that too if it's possible. Depends on what ever. I know it probably essentially related to the battery strength goes down quick when you increase the number of data. Possibly the mine being such an important entity in that area, finer detail can help in an analysis.

JW: I can confer with the biologist unless Brad has anything to add to that recommendation.

BP: Yes. This is Brad here with the GN. I'm just trying to just for clarification, you say finer fixes, are you referring to how often you get a ping or how close, how accuracy is down to the number of metres for where that collar is?

MB: Sorry, I should have been clearer, Brad. With temporal resolution, so more often.

BP: That is something that we can do. It significantly reduces the battery life on the collars. It can be an issue with when we have a 2-year deployment cycle for collars, if we all of a sudden raise the number of times they are sending off a signal, we could end up with periods of time when we just don't have working collars on the herd. I'm going to need to talk to Mitch and Casles about just how much that could be done.

MB: Brad, the only thing I wanted to adjust to make sure this gets brought back through to Mitch and Casles is if there is an ability to apply the increased fixed rate for only a specific spatial boundary you may not be facing the same boundary issues. The idea would be to apply a buffer around our area of interest and only have that fixed rate speed up are within that target area. Just from my looking at the data for the Commitment 38 analyses we do know that a huge portion of the caribou's year is not spent close to the mine. That spatial boundary was a kilometre or two from the mine, a very small proportion of their fixes occur in that region. That region is so valuable to us when we are asking these questions that if the fixes could be more frequent for that spatial area there might be a way to get a bit of a tradeoff there in terms of retaining battery but also getting better resolution data.

DC: If I could add to that, if that's okay, Brad, if you think about those animals that are interacting, you can find of assess, how quickly they are moving through the area. For example, the LSA boundary is 1 kilometre on either side of the AWAR, we know from the existing collar data that caribou spend about one day. If that was where the geofence is, you are talking about a very short period of time the number of days. Proportionally, over the 2-year cycle, it ends up being a small amount of time you are increasing the frequency. If you make that boundary wider, it's more. Anyways, that's kind of the way it could be assessed in terms of the cost of battery life.

BP: Ok. There is one other issue with that. You will see from the maps that you are getting a lot of times the end point for these caribou will remain the same over multiple days and that's happened despite these collars essentially sending out a ping multiple times per day. What happens is if there is not a satellite in range at the time when they send this out, that data is not lost. It's kept. When it connect, the satellite will get all of it and it will be transmitted to us. With that being the problem satellite coverage as poor as it is this far north an increased frequency of signals might not actually end up translating to better real time data.

MB: That's a good point. I wonder, Brad, trialing it on an individual or two could be a start.

BP: Yeah. We can look at that.

SAt: I think there is geocache signals around the site. The TAG is the group put forward even a letter to the GN recommending a trial period with geofence collars laying out exactly what that geofence would look like, what area it cover and maybe even a little bit of background just to give some idea to the GN of what the time the average collar would be in geofencing works. The TAG should put this forward to the GN. It would sell better that way. I don't think it would be too much of an issue, may not give realtime data all the time. What it will give is it will give a cooler data for subsequent analysis that I think is going to be incredibly useful to try to get some of the questions we are struggling with right now. I would propose that the TAG put together a brief letter or memo just with what the specific recommendations are for geofence projects.

DCh: See, it happened right at the very end of the meeting. We are almost all gone. Look at the discussion we had on a particular point that can be very useful to all of us. I'm glad we had that discussion.

(MEETING ADJOURNED AT 4:22 P.M.)

APPENDIX B: C38 COMMITMENT ANALYSES AND ADDENDUM

wsp

REPORT

Commitment 38 Analyses

Caribou Movements Relative to Meliadine Mine and Other Factors

Submitted to:

Manon Turmel and Jennifer Range

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Submitted by:

WSP Canada Inc.

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22524250-Rev0

14 July 2023
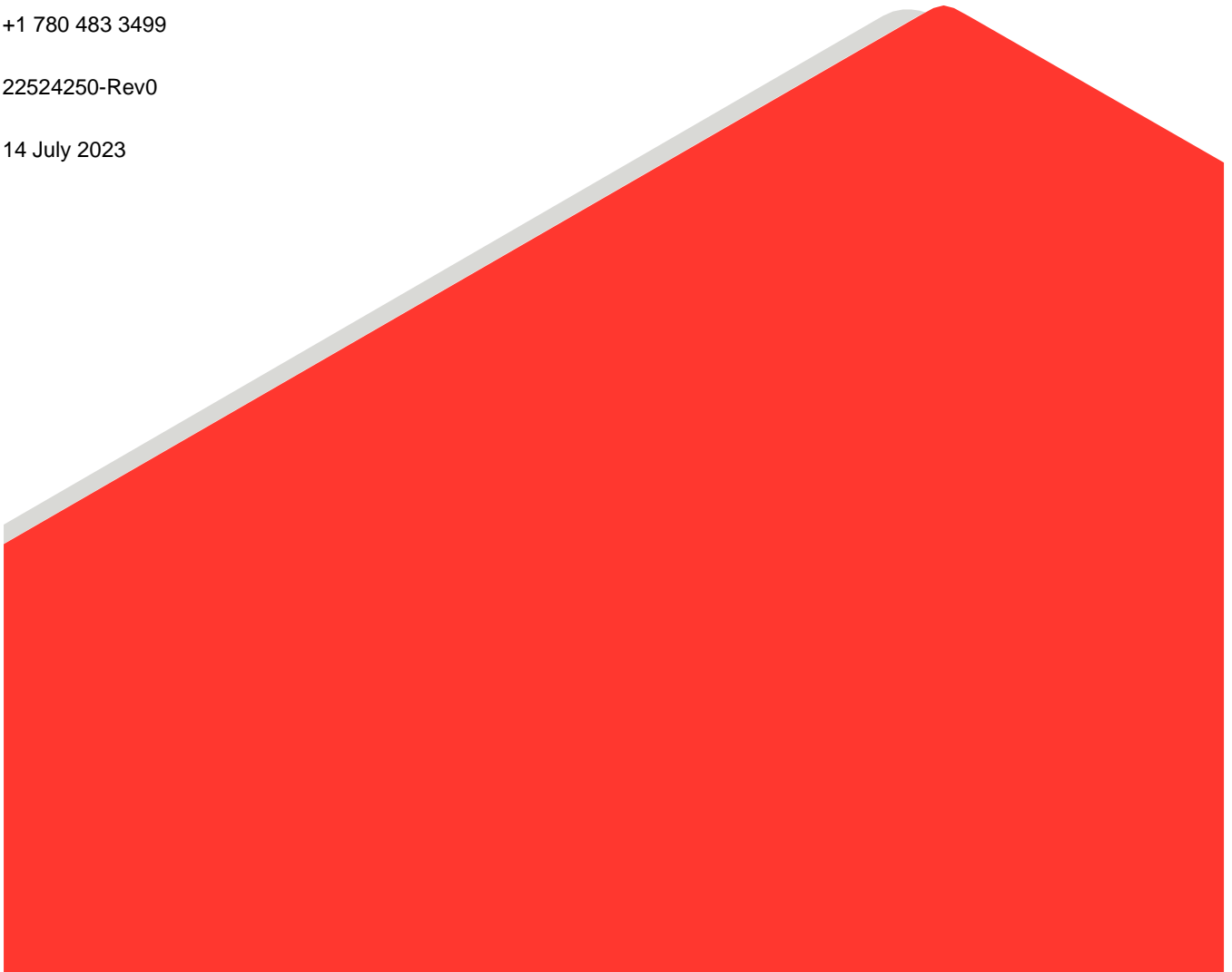
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1 electronic PDF: Agnico Eagle Mines Ltd.

1 electronic PDF: WSP Canada Inc.

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WSP

1.0   INTRODUCTION

Agnico Eagle Mines Limited (Agnico Eagle) owns and operates Meliadine Gold Mine (the Project), which is located approximately 25 km north of Rankin Inlet, and 80 km southwest of Chesterfield Inlet in the Kivalliq Region of Nunavut. During technical discussions for the Meliadine Waterlines Project, the Kivalliq Inuit Association (KivIA) requested that Agnico Eagle complete an analysis of collared barren-ground caribou (*Rangifer tarandus groenlandicus*) movements relative to the Meliadine Mine (Mine) and All-weather Access Road (AWAR). Agnico Eagle committed (Commitment 38) to this analysis and to also include the KivIA, Ghotelnene Kohtineh Dene First Nation (GKD), and the Government of Nunavut (GN) for input into the study design.

Key points regarding the analysis for Commitment 38 include:

■   A study area that reflects Zone of Influence (ZOI) around the Meliadine mine and mine roads.

■   A definition of "deflection" that accounts for the observed behaviour of caribou paralleling the road or adjusting their course away from the road at any angle of movement.

■   Agnico Eagle will consult with the interested parties on the size of the study area, the definitions of deflection and no crossing potential (using both Inuit Qaujimajatuqangit [IQ] and technical criteria and incorporating a definition that accounts for caribou paralleling the road), and incorporating other relevant covariates (e.g., insect harassment, daily traffic levels).

At the Terrestrial Advisory Group (TAG) meeting on 15 December 2022 (Agnico Eagle 2023a), Agnico Eagle solicited input on the study design to fulfill Meliadine Waterlines Commitment 38 (i.e., the 'Commitment 38 study design'). Additional groups participating included the Baker Lake Hunters and Trappers Organization (BHTO) and the Nunavut Tunngavik Incorporated (NTI). Some of the items identified by TAG members at the meeting (Agnico Eagle 2023a) included defining the study objectives, defining the study area, and incorporating movement behaviours, such as paralleling, deflection, and crossing into the study design. The TAG also expressed interest in evaluating the AWAR and Mine ZOI using the proposed analyses, as well as including natural factors that influence caribou behaviour, such as insect harassment (Weladji et al. 2003; Witter et al. 2012).

At the TAG meeting on 13 April 2023, Agnico Eagle presented its study design proposal, which included inputs provided at the December TAG meeting and throughout the Waterline NIRB Review Process and solicited further input on the Commitment 38 study design. On 13 April 2023, Agnico Eagle obtained support from the TAG to proceed with execution of the Commitment 38 study (WSP 2023).

The main study objectives identified by the TAG in the 15 December 2022 (Agnico Eagle 2023a) and 13 April 2023 meetings are as follows:

■   Objective 1: Evaluate caribou movement behaviours, including speed and directionality, in response to the AWAR and Mine. Evaluate caribou response to the AWAR and Mine, including deflection, crossing, and paralleling.

■   Objective 2: Evaluate the presence and, if present, the spatial extent of a ZOI surrounding the AWAR and Mine on caribou.

WSP

2.0   METHODS

2.1   Telemetry Data Review

Caribou telemetry data (i.e., collar data) used in Commitment 38 analyses were provided by the GN. Telemetry data were first constrained to the Qamanirjuaq (QAM) herd. Because caribou capture dates were not provided, the first 14 days of data for each caribou were excluded to remove potential capture effects (Jung et al. 2019). Fix rates programmed to collars varied by year and/or collar and were not specified in the dataset. Thus, telemetry data were first reviewed to estimate the expected fix rate per caribou-year. The mode (i.e., most common) fix rate (i.e., interval of time between two subsequent relocations) was calculated then assigned to each caribou-year. Fix rates varied within the QAM herd; collars deployed from 2012 to 2022 usually collected fixes every four or six hours, but some collars deployed from 2012 to 2017 collected fixes every 12 or 24 hours. Once expected fix rates could be assigned to each caribou year, expected fix rates were used to resample telemetry data with the *amt* package (Signer et al. 2019) in *R* (R Core Team 2023), which cleans the telemetry data such that only one relocation is available per fix interval (e.g., four- or six-hour period) and removes any duplicate relocations. Finally, resampled movement trajectories for each QAM caribou-year were visualized using the *amt* package (Signer et al. 2019) in *R* (R Core Team 2023) to screen for erroneous locations.
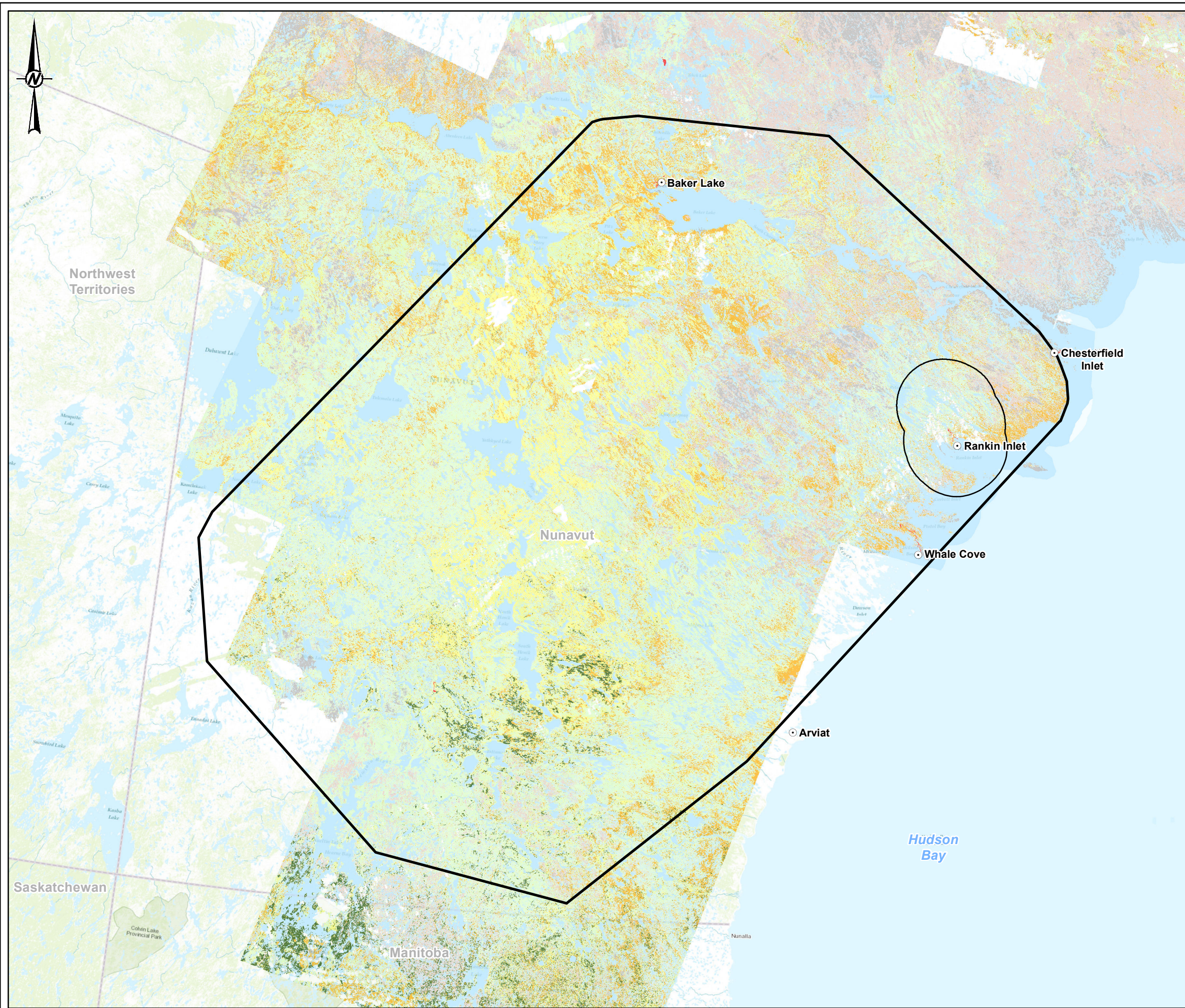
2.2   Study Area

The study area for Commitment 38 analyses was defined using a two-part approach. The study area began as the 30-km buffered area surrounding the current delineation of the AWAR and Mine footprint, and the community of Rankin Inlet, then was updated to include areas where caribou cows and calves may be sensitive to disturbance (described below). The 30-km buffered area incorporated areas adjacent to the AWAR, Mine, and Rankin Inlet into the study area.

TAG members recommended that the study area also be biologically informed by calf age and the period when cows and calves may be vulnerable to disturbance (i.e., the three-week period following parturition, or giving birth to a calf). Calf age was considered in the study area definition by estimating caribou parturition dates for the QAM herd using methods established by DeMars et al. (2013) and Cameron et al. (2018), then subsetting QAM telemetry data to include relocations from the earliest date of parturition to 21 days after the latest date of parturition. Then, these subset data were used to create a 100% minimum convex polygon (called the 'post-parturition MCP'), which defined areas where QAM cows may have young calves susceptible to disturbance.

The maximum extent of the combined buffered 30-km study area and post-parturition MCP was merged to represent the Commitment 38 study area (Figure 1). All QAM caribou telemetry locations within the study area were considered in analyses.

LEGEND

- ⊙ COMMUNITY
- ▭ COMMITMENT 38 STUDY AREA
- ▭ 30 km BUFFER OF AWAR/CURRENT MINE FOOTPRINT

ECOLOGICAL LAND CLASSIFICATION

- CLOUD/SHADOW
- DISTURBANCE
- GRAMINOID
- HEATH-FORB
- LICHEN
- NON-VEGETATED
- SHRUB
- TREED
- WATER

STUDY AREA

0   50   100
1:2,500,000   KILOMETRES
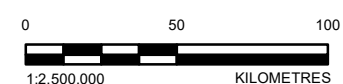
REFERENCE(S)
1. TOPOGRAPHIC MAP © ESRI AND ITS LICENSORS. USED UNDER LICENSE, ALL RIGHTS RESERVED.
2. DATUM: NAD83 PROJECTION UTM ZONE 15

CLIENT
AGNICO EAGLE MINES LIMITED
AGNICO EAGLE

PROJECT
MELIADINE GOLD PROJECT
NUNAVUT

TITLE
COMMITMENT 38 STUDY AREA

CONSULTANT	YYYY-MM-DD	2023-07-11
	DESIGNED	MB
wsp	PREPARED	CDB
	REVIEWED	MB
	APPROVED	DC

PROJECT NO.	CONTROL	REV.	FIGURE
22524250	10000/10004	0	1

Northwest Territories

Nunavut

Baker Lake

Chesterfield Inlet

Rankin Inlet

Whale Cove

Arviat

Hudson Bay

Saskatchewan

Manitoba

2.2.1   Parturition Predictions

To create a biologically informed study area, predicted parturition dates were used to estimate a study area used by QAM caribou, post-calving. A method has previously been developed for barren-ground caribou (i.e., sometimes called the 'Individual-Based Method' or IBM; DeMars et al. 2013; Cameron et al. 2018), which allows information gathered using collars to be leveraged to predict parturition. Importantly, these methods do not actually measure or estimate pregnancy; rather, the IBM is based on female movement rates (DeMars et al. 2013; Cameron et al. 2018) in relation to expected parturition dates.

Female movement rates have been shown to decrease substantially when a calf is born (Nagy 2011). This sudden reduction in movement between collar locations (called a 'breakpoint') provides an estimate of a calving event (i.e., parturition) because the distance travelled between successive collar locations (i.e., 'step lengths') remains very small for several consecutive days. If the step length remains small after a breakpoint, then the calf likely survived the birth or neonatal period because the cow will typically remain in place to protect her newborn calf. If movement rate increases quickly after the breakpoint and to pre-breakpoint patterns, the calf likely died during the neonatal period (Nagy 2011; DeMars et al. 2013).

The IBM fits two models to caribou movement data (DeMars et al. 2013; Cameron et al. 2018): a constant mean movement model and a breakpoint model that identifies an apparent parturition event and followed by a mean linear increase in movement rate back to the cow's pre-breakpoint movement rate. Additionally, the breakpoint model can also identify an apparent neonate mortality event. Figure 2 provides examples of possible cow movement patterns, which correspond to a no-calving event, a calving event, and a neonate mortality event. Each model is evaluated for its relative fit to the data using Akaike's Information Criterion (AIC; Burnham and Anderson 2002). Information-theoretic approaches are described in the following paragraphs and, specifically, in Section 2.8.

Following Cameron et al. (2018), two sets of constraints were stipulated when executing the IBM for QAM female caribou: (1) the minimum number of sequential locations before and after a breakpoint could be assigned (referred to as *'int'*); and (2) the minimum and maximum number of locations it takes a cow to return to the pre-parturition movement rate (referred to as minimum '*kcon'* and maximum '*kcon'*). To estimate parturition for the QAM herd, an *int* = three days, minimum *kcon* = five days, and maximum *kcon* = 21 days were applied. Following Cameron et al. (2018), the telemetry data used as input in the IBM were constrained to 19 May to 15 July, each year. Because collars with fix rates up to 24 hours can reliably estimate parturition, all caribou-years from 2004 to 2022 (i.e., with fix rates varying from 4, 6, 12, to 24 hours) were used to estimate parturition, where sample sizes allowed.

For each QAM caribou-year, AIC values for each fitted model (i.e., no-calving event [M0], calving event [M1], and calf mortality event [M2]) were compared to understand the certainty surrounding parturition predictions. A competing top model was defined as any model within 2 AIC values (i.e., ΔAIC $\leq$ 2.0) of the top model (i.e., the model with the lowest AIC value; Burnham and Anderson 2002). If M0, M1, and M2 were all competing top models (i.e., ΔAIC $\leq$ 2.0), it was assumed that the data did not support parturition predictions because there was no certainty on which of the three potential outcomes occurred. If M0 and M1 were competing top models, it was assumed that parturition could not be determined. If M1 and M2 were competing top models, it was assumed that parturition occurred but whether there was a neonate mortality event was uncertain; estimated parturition dates from these models were carried forward to inform the study area. If M1 or M2 were not competing with another model, it was assumed that the predicted event (i.e., calving or mortality, respectively) occurred; estimated parturition dates from these models were also carried forward to inform the study area. If M0 was not competing

with another model, it was assumed that no parturition occurred (this distinction was important for assessing mean daily movement as a function of parturition status; see Appendix A).

The study design (WSP 2023) indicated that where parturition could not be estimated from the movement data, a daily movement rate of five km/day would be used to determine whether cows had young calves, based on an assumption presented by the KivIA that cows with young calves move less than five km/day and that at around 21 days of age, calves are able to move more than five km/day. This assumption was tested using QAM telemetry data and results are presented in Appendix A. Because cows with calves were found to exceed five km of daily movements within a week of parturition, the five km/day movement threshold was not applied to inform which caribou may have calved or not.
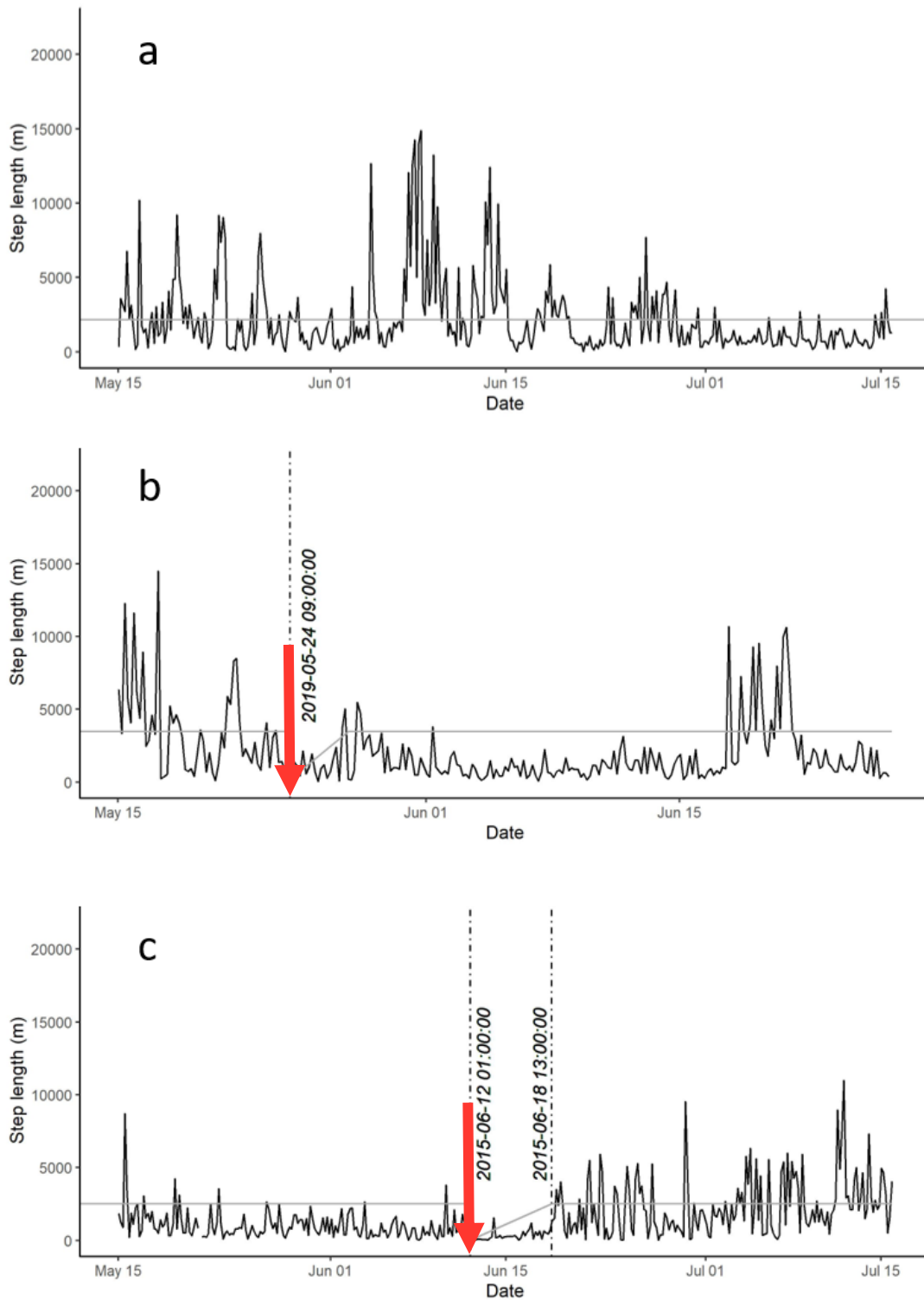
Figure 2: Examples of Individual Based Model predictions, including no-calving event (a), calving event (b), and neonate mortality event (c) from movements of collared caribou cows. Breakpoints are indicated with red arrows.

2.3   Modelling Approach: Integrated Step Selection Analysis

Integrated step selection analyses (iSSA; Avgar et al. 2016) were applied to meet the Commitment 38 study objectives. An iSSA is a type of movement analysis that relaxes the assumption that movement attributes (i.e., velocities and temporal autocorrelation) are independent from resource selection (Avgar et al. 2016). As such, an iSSA can simultaneously estimate movement and resource selection (Avgar et al. 2016, Prokopenko et al. 2017), which allows for greater flexibility in the types of hypotheses that can be tested. An iSSA uses a conditional logistic regression to model used and available steps, where available steps are informed by distributions of step length and turning angles made by an individual (Avgar et al. 2016). Informing available locations by step lengths and turning angles that an individual could realistically make is one of the unique benefits of an iSSA.

An iSSA is also unique in that movement parameters, including turning angle and step length, are included as covariates (i.e., variables) in models. The inclusion of these parameters allows the influence of habitat characteristics on movement parameters (e.g., step length, turning angle) to be quantified and evaluated. Specifically, responses to different habitat characteristics are quantified by comparing steps taken (i.e., 'used' steps, assigned use = '1') with steps that the caribou could have taken (i.e., 'available' steps, assigned use = '0'). These responses are presented as beta (β) coefficient estimates, where a positive beta coefficient indicates that caribou habitat selection is positively associated with the covariate of interest and a negative beta coefficient indicates that caribou habitat selection is negatively associated with the covariate of interest. A beta coefficient of zero indicates that caribou habitat selection is not related to the covariate of interest.

Although the study area and QAM parturition predictions were informed by caribou-years with any fix rate (i.e., 4, 6, 12, or 24-hour fix rates), iSSA were informed by only caribou-years with four-hour fix intervals. This is because the step length parameter depends on consistent fix intervals between relocations (i.e., inferring speed from step length is only possible when the time between fixes is constant). Thus, used steps were informed by telemetry locations from caribou-years with four-hour fix intervals within the study area and were defined as straight line distances between two consecutive relocations. Turning angle and step length distributions for an individual caribou-year were informed from mean headings and mean step lengths, calculated over a 28-hour period. This period represented the general direction and speed of the caribou and included the 20 hours preceding (i.e., five steps preceding), the step itself, and the four hours following (i.e., one step following) each step. For every used location, 10 random available steps were created.

2.4   Season

Telemetry data used in iSSA were constrained to post-calving and summer seasons. Calving can occur as early as 21 May in the QAM herd, so iSSA included data from 21 May to 22 August (i.e., the end of summer; Caslys 2015), each year.

2.5   Population Estimates

The iSSA models within each candidate set were estimated for each caribou-year (i.e., at the individual level as recommended by the TAG) using conditional logistic regression from the *survival* package (Therneau and Grambsch 2000; Therneau 2023) in *R* (R Core Team 2023). The resulting candidate set was ranked from best-fitting model to least-fitting model, where the top model and any competing models (i.e., ΔAIC ≤ 2.0) were ranked best-fitting. The number of occurrences as a competing top model was calculated for each model in a candidate set; the model with the most occurrences as a competing top model across all individual caribou-years was considered the population model. The population model, regardless of whether it was a top model or not for a

particular caribou-year, was fit to all caribou-years using the *survival* package (Therneau and Grambsch 2000; Therneau 2023), then bootstrapped with 5,000 replicates to generate population-level beta coefficients and 95% confidence intervals (CI) from individual caribou-years using the *boot* package (Canty and Ripley 2022) in *R* (R Core Team 2023). Where possible population-level estimates were generated using at least three caribou-years and a cut-off of 20 used steps; however, the cut-off was decreased for some candidate sets to a minimum of 10 used steps due to data limitations. The proportion of caribou-years that qualitatively followed the population trend (i.e., the same direction of response as the population mean) was then calculated per model coefficient.

2.6   Covariates

Movement and spatial-temporal covariates were developed for iSSA (Table 1, Table 2) and were extracted spatially or temporally to the endpoints of each used and available step, based on geographic coordinates or rounded hourly timestamps, respectively. Some spatial-temporal covariates were available daily, in which case these covariates were extracted to used and available steps based on the day. Covariates without adequate spatial and/or temporal coverage were not considered in iSSA models. All covariates were assessed for multicollinearity and if covariates were highly correlated (R ≥ 0.70), only one highly correlated covariate was retained for analyses.

Table 1: Proposed Movement Covariates for Inclusion in Integrated Step Selection Analyses (iSSA)

Covariate(s)	Covariate Code	Source	Brief Description and/or Definition	Expected Relationship with Caribou
Deflection step	DeflectionStep	Calculated from telemetry data, in reference to AWAR and Mine	▪ Coded as a binary covariate, which describes whether step was a deflection step (1) or not (0). ▪ Both used and available steps were assigned a 0 or 1 for deflection. ▪ Occurs only within five km of the AWAR and/or Mine. ▪ Deflection is defined as a turning angle ≥ 60° between the heading of the step and the average heading of the individual caribou's movement. ▪ The general direction of the individual caribou's movement was calculated using a moving window, over the 20-hour period preceding and four-hour period following each step and reflect the mean turning angle during this period (i.e., moving window).	Whether a caribou deflects from the AWAR and Mine may be influenced by: ▪ whether the alternative (i.e., available steps) would require the caribou to cross the AWAR or Mine, ▪ how long the caribou has been in the vicinity of the AWAR or Mine, ▪ distance to AWAR and Mine (e.g., the caribou selects habitat further from the disturbance), ▪ land cover (e.g., the caribou wants to move away from poor forage or the caribou selects good forage).
Paralleling step	ParallelStep	Calculated from telemetry data, in reference to AWAR and Mine	▪ Coded as a binary covariate, which describes whether step was a paralleling step (1) or not (0). ▪ Both used and available steps were assigned a 0 or 1 for paralleling. ▪ Occurs only within five km of the AWAR and/or Mine. ▪ Paralleling is defined as a turning angle of either 0° or 180° (± 10°) between the heading of the step and the general heading of the AWAR or Mine infrastructure. ▪ The general heading of the AWAR or Mine was estimated by creating ordered points every 250 m along the AWAR and Mine footprint perimeter, then estimating a straight line with a heading from north between two subsequent perimeter points. The nearest AWAR or Mine perimeter segment to each used or available step was used to calculate paralleling steps.	Whether a caribou parallels the AWAR and Mine may be influenced by: ▪ whether the alternative (i.e., available steps) would require the caribou to cross the AWAR or Mine, ▪ land cover (e.g., the caribou wants to move away from poor forage or the caribou selects good forage).
Crossing step	CrossingStep	Calculated from telemetry data, in reference to AWAR and Mine	▪ Coded as a binary covariate, which describes whether step was a crossing step (1) or not (0). ▪ Both used and available steps were assigned a 0 or 1 for crossing. ▪ Occurs only within five km of the AWAR and/or Mine. ▪ Crossing steps are defined as a step that intersected the AWAR and/or Mine.	Whether a caribou crosses the AWAR or Mine may be influenced by: ▪ land cover (e.g., the caribou wants to move away from poor forage or the caribou selects good forage), ▪ how long the caribou has been in the vicinity of the AWAR or Mine, ▪ how many other crossing events have taken place (i.e., by other caribou in the herd).
Step length	StepLength	Calculated from telemetry data	▪ Straight line distance between two consecutive relocations (Avgar et al. 2016). ▪ Transformed as the natural logarithm (ln) of step length for use in iSSA. ▪ Indicates movement rate (i.e., speed) when fix rates are constant. ▪ Longer steps between consecutive relocations are the result of caribou moving at higher speeds vs. shorter steps between consecutive relocations.	▪ Inclusion of step length supports iSSA modelling (Avgar et al. 2016). ▪ Can interact with other covariates (e.g., distance to AWAR and Mine) to understand how speed varies with distance from AWAR and Mine.

wsp

Table 1: Proposed Movement Covariates for Inclusion in Integrated Step Selection Analyses (iSSA)

Covariate(s)	Covariate Code	Source	Brief Description and/or Definition	Expected Relationship with Caribou
Turning angle	TurnAngle	Calculated from telemetry data	▪ Angular deviations between the headings of two consecutive steps (Avgar et al. 2016). ▪ Transformed as the cosine of turning angle for use in iSSA. ▪ By using cosine transformation, circular measure becomes a linear correlation factor between -1 and 1, where a negative value indicates moving backwards from the previous relocation and a positive value indicates moving forwards from the previous relocation. Zero indicates a random walk. ▪ Indicates directionality of movement.	▪ Inclusion of turning angle supports iSSA modelling (Avgar et al. 2016). ▪ Can interact with other covariates (e.g., distance to AWAR and Mine) to understand how turning angles vary at increasing distance from AWAR and Mine.

AWAR = All-weather Access Road

Table 2: Proposed Spatial-Temporal Covariates for Inclusion in Integrated Step Selection Analyses (iSSA). Covariates retained for iSSA are bolded.

Covariate(s)	Covariate Code	Source	Brief Description and/or Definition	Expected Relationship with Caribou	Retained for Analyses
▪ **All-terrain vehicle (ATV) traffic[a]**	▪ **ATVTraffic**	▪ Remote camera data (ERM 2023)	▪ Remote camera data were available for June and July 2020 to 2022 (n cameras = 23 in 2020; n = 4 in 2021; n = 3 in 2022). ▪ Maximum daily counts of ATVs, pooled across cameras, were calculated each year. ▪ ATV traffic was included as an estimate of daily harvest-related traffic; however, not all ATVs are related to harvest.	▪ Caribou movement may be influenced by harvest-related traffic.	Yes
▪ **AWAR and Mine closure status**	▪ NA	▪ Meliadine Mine caribou advisory data	▪ Open vs. closed status of AWAR and Mine. ▪ Any form of restriction or closure on the AWAR or at the Mine was assumed to represent a closure[b]. ▪ Temporal covariate that determines which data occur in Treatment Group 2 vs. Treatment Group 3 (see Section 2.7).	▪ Caribou movement may be influenced by closures and restrictions on the AWAR and at the Mine. ▪ Caribou may move faster and more directionally when no closures or restrictions are in place.	Yes – to inform treatment groups
▪ Calf age	▪ NA	▪ Estimated based on parturition dates, which were predicted using telemetry data	▪ Where sufficient data existed, predicted parturition dates (Section 2.2.1) were used to estimated calf age to a maximum age of 21 days. ▪ Refer to Appendix A for more information.	▪ Female caribou with young calves may stop more frequently to allow calves to rest, which impacts mobility/movement.	No – see Appendix A
▪ **Caribou hunter harvest[a]**	▪ **Harvest**	▪ Hunter harvest survey data (Agnico Eagle 2023b)	▪ Hunter harvest survey data were available for certain spatial grid cells, 2021 and 2022. ▪ Hunter harvest was included as a spatial and temporal estimate of harvest pressure.	▪ Caribou may move differently when hunter harvest is high, or in areas where hunter harvest is high, compared to when and where harvest is lower.	Yes

Table 2: Proposed Spatial-Temporal Covariates for Inclusion in Integrated Step Selection Analyses (iSSA). Covariates retained for iSSA are bolded.

Covariate(s)	Covariate Code	Source	Brief Description and/or Definition	Expected Relationship with Caribou	Retained for Analyses
▪ **Cumulative growing degree days above 0°C**	▪ **GrowingDays**	▪ Meliadine Mine and Rankin Inlet weather monitoring station data ▪ CARMA MERRA (Russell et al. 2013)	▪ Included based on feedback from TAG. ▪ Both linear and quadratic terms were considered. A quadratic term was considered based on relationship between calf age and cumulative daily movement, presented in Appendix A. ▪ Cumulative growing degree days above 0°C, calculated daily (equation available in Russell et al. 2013). ▪ Due to spatial and temporal resolution of CARMA MERRA data, hourly weather data from Meliadine Mine and Rankin Inlet weather monitoring stations were used to calculate this covariate. ▪ Data were assigned to steps based on whichever weather station was closer. ▪ Considered in base habitat model (see Section 2.8.1).	▪ If there have been more growing degree days, vegetation should be greener and caribou should move less directionally and more slowly.	Yes
▪ **Days since entering AWAR and Mine vicinity**	▪ **DaysVicinity**	▪ AWAR and Mine footprint ▪ Telemetry data	▪ Days since first entering the AWAR and Mine vicinity, where the vicinity was defined as a 5-km buffer surrounding the AWAR and Mine, calculated per caribou-year. ▪ Once a caribou entered the vicinity, all subsequent steps were assigned a number of 'days since entering the AWAR and Mine vicinity', regardless of whether the caribou exited and re-entered the vicinity. ▪ The maximum number of days that was applied was based on the day that the caribou left the vicinity and did not re-enter that summer season.	▪ Caribou may be more likely to cross the AWAR and Mine (and less likely to deflect or parallel) if they have been within five km of the AWAR and Mine for many days.	Yes
▪ Distance to AWAR ▪ **Distance to AWAR-Mine** ▪ Distance to Mine ▪ Distance to Rankin Inlet	▪ DistanceAWAR ▪ **DistanceAWARMine** ▪ DistanceMine ▪ DistanceRankin	▪ Mine footprint ▪ Settlement data for Nunavut	▪ Multiple covariate options considered, based on feedback from TAG.	▪ Caribou may move faster and more directionally when near the Mine and/or AWAR. ▪ Caribou may deflect from Mine and/or AWAR. ▪ Caribou may exhibit paralleling behaviour in response to Mine and/or AWAR. ▪ Caribou may cross AWAR after deflecting or paralleling. ▪ Nearby settlements (e.g., Rankin Inlet) may influence caribou movement.	Yes, however, some covariates were highly correlated (see Appendix B)

Table 2: Proposed Spatial-Temporal Covariates for Inclusion in Integrated Step Selection Analyses (iSSA). Covariates retained for iSSA are bolded.

Covariate(s)	Covariate Code	Source	Brief Description and/or Definition	Expected Relationship with Caribou	Retained for Analyses
■ Elevation ■ Terrain Ruggedness Index ■ Topographic Position Index ■ Vector Terrain Ruggedness	■ Elevation ■ TerrainRuggedness ■ TopoPosition ■ VectorRuggedness	■ Canadian Digital Elevation Model (DEM)	■ Topographic covariates were considered based on feedback from TAG. ■ Elevation was measured in metres above sea level. ■ Two terrain ruggedness indices were applied: Terrain Ruggedness Index (TRI; which indicates the amount of elevation difference between adjacent cells of a DEM) and Vector Terrain Ruggedness (VTR; which measures ruggedness as the variation in three-dimensional orientation of grid cells within a neighbourhood while accounting for slope and aspect). ■ Topographic Position Index helps differentiate between being on top of a hill vs. in a concave low-lying area. ■ Covariates were considered in base habitat model (see Section 2.8.1).	■ Topography may influence levels of insect harassment, energy expenditure, and caribou line of sight (e.g., ability to visualize AWAR and Mine, predators).	No (see Appendix B)
■ Enhanced vegetation index (EVI) ■ **Normalized difference vegetation index (NDVI)**	■ EVI ■ **Greenness**	■ United States Geological Survey (USGS)	■ Included based on feedback from TAG. ■ Indices of vegetation greenness. ■ Covariates were considered in base habitat model (see Section 2.8.1). ■ All NDVI or EVI images (with sufficiently low cloud and snow cover) available between 9 June and 22 August, each year, were averaged to calculate a mean NDVI and mean EVI, per year.	■ Caribou track green up in early summer and are expected to select more green areas during the post-calving period.	Yes, however, some covariates were highly correlated (see Appendix B)
■ **Mosquito Index** ■ Oestrid Index	■ **MosquitoIndex** ■ OestridIndex	■ Meliadine Mine and Rankin Inlet weather monitoring station data ■ CARMA MERRA (Russell et al. 2013)	■ Included based on feedback from TAG. ■ Insect harassment indices based on weather and temperature and calculated hourly (equations available in Russell et al. 2013). ■ Due to spatial and temporal resolution of CARMA MERRA data, hourly weather data from Meliadine Mine and Rankin Inlet weather monitoring stations were used to calculate this covariate. ■ Data were assigned to steps based on whichever weather station was closer. ■ Considered in base habitat model (see Section 2.8.1).	■ Caribou are expected to move faster when insect harassment is high.	Yes; however, some covariates were highly correlated (see Appendix B)
■ **Land cover**	■ **Graminoid** ■ **HeathForb** ■ **Lake** ■ **Lichen** ■ **NonVegetated** ■ **Shrub**	■ Kivalliq Land Cover Data	■ Ecological land cover reclassified into six relevant groupings based on reclassifications used by Boulanger et al. (2020; Appendix C). ■ Reclassified land cover covariates were calculated based on proportion of each target land cover within a 250-m moving window. ■ Land cover was considered in base habitat model (see Section 2.8.1). ■ Note that Kivalliq Land Cover Data were not available for some portions of the study area (see Appendix C), so telemetry data in these regions could not be included in analyses.	■ Caribou are expected to select land cover where preferred forage is available (e.g., heath/forb) and avoid land cover where movement is more difficult (e.g., lakes) or where forage is not available (e.g., non-vegetated).	Yes

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Table 2: Proposed Spatial-Temporal Covariates for Inclusion in Integrated Step Selection Analyses (iSSA). Covariates retained for iSSA are bolded.

Covariate(s)	Covariate Code	Source	Brief Description and/or Definition	Expected Relationship with Caribou	Retained for Analyses
▪ **Number previous AWAR and/or Mine crossings**	▪ **CumulCrossings**	▪ AWAR and Mine footprint ▪ Telemetry data	▪ Temporal movement covariate representing the daily cumulative number of AWAR or Mine crossings by collared caribou per year.	▪ Caribou may be more likely to cross the AWAR and Mine (and less likely to deflect from or parallel) if many others have already crossed the AWAR and/or Mine.	Yes
▪ **Total AWAR traffic**[(a)] ▪ Project AWAR traffic ▪ Local AWAR traffic	▪ **AWARTrafficTotal** ▪ AWARTrafficProject ▪ AWARTrafficLocal	▪ Meliadine Mine traffic counter data	▪ Considered based on feedback from TAG. ▪ Daily Project-related and non-Project-related (i.e., local) vehicle traffic on the AWAR.	▪ Caribou movement may be influenced by traffic rates on the AWAR. ▪ Caribou may move faster and more directionally when traffic is high, compared to when traffic is low.	Yes, however, some covariates were highly correlated (see Appendix B)

AWAR = All-weather Access Road; CARMA = CircumArctic *Rangifer* Monitoring and Assessment; MERRA = Modern Era Retrospective Analysis for Research and Applications

a) These covariates had a limited spatial and/or temporal extent and were therefore tested in a subset candidate set (more information in Section 2.8).

b) This assumption was made to conservatively assign AWAR closure status and, subsequently, treatment groups. Further, this assumption allowed for a more balanced sample size of caribou-years in Treatment Groups 2 and 3 (more information on treatment groups in Section 2.7).

2.7   Treatment Groups

Caribou were classified into four treatment groups based on their potential to interact with the AWAR and Mine, whether they interacted with the AWAR during Advanced Exploration and Construction and Operations development phases, and whether they interacted with the AWAR while it was open or closed to Project traffic (Table 3). This approach is consistent with the recommendations of Flydal et al. (2019), which highlights the importance of including reference and/or baseline data to strengthen inferences about effects from development disturbance.

Caribou locations that occurred within (and up to) 15 km from the AWAR and Mine had the potential to interact with the AWAR and/or Mine ('AWAR and Mine interactors'; Table 3). Caribou were assigned to treatment groups based on whether they interacted with the AWAR during one of two development phases: Advanced Exploration (i.e., from 2012 to 2017, when AWAR had mostly public use) or Construction and Operations (i.e., from 2018 to 2022, when AWAR had public and Project use). All AWAR and Mine interactors in the Construction and Operations phase were assigned an AWAR closure status (i.e., 'open' or 'closed'; Table 3). Treatment Group 4 ('Control') included caribou telemetry locations farther than 15 km from the AWAR and Mine (Table 3), but within the study area.

Caribou-years were assigned to each treatment group to account for individuals that were in one group in year t and in another group in year t+1. For example, an individual caribou could be in Treatment Group 2 in year 2019 and Treatment Group 4 in 2020. The sample size of caribou-years and telemetry locations available for Treatment Group 1 depended on how many caribou interacted with the AWAR and Mine during Advanced Exploration. The sample size of caribou-years and telemetry locations in Treatment Group 2 depended on how many caribou interacted with the AWAR and Mine while the AWAR was 'open', acknowledging that the AWAR was closed to Project traffic once 50 or more caribou were observed within 100 m of the road. The sample size of caribou-years and telemetry locations in Treatment Group 3 depended on the cumulative duration of AWAR closures between 2018 and 2022. The sample size of caribou-years and telemetry locations for Treatment Group 4 depended on the maximum extent of the study area.

Table 3: Spatial and temporal subsets of caribou-years, based on potential for caribou to interact with the All-Weather Access Road (AWAR) and Mine, AWAR and Mine development phase, and AWAR and Mine closure status, resulting in four treatment groups.

Potential to Interact with AWAR and Mine	Temporal Subsets		Resulting Treatment Groups
	AWAR and Mine Development Phase	AWAR and Mine Closure Status	
AWAR and Mine interactors (i.e., comprised of telemetry locations ≤ 15 km of the AWAR and/or Mine; when caribou were in this area, they had the potential to interact with the AWAR and/or Mine)	**Advanced Exploration** (i.e., primarily public use; 2012 to 2017)	NA	**Treatment Group 1:** AWAR and Mine interactors × Public use
	Construction and Operations (i.e., public and Project use; 2018 - 2022)	**Open**	**Treatment Group 2:** AWAR and Mine interactors × Public and Project use × Open
		Closed	**Treatment Group 3:** AWAR and Mine interactors × Public and Project use × Closed
Control (i.e., comprised of telemetry locations > 15 km from the AWAR and/or Mine; when caribou were in this region, they had no potential to interact with the AWAR and/or Mine)	NA; data spanned same time period as AWAR and Mine interactors (i.e., Treatment Groups 1 to 3, or 2012 to 2022)	NA	**Treatment Group 4:** Control

2.8   Candidate Models

Candidate sets of models were developed *a priori* and applied to relevant treatment groups to meet Commitment 38 study objectives. In general, candidate sets of models included a base habitat model, which was developed to account for general habitat selection (Section 2.8.1), and several numbered test models, which were developed to test specific hypotheses related to explaining why caribou likely exhibit certain movement patterns.

An information-theoretic approach was used to evaluate the candidate sets of models (Burnham and Anderson 2002). Information theory is based on the concepts of simplicity and parsimony, which suggest that the simplest explanation is probably the most likely. AIC balances explanatory value with the number of covariates when evaluating a model by assigning a penalty for the number of model parameters. Each candidate set was ranked by delta AIC (ΔAIC), or the difference between the AIC of the best fitting model (i.e., top model) and each model in the set. A competing top model was defined as any model within two AIC values (i.e., ΔAIC ≤ 2.0) of the top model (Burnham and Anderson 2002).

2.8.1   Base Habitat Model

Table 4 presents the candidate set of models used to develop a base habitat model. Each model included the two standard iSSA movement parameters, StepLength and TurnAngle (defined in Table 1), and a single habitat covariate, and were estimated for each caribou-year, regardless of treatment group. Each caribou-year's candidate set was ranked from smallest to largest ΔAIC (i.e., from best-fitting to least-fitting model) and the four models that occurred most often in the top five were used to inform the covariates included in the base habitat model.

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Table 4: Candidate set of models used to select habitat covariates for the base habitat model.

Model Name	Model Structure[a]
Habitat 1	Greenness + StepLength +TurnAngle
Habitat 2	MosquitoIndex + StepLength +TurnAngle
Habitat 3	Lichen + StepLength +TurnAngle
Habitat 4	HeathForb + StepLength +TurnAngle
Habitat 5	Graminoid + StepLength +TurnAngle
Habitat 6	Shrub + StepLength +TurnAngle
Habitat 7	Lake + StepLength +TurnAngle
Habitat 8	NonVegetated + StepLength +TurnAngle
Habitat 9	GrowingDays*StepLength + StepLength +TurnAngle
Habitat 10	TerrainRuggedness + StepLength +TurnAngle
Habitat 11	VectorRuggedness + StepLength +TurnAngle
Habitat 12	TopoPosition + StepLength +TurnAngle
Habitat 13	GrowingDays^2*StepLength + StepLength +TurnAngle

a)   An asterisk (*) indicates an interaction between two covariates.

2.8.2   Caribou Movement: Influence of All-Weather Access Road and Mine

Table 5 presents the candidate set of models used to evaluate changes to caribou movement, including speed and directionality, in response to the AWAR and Mine, while also considering additional natural factors. The caribou movement candidate set was applied to caribou-years from Treatment Groups 1 to 3 (i.e., 2012 to 2022, ≤ 15 km of AWAR and/or Mine) to compare model results for caribou that interacted with the AWAR and Mine between two development phases (i.e., Advanced Exploration and Construction and Operations) and while the AWAR and Mine were open and closed. Population-level beta coefficients and 95% CI were informed by caribou-years with at least 20 used steps.

Table 5: Candidate models to evaluate influence of the All-Weather Access Road (AWAR) and Mine and land cover on caribou movement, 2012 to 2022, within 15 km of the AWAR and/or Mine.

Model Name	Model Structure[a]	Hypotheses Being Tested
Habitat	Lake + Greenness + HeathForb + GrowingDays*StepLength + TurnAngle	Accounts for basic covariates expected to influence caribou habitat selection, regardless of AWAR and Mine, during post-calving and summer seasons.
Model 1	Habitat + DistanceMineAWAR*TurnAngle + DistanceMineAWAR*StepLength	Tests hypothesis that caribou speed and directionality varies as a function of distance to AWAR and Mine.
Model 2	Habitat + Lake*TurnAngle + Lake*StepLength	Caribou appear to avoid lakes, which may cause movement patterns that may look like avoidance of the AWAR and Mine (if lakes are close to the Mine). This model tests the hypothesis that speed and directionality will vary as a function of lake land cover in area.
Model 3	Habitat + Graminoid*TurnAngle + Graminoid*StepLength	These models test the hypothesis that speed and directionality will vary as a function of different land cover classes. Caribou are expected to have less directional movement and shorter steps when foraging such as when in heath-forb or lichen land cover. Caribou are expected to have more directional movement and longer steps where forage is not available, such as in non-vegetated land cover.
Model 4	Habitat + Shrub*TurnAngle + Shrub*StepLength	
Model 5	Habitat + Lichen*TurnAngle + Lichen*StepLength	
Model 6	Habitat + NonVegetated*TurnAngle + NonVegetated*StepLength	
Model 7	Habitat + HeathForb*TurnAngle + HeathForb*StepLength	
Model 8	Habitat + Greenness*DistanceMineAWAR + HeathForb*DistanceMineAWAR + Lichen*DistanceMineAWAR	These models test the hypothesis that caribou movement behaviours vary while foraging as a function of distance to AWAR and Mine. If proximity to AWAR and Mine influences caribou, caribou should vary step length and directionality when foraging and/or when moving through non-vegetated areas. Comparing these models with Models 3–7 will help to understand the interaction of land cover and proximity to the Project.
Model 9	Habitat + NonVegetated*DistanceMineAWAR	

a)   An asterisk (*) indicates an interaction between two covariates.

2.8.3   Caribou Movement: Influence of Harvest and Traffic

Table 6 presents the candidate set of models used to evaluate changes to caribou movement, including speed and directionality, in response to the AWAR and Mine, while also evaluating changes in movement due to caribou harvest pressure, ATV traffic, and total AWAR traffic. The caribou harvest candidate set was applied using a subset of telemetry data from June and July 2021, within 15 km of the AWAR and/or Mine, when harvest and traffic data were available, and for Treatment Groups 2 and 3. Data were insufficient to constrain population-level beta coefficients to caribou-years with ≥ 20 used steps, so the cut-off of ≥ 15 used steps was used.

Table 6: Candidate models to evaluate influence of the All-Weather Access Road (AWAR) and Mine, caribou harvest, and AWAR traffic on caribou movement in June and July 2021, within 15 km of the AWAR and/or Mine.

Model Name	Model Structure[a]	Hypotheses Being Tested
All candidate models from Table 5 plus the following three models		
Model 10[b]	Habitat + AWARTrafficTotal*TurnAngle + AWARTrafficTotal*StepLength	This model tests the hypothesis that caribou speed and directionality is influenced by traffic volume on the AWAR.
Model 11[b]	Habitat + ATVTraffic*TurnAngle + ATVTraffic*StepLength	This model tests the hypothesis that caribou speed and directionality is influenced by ATV traffic on the AWAR.
Model 12[b]	Habitat + Harvest*TurnAngle + Harvest*StepLength	This model tests the hypothesis that caribou speed and directionality is influenced by harvest pressure.

a)   An asterisk (*) indicates an interaction between two covariates.

b)   For a subset of time when AWARTrafficTotal, ATVTraffic, and Harvest data were available (i.e., June and July 2021), Models 1 to 12 were estimated.

2.8.4   Crossing, Deflection, and Paralleling Steps: Influence of All-Weather Access Road and Mine

Specific movement responses, including crossing, deflection, and paralleling, were defined collaboratively by the TAG and described in Table 1. Candidate sets of models presented in Tables 7 to 9 were designed to test hypotheses related to how specific movement responses (i.e., crossing, deflection, paralleling) vary as a function of land cover and proximity to AWAR and Mine. Crossing, deflection, and paralleling candidate sets were applied to Treatment Groups 1 to 3, within five km of the AWAR and/or Mine (described in Table 1). Data were insufficient to constrain population-level beta coefficients to caribou-years with ≥ 20 used steps, so the cut-off of ≥ 10 used steps was used.

Table 7: Candidate models to evaluate caribou crossing behaviour, in response to the All-Weather Access Road (AWAR) and Mine, 2012 to 2022, within five km of the AWAR and/or Mine.

Model Name	Model Structure[a]	Hypotheses Being Tested
Habitat	Lake + Greenness + HeathForb + GrowingDegreeDays*StepLength + TurnAngle	Accounts for basic covariates expected to influence caribou habitat selection, regardless of AWAR and Mine, during post-calving and summer.
Model 1	Habitat + DistanceMineAWAR*CrossingStep	This model tests whether caribou crossing the AWAR and/or Mine is a function of proximity to AWAR and/or Mine.
Model 2	Habitat + NonVegetated*CrossingStep	These models test whether caribou cross the AWAR and/or Mine as a function of land cover at the end of their step. For example, a caribou may cross to avoid non-vegetated land cover or lakes, or may cross to seek out forage (e.g., heath-forb, lichen).
Model 3	Habitat + Lake*CrossingStep	
Model 4	Habitat + Shrub*CrossingStep	
Model 5	Habitat + Graminoid*CrossingStep	
Model 6	Habitat + HeathForb*CrossingStep	
Model 7	Habitat + Lichen*CrossingStep	
Model 8	Habitat + DaysVicinity*CrossingStep + CumulCrossings*CrossingStep	This model tests whether caribou cross the AWAR and/or Mine because they have been in the vicinity for longer and because many other caribou from the QAM herd have already crossed.

a)   An asterisk (*) indicates an interaction between two covariates.

Table 8: Candidate models to evaluate caribou deflection behaviour, in response to the All-Weather Access Road (AWAR) and Mine, 2012 to 2022, within five km of the AWAR and/or Mine.

Model Name	Model Structure[a]	Hypotheses Being Tested
Habitat	Lake + Greenness + HeathForb + GrowingDegreeDays*StepLength + TurnAngle	Accounts for basic covariates expected to influence caribou habitat selection, regardless of AWAR and Mine, during post-calving and summer.
Model 1	Habitat + DistanceMineAWAR*DeflectionStep	This model tests whether caribou deflection is a function of proximity to AWAR and/or Mine. For example, caribou may be more likely to deflect from their general path of movement if they are closer to the AWAR and/or Mine.
Model 2	Habitat + NonVegetated*DeflectionStep	These models test whether caribou deflection is related to land cover. For example, a caribou may deflect to avoid non-vegetated land cover or lakes, or may deflect to seek out forage (e.g., heath-forb, lichen).
Model 3	Habitat + Lake*DeflectionStep	
Model 4	Habitat + Shrub*DeflectionStep	
Model 5	Habitat + Graminoid*DeflectionStep	
Model 6	Habitat + HeathForb*DeflectionStep	
Model 7	Habitat + Lichen*DeflectionStep	
Model 8	Habitat + CrossingStep*DeflectionStep	This model tests whether caribou deflection is related to whether the caribou has to the cross the AWAR and/or Mine. For example, a caribou may deflect to avoid crossing the AWAR and/or Mine.

a) An asterisk (*) indicates an interaction between two covariates.

Table 9: Candidate models to evaluate caribou paralleling behaviour, in response to the All-Weather Access Road (AWAR) and Mine, 2012 to 2022, within five km of the AWAR and/or Mine.

Model Name	Model Structure[a]	Hypotheses Being Tested
Habitat	Lake + Greenness + HeathForb + GrowingDegreeDays*StepLength + TurnAngle	Accounts for basic covariates expected to influence caribou habitat selection, regardless of AWAR and Mine, during post-calving and summer.
Model 1	Habitat + DistanceMineAWAR*ParallelStep	This model tests whether caribou paralleling is a function of proximity to AWAR and/or Mine. For example, caribou may be more likely parallel the AWAR and/or Mine if they are closer to the AWAR and/or Mine.
Model 2	Habitat + NonVegetated*ParallelStep	These models test whether caribou paralleling is related to land cover. For example, a caribou paralleling the AWAR and/or Mine may not be related to the AWAR and/or Mine but instead related to avoiding non-vegetated land cover or seeking out forage (e.g., heath-forb, lichen).
Model 3	Habitat + Lake*ParallelStep	
Model 4	Habitat + Shrub*ParallelStep	
Model 5	Habitat + Graminoid*ParallelStep	
Model 6	Habitat + HeathForb*ParallelStep	
Model 7	Habitat + Lichen*ParallelStep	
Model 8	Base + CrossingStep*ParallelStep	This model tests whether caribou paralleling is related to whether the caribou has to the cross the AWAR and/or Mine. For example, a caribou may parallel the AWAR and/or Mine to avoid crossing the AWAR and/or Mine.

a) An asterisk (*) indicates an interaction between two covariates.

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2.8.5   Zone of Influence

A ZOI, if present, is expected to result in observable changes to caribou habitat selection, movement, or both, as a function of distance from AWAR and Mine. The candidate set of models presented in Table 10 were applied for Treatment Groups 1 to 3 to assess the presence of a ZOI due to the Mine and introduction of Mine traffic on the AWAR.

The ZOI candidate set was designed to test caribou movement parameters split at different distances (i.e., breakpoints, or potential ZOI extents) from the AWAR and Mine. Ten breakpoints were selected by the TAG. The first breakpoint occurred at one km, the next at two km, the third at three km, and the farthest at 10 km (Table 10). To test each potential ZOI extent, a binary covariate representing steps within the breakpoint (i.e., within one km, within two km, …, within 10 km) vs. steps farther than the breakpoint (i.e., farther than one km, farther than two km, …, farther than 10 km) was included in candidate models. The binary breakpoint covariate was interacted with movement parameters (i.e., StepLength, TurnAngle) to test whether caribou movement differs on either side of the breakpoint and evaluate whether a ZOI may be present.

Table 10: Candidate models to evaluate the presence and, if present, the extent of a Zone of Influence surrounding the All-Weather Access Road (AWAR) and Mine, 2012 to 2022, within 15 km of the AWAR and/or Mine.

Model Name	Model Structure[a]	Hypotheses Being Tested
Habitat	Lake + Greenness + HeathForb + GrowingDegreeDays*StepLength + TurnAngle	Accounts for basic covariates expected to influence caribou habitat selection, regardless of AWAR and Mine, during post-calving and summer.
Model 1	Habitat + BreakPt1km*TurnAngle + BreakPt1km*StepLength	If a ZOI existed at (or near) a particular breakpoint (i.e., buffered distance from the AWAR and Mine), caribou movement patterns were expected to differ on either side of the breakpoint/buffer. For example, if a ZOI existed around six km from the AWAR and Mine, caribou steps within this buffer may be directional and quick, whereas steps outside this buffer may be less directional and slow.
Model 2	Habitat + BreakPt2km*TurnAngle + BreakPt2km*StepLength	
Model 3	Habitat + BreakPt3km*TurnAngle+ BreakPt3km*StepLength	
Model 4	Habitat + BreakPt4km*TurnAngle+ BreakPt4km*StepLength	
Model 5	Habitat + BreakPt5km*TurnAngle + BreakPt5km*StepLength	
Model 6	Habitat + BreakPt6km*TurnAngle+ BreakPt6km*StepLength	
Model 7	Habitat + BreakPt7km*TurnAngle+ BreakPt7km*StepLength	
Model 8	Habitat + BreakPt8km*TurnAngle + BreakPt8km*StepLength	
Model 9	Habitat + BreakPt9km*TurnAngle + BreakPt9km*StepLength	
Model 10	Habitat + BreakPt10km*TurnAngle + BreakPt10km*StepLength	

a)   An asterisk (*) indicates an interaction between two covariates.

2.8.6   Comparison with Control Group

Lastly, Table 11 includes a candidate set of models applied to all four treatment groups. The control candidate set of models was limited in that it could not include covariates related to the AWAR or Mine because caribou in Treatment Group 4 did not interact with the AWAR or Mine. The purpose of this candidate set was to compare baseline caribou movement and selection among the treatment groups.

Table 11: Candidate models to compare baseline movement metrics between 'interactor', 'non-interactor', and 'control' caribou, between 2012–2022, for the entire study area where land cover data were available (Appendix C).

Model Name	Model Structure[a]	Hypotheses Being Tested
Habitat	Lake + Greenness + HeathForb + GrowingDegreeDays*StepLength + TurnAngle	Accounts for basic covariates expected to influence caribou habitat selection, regardless of AWAR and Mine, during post-calving and summer.
Model 1	Habitat + HeathForb*StepLength + HeathForb*TurnAngle	Model tests whether caribou movement speed and directionality is predominantly related to forage (e.g., heath-forb land cover).
Model 2	Habitat + Lake*StepLength + Lake*TurnAngle	Model tests whether caribou movement speed and directionality is predominantly related to avoidance of water (e.g., lake land cover).
Model 3	Habitat + Greenness*StepLength + Greenness*TurnAngle	Model tests whether caribou movement speed and directionality is predominantly related to vegetation green-up.

a)   An asterisk (*) indicates an interaction between two covariates.

3.0   RESULTS

3.1   Parturition Predictions

A total of 630 caribou-years, from 2004 to 2022, were used to predict parturition dates for the QAM herd. Of these caribou-years, 84 had insufficient data to predict parturition (i.e., too many missing fixes). Thus, the IBM was used to estimate parturition for 546 caribou-years. A total of $n = 12$ caribou-years did not support parturition predictions (all three parturition models were competing). Parturition could not be determined for $n = 7$ caribou-years, where 'no-calving' (i.e., M0) and 'calving' models (i.e., M1 and M2) were competing. Calving was certain but calf mortality was uncertain for $n = 419$ caribou-years. Calf survival and calf mortality were predicted for $n = 2$ and $n = 38$ caribou-years, respectively. Finally, no calving was predicted for $n = 68$ caribou-years.

The earliest and latest dates of calving within the QAM herd were Julian day 142 (or 21 May, in 2020) and Julian day 174 (or 23 June, in 2009). The resulting temporal window used to constrain the Commitment 38 study area was Julian day 142 to Julian day 195 (i.e., latest parturition date plus 21 days [Section 2.2]; 14 July).

3.2   Base Habitat Model

A total of 393 caribou-years, from 2012 to 2022, were available for informing a base habitat model. Model 7 (Lake), Model 1 (HeathForb), Model 4 (Greenness), and Model 9 (GrowingDays*StepLength) had 389, 384, 355, and 282 occurrences as competing top models, respectively (Table 4; Figure 3). Thus, lakes, heath-forb land cover, greenness, and cumulative growing degree days > 0°C were included as covariates in the base habitat model to account for general caribou habitat selection during post-calving and summer seasons. Movement parameters (i.e., step length and turning angle) were also included as covariates in the base habitat model.
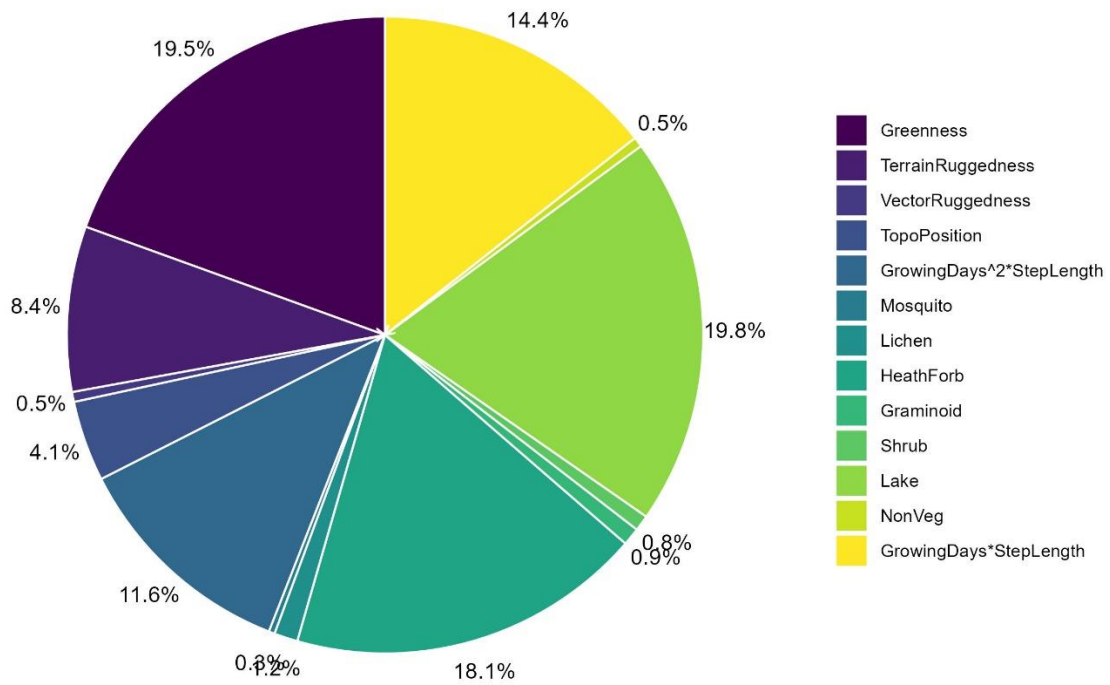
Figure 3: Results of base habitat model selection. A total of 393 caribou-years, from 2012 to 2022, were used to inform a base habitat model.

3.3   Caribou Movement: Influence of All-Weather Access Road and Mine

Models testing the influence of the AWAR and/or Mine on caribou movement and directionality (Table 5) converged for 97%, 82%, and 80% of caribou-years within Treatment Groups 1, 2, and 3, respectively. The base habitat model was the population model for all three treatment groups (Figure 4). Specifically, the base habitat model was a competing top model for 23%, 24%, and 23% of caribou-years within Treatment Groups 1, 2, and 3, respectively.

Based on bootstrapped population means, caribou selected habitats that were greener, had more heath-forb land cover, and had less lake land cover, regardless of treatment group (Figure 5; Table 12). Approximately 74.1%, 68.4%, and 75.0% of caribou-years in Treatment Groups 1, 2, and 3, respectively, exhibited the population response to greenness (Table 13). Similarly, 85.2%, 65.8%, and 66.7% of caribou-years in Treatment Groups 1, 2, and 3, respectively, exhibited the population response to heath-forb land cover (Table 13). Lastly, 74.1%, 94.7%, and 90.0% of caribou-years in Treatment Groups 1, 2, and 3, respectively, responded to lake land cover like the population (Table 13).

The population mean of the interaction between step length and growing degree days > 0°C was positive for all treatment groups, indicating that movement was faster as growing degree days increased (Figure 5; Table 12). Approximately 66.7%, 78.9%, and 85% of caribou-years in Treatment Groups 1, 2, and 3 followed this pattern, respectively (Table 13).

The population mean of the coefficient for turning angle was negative, indicating non-directional movement, regardless of treatment group (Figure 5; Table 12). Regardless of treatment group, 100.0% of individual caribou-years followed this pattern (Table 13). The population mean for step length was negative, indicating slower movement, regardless of treatment group (Figure 5; Table 12). Over 63% of individual caribou-years followed this pattern, regardless of treatment group (Table 13).
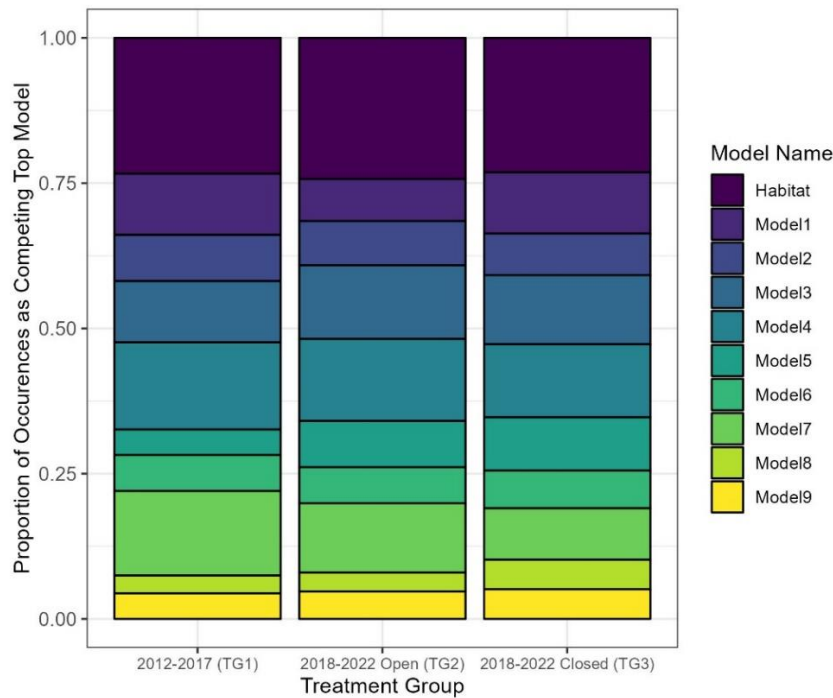
Figure 4: Proportion of occurrences as a competing top model for the caribou movement candidate set (presented in Table 5). Treatment Groups 1, 2, and 3 were comprised of *n* = 107, 146, and 155 caribou-years, respectively.

Figure 5: Predicted population response for covariates included in population models for Treatment Groups 1 to 3, based on results from the caribou movement candidate set. Predicted population responses (symbolized with circles) were informed by caribou-years with *n* ≥ 20 used steps. Horizontal lines indicate bootstrapped 95% confidence intervals (CIs). CIs that overlap 0 indicate no, or zero, population-level response.

Table 12: Beta coefficient estimates (β) and upper and lower 95% confidence interval limits for covariates included in population models, per treatment group. Population estimates were informed from results of the caribou movement candidate set and included caribou-years with *n* ≥ 20 used steps.

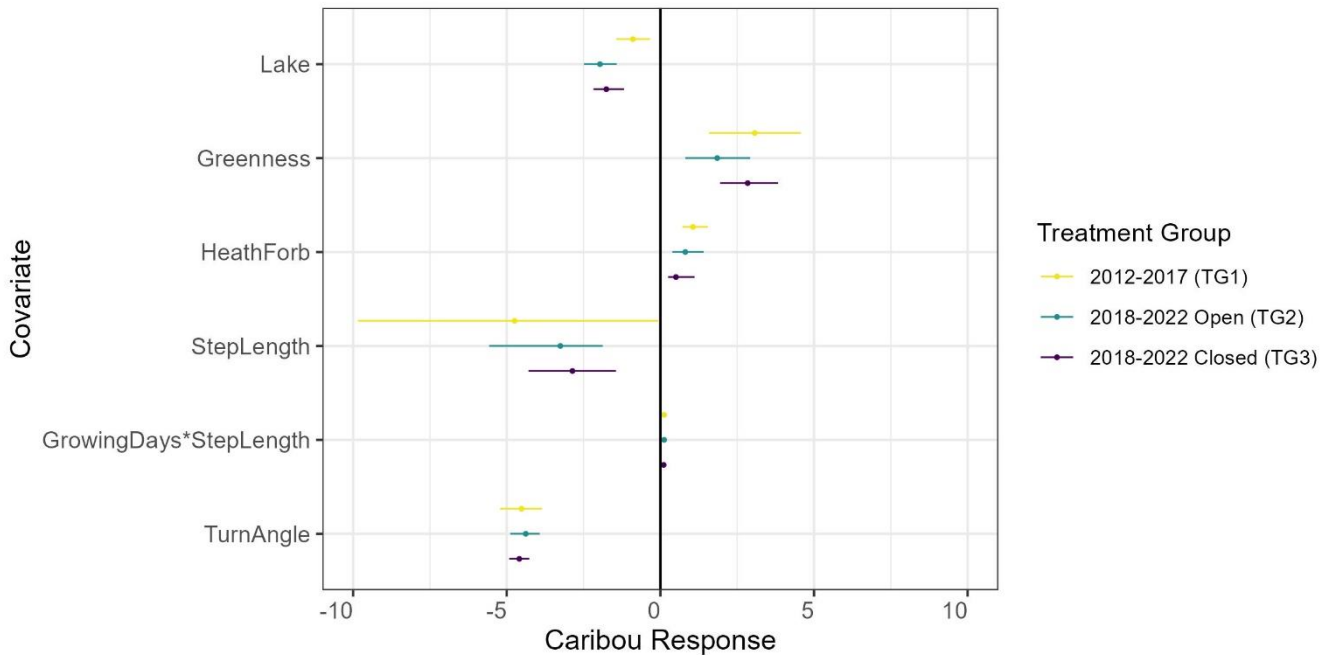| Covariate[a]	Treatment Group 1			Treatment Group 2			Treatment Group 3		
	β	Lower 95% Limit	Upper 95% Limit	β	Lower 95% Limit	Upper 95% Limit	β	Lower 95% Limit	Upper 95% Limit
Lake	-0.89	-1.43	-0.34	-1.97	-2.49	-1.42	-1.76	-2.18	-1.18
Greenness	3.07	1.58	4.57	1.85	0.81	2.93	2.84	1.94	3.83
HeathForb	1.06	0.72	1.54	0.81	0.39	1.41	0.51	0.25	1.11
StepLength	-4.75	-9.84	-0.07	-3.25	-5.57	-1.88	-2.86	-4.29	-1.45
GrowingDays*StepLength	0.12	0.04	0.21	0.12	0.07	0.21	0.11	0.06	0.15
TurnAngle	-4.52	-5.21	-3.85	-4.38	-4.88	-3.93	-4.59	-4.92	-4.26

a)   An asterisk (*) indicates an interaction between two covariates.

Table 13: Percentage (%) of caribou-years with positive (+) and negative (–) responses to covariates included in the population model, per treatment group. Population estimates were informed from results of the caribou movement candidate set and included caribou-years with *n* ≥ 20 used steps.

Covariate[a]	Treatment Group 1		Treatment Group 2		Treatment Group 3	
	+	–	+	–	+	-
Lake	25.9	74.1	5.3	94.7	10.0	90.0
Greenness	74.1	25.9	68.4	31.6	75.0	25.0
HeathForb	85.2	14.8	65.8	34.2	66.7	33.3
StepLength	37.0	63.0	15.8	84.2	20.0	80.0
GrowingDays*StepLength	66.7	33.3	78.9	21.1	85.0	15.0
TurnAngle	0.0	100.0	0.0	100.0	0.0	100.0
Total caribou-years with *n* ≥ 20 used steps	27		38		60	

a)   An asterisk (*) indicates an interaction between two covariates.

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3.4   Caribou Movement: Influence of Harvest and Traffic

Models testing the influence of caribou harvest and AWAR traffic on caribou movement and directionality, for June and July 2021 (Table 6), converged for 82% and 73% of caribou-years within Treatment Groups 2 and 3, respectively. The base habitat model was the population model for both treatment groups, representing a competing top model for 26% and 18% of caribou-years within Treatment Groups 2 and 3, respectively (Figure 6). Because the base habitat model has been described above in Section 3.3 it will not be presented again in this section.

Figure 6: Proportion of occurrences as a competing top model for the caribou harvest candidate set (presented in Table 6). Treatment Groups 2 and 3 were comprised of *n* = 36 and 46 caribou-years, respectively.

3.5   Crossing Steps: Influence of All-Weather Access Road and Mine

Models testing how crossing steps varied as a function of land cover and proximity to AWAR and/or Mine, within five km of the AWAR and/or Mine (Table 7), converged for 82%, 73%, and 68% of caribou-years within Treatment Groups 1, 2, and 3, respectively. Model 8 was the population model for both Treatment Groups 1 and 3; the base habitat model was the population model for Treatment Group 2 (Figure 7). Specifically, Model 8 was a competing top model for 35% and 51% of caribou-years within Treatment Groups 1 and 3, respectively, and the base habitat model was a competing top model for 35% of caribou-years within Treatment Group 2.

Based on bootstrapped population means from population models, caribou within five km of the AWAR and/or Mine selected habitats that had less lake land cover (Figure 8; Table 14). Generally, caribou within five km of the AWAR and/or Mine did not respond to heath-forb land cover or greenness, as indicated by beta estimates that were close to zero and 95% CIs that overlapped zero (Figure 8; Table 14). Similar to results presented for the

base habitat model within 15 km of the AWAR and/or Mine (Figure 5), caribou within five km of the AWAR and/or Mine moved less directionally (Figure 8 Table 14).

For Treatment Group 3, where Model 8 was the population model, the interaction term between DaysVicinity and CrossingStep was positive, indicating that caribou are more likely to cross the AWAR and/or Mine when they have been in the vicinity of the AWAR and/or Mine for longer. For approximately half of caribou-years in Treatment Group 3 (i.e., 52.0%), whether a caribou crossed the AWAR and/or Mine was positively related to the number of days the caribou had been in vicinity of the AWAR and/or Mine (Table 15). The bootstrapped population mean for the interaction term between CumulCrossings and CrossingStep was positive for Treatment Group 3, indicating that caribou are more likely to cross the AWAR and/or Mine when more caribou in the herd have crossed (Table 14). However, the population trend was observed for only 35.0% of caribou-years (Table 15).

Although Model 8 was the population model for Treatment Group 1, the 95% CIs for both interaction terms (i.e., DaysVicinity*CrossingStep and CumulCrossings*CrossingStep) overlapped zero, indicating that whether caribou crossed the AWAR and/or Mine was unrelated to the number of days that caribou had been in the vicinity or number of previous caribou crossings.

Model 1, which included the 'Distance to AWAR and/or Mine' covariate interacted with crossing steps (Table 7), was the top model for three caribou-years in Treatment Group 3, among the 227 caribou-years across the three treatment groups (i.e., 1.3% of caribou-years). However, all beta coefficient estimates for DistAWARMine*CrossingStep were either zero or had 95% CI that overlapped zero.
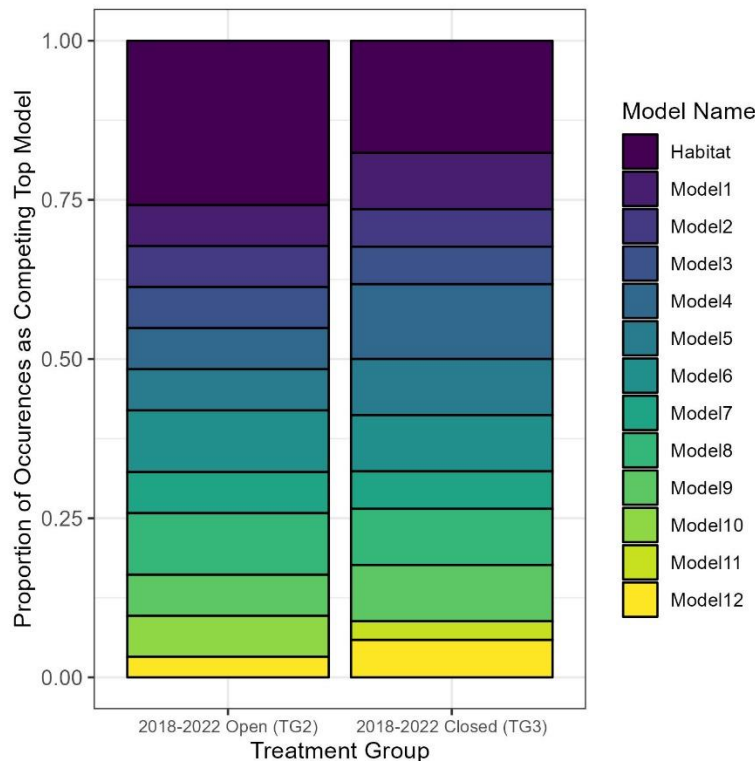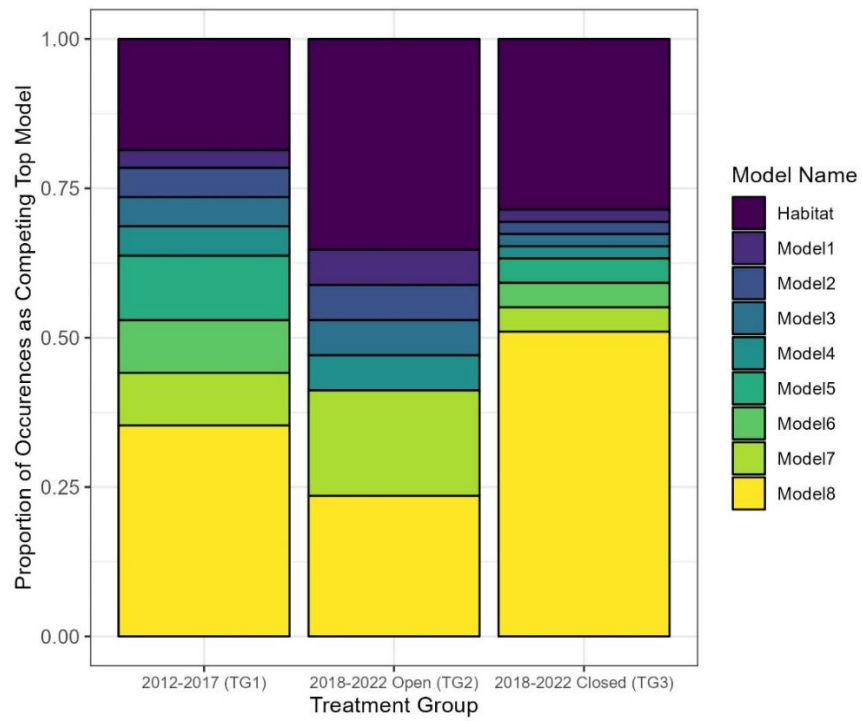
Figure 7: Proportion of occurrences as a competing top model for the crossing candidate set (presented in Table 7). Treatment Groups 1, 2, and 3 were comprised of *n* = 94, 77, and 155 caribou-years, respectively.
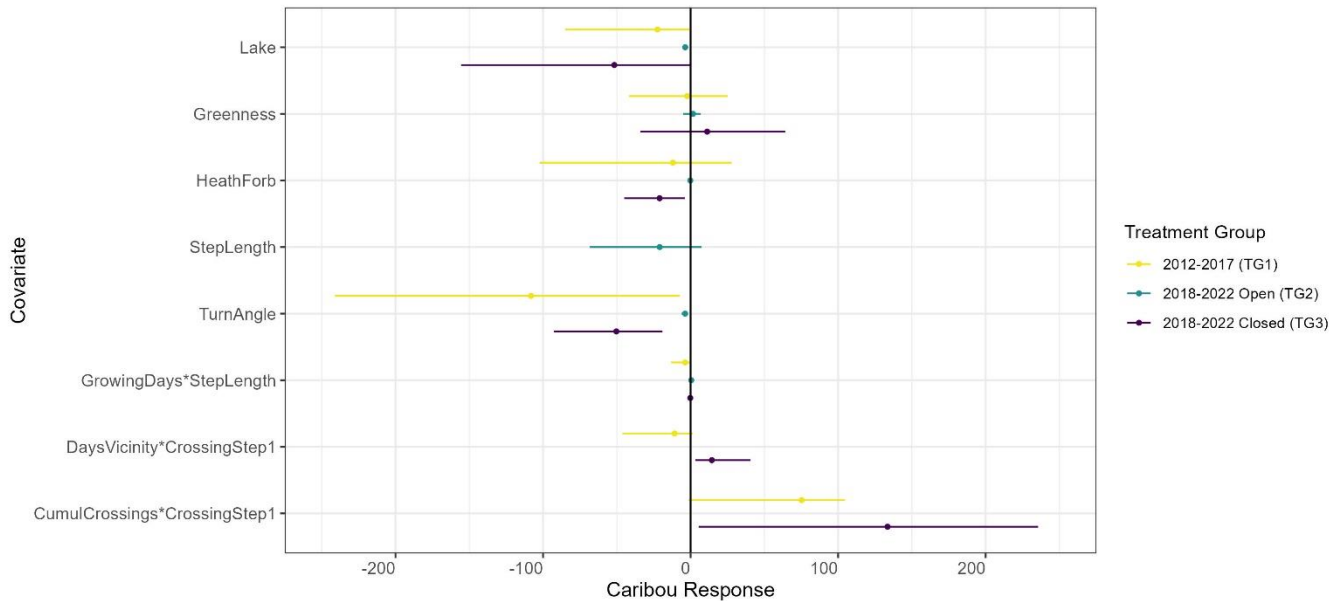
Figure 8: Predicted population response for covariates included in population models for Treatment Groups 1 to 3, based on results from the crossing candidate set. Predicted population responses (symbolized with circles) were informed by caribou-years with $n \geq 10$ used steps. Horizontal lines indicate bootstrapped 95% confidence intervals (CIs). CIs that overlap 0 indicate no, or zero, population-level response. CrossingStep = '1' was used as the reference category. Beta coefficient estimates for Treatment Group 1 and 3 StepLength were too large to include in the figure but are reported in Table 14.

Table 14: Beta coefficient estimates (β) and upper and lower 95% confidence interval limits for covariates included in population models, per treatment group. Population estimates were informed from results of the crossing candidate set and included caribou-years with $n \geq 10$ used steps. Model 8 was the population model for Treatment Groups 1 and 3; the base habitat model was the population model for Treatment Group 2.

Covariate[a]	Treatment Group 1			Treatment Group 2			Treatment Group 3		
	β	Lower 95% Limit	Upper 95% Limit	β	Lower 95% Limit	Upper 95% Limit	β	Lower 95% Limit	Upper 95% Limit
Lake	-22.45	-85.09	-0.67	-3.64	-4.38	-2.95	-51.71	-155.59	-0.16
Greenness	-2.32	-41.79	25.12	1.66	-4.97	6.96	11.24	-33.95	64.18
HeathForb	-11.98	-102.29	27.81	-0.18	-0.88	0.43	-20.98	-44.98	-3.86
StepLength	576.09	-118.59	1830.83	-20.94	-68.31	7.34	-508.57	-1462.89	-117.11
TurnAngle	-108.11	-241.03	-7.24	-3.70	-6.06	-2.31	-50.30	-92.53	-19.09
GrowingDays*StepLength	-3.72	-13.13	-0.43	0.48	-0.33	1.10	-0.19	-1.08	0.01
DaysVicinity*CrossingStep[b]	-10.80	-46.21	1.57	NA			14.39	3.40	40.70
CumulCrossings*CrossingStep[b]	75.31	-1.24	104.72				133.48	5.51	235.52

a)   An asterisk (*) indicates an interaction between two covariates.

b)   CrossingStep = '1' was used as the reference category.

Table 15: Percentage (%) of caribou-years with positive (+) and negative (–) responses to covariates included in the population model, per treatment group. Population estimates were informed from results of the crossing candidate set and included caribou-years with *n* ≥ 10 used steps.

Covariate[a]	Treatment Group 1		Treatment Group 2		Treatment Group 3	
	+	–	+	–	+	–
Lake	18.8	81.3	0.0	100.0	23.3	76.7
Greenness	59.4	40.6	33.3	66.7	66.7	33.3
HeathForb	50.0	50.0	33.3	66.7	60.0	40.0
StepLength	43.8	56.3	33.3	66.7	33.3	66.7
TurnAngle	3.1	96.9	0.0	100.0	0.0	100.0
GrowingDays*StepLength	59.4	40.6	66.7	33.3	70.0	30.0
DaysVicinity*CrossingStep[b]	77.8	22.2	NA		52.0	48.0
CumulCrossings*CrossingStep[b]	28.6	71.4			35.0	65.0
Total caribou-years with *n* ≥ 10 used steps	32		3		30	

a) An asterisk (*) indicates an interaction between two covariates.

b) CrossingStep = '1' was used as the reference category.

3.6 Deflection Steps: Influence of All-Weather Access Road and Mine

Models testing how deflection steps varied as a function of land cover and proximity to AWAR and/or Mine, within five km of the AWAR and/or Mine (Table 8), converged for 93%, 79%, and 73% of caribou-years within Treatment Groups 1, 2, and 3, respectively. The base habitat model was the population model for all treatment groups (Figure 9) and was a competing top model for 29%, 19%, and 23% of caribou-years within Treatment Groups 1, 2, and 3, respectively. Because the base habitat model has been described above in Section 3.3 it will not be presented again in this section.

Model 1, which included the 'Distance to AWAR and/or Mine' covariate interacted with deflection steps (Table 8), was a top model for 4.4% of caribou-years (*n* = 10 caribou-years) among the three treatment groups. However, all beta coefficient estimates for DistAWARMine*DeflectionStep were either zero or had 95% CI that overlapped zero, except for one caribou-year. In 2021, caribou 'UK2018033' was more likely to exhibit deflection movement behaviour as she got further from the AWAR and/or Mine (i.e., distance to AWAR and/or Mine increased; β = 0.63, 95% CI = 0.61 – 0.65).
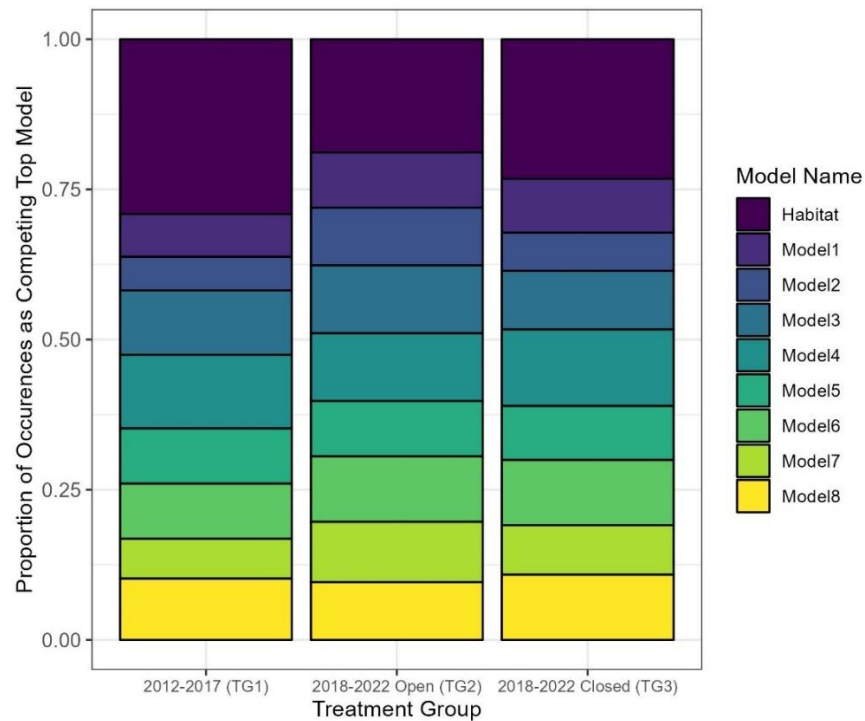
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Figure 9: Proportion of occurrences as a competing top model for the deflection candidate set (presented in Table 8). Treatment Groups 1, 2, and 3 were comprised of _n_ = 94, 77, and 155 caribou-years, respectively.

3.7   Paralleling Steps: Influence of All-Weather Access Road and Mine

Models testing how paralleling steps varied as a function of land cover and proximity to AWAR and/or Mine (Table 9) converged for 84%, 79%, and 73% of caribou-years within Treatment Groups 1, 2, and 3, respectively. The base habitat model was the population model for all treatment groups (Figure 10) and was a competing top model for 30%, 23%, and 25% of caribou-years within Treatment Groups 1, 2, and 3, respectively. Because the base habitat model has been described above in Section 3.3 it will not be presented again in this section.

Model 1, which included the 'Distance to AWAR and/or Mine' covariate interacted with paralleling steps (Table 9), was a top model for 6.2% of caribou-years (_n_ = 14 caribou-years) among the three treatment groups. Beta coefficient estimates for DistAWARMine*ParallelStep were zero or had 95% CI that overlapped zero for 12 of these caribou-years and were negative for two of these caribou years. Specifically, in 2016 and 2017 (Treatment Group 2), caribou 'QM1670415' and caribou 'QM1690415' were more likely to exhibit paralleling movement behaviour if they were closer to the AWAR and/or Mine, respectively
(QM1670415 in 2016: β = -0.43, 95% CI = -0.45 – -0.40; QM1690415 in 2017: β = -0.06, 95% CI = -0.06 – -0.05).
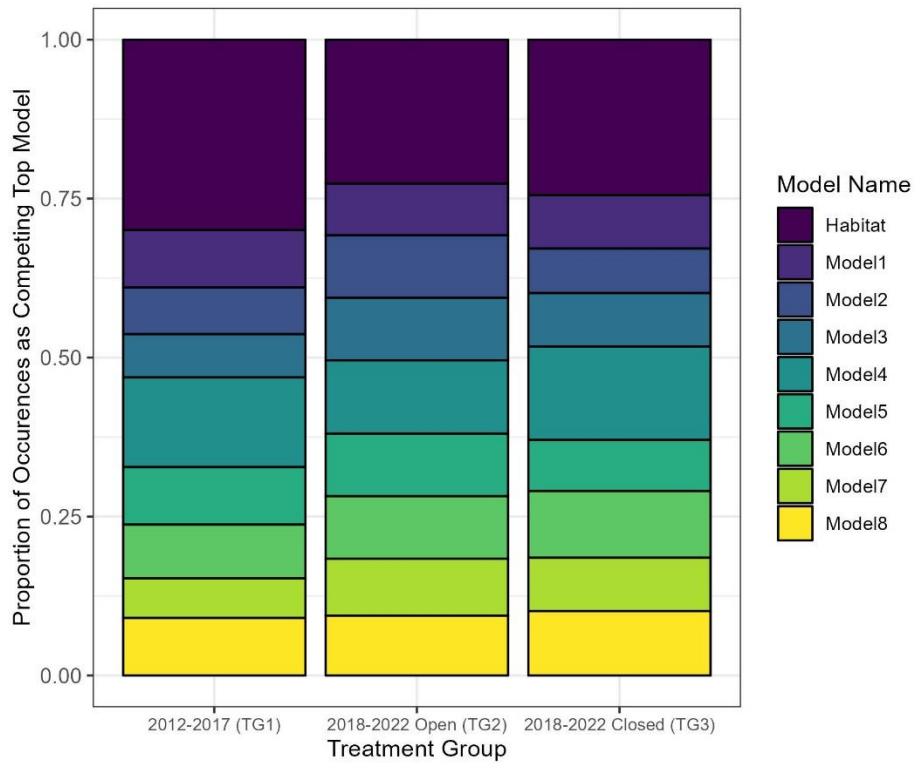
Figure 10: Proportion of occurrences as a competing top model for the paralleling candidate set (Table 9). Treatment Groups 1, 2, and 3 were comprised of *n* = 94, 77, and 155 caribou-years, respectively.

3.8   Zone of Influence

Models testing for the presence of a ZOI (Table 10) converged for 97%, 81%, and 80% of caribou-years within Treatment Groups 1, 2, and 3, respectively. The base habitat model was the population model for all treatment groups (Figure 11) and was a competing top model for 19%, 13%, and 16% of caribou-years within Treatment Groups 1, 2, and 3, respectively. Because the base habitat model has been described above in Section 3.3 it will not be presented again in this section.

Figure 11: Proportion of occurrences as a competing top model for the zone of influence (ZOI) candidate set (presented in Table 10). Treatment Groups 1, 2, and 3 were comprised of *n* = 107, 146, and 155 caribou-years, respectively.

3.9   Comparison with Control Group

Models comparing all four treatment groups (Table 11) converged for 97%, 81%, 80%, and 100% of caribou-years within Treatment Groups 1, 2, 3, and 4, respectively. The base habitat model was the population model for Treatment Groups 1 to 3 (Figure 12 and was a competing top model for 43%, 43%, and 47% of Treatment Groups 1, 2, and 3, respectively. Model 1 was the population model for Treatment Group 4 (Figure 12) and represented a competing top model for 23% of caribou-years.

Caribou in the three test treatment groups (i.e., Treatment Groups 1 to 3) exhibited similar population-level responses to land cover as caribou in the Control Group (i.e., Treatment Group 4). For instance, based on bootstrapped population means, caribou in all treatment groups selected habitats that were greener and had less lake land cover (Figure 13; Table 16). Over 68% and 74% of caribou-years in test treatment groups exhibited a positive response to greenness and negative response to lake land cover, respectively. These trends were stronger in the Control Group, where almost all caribou-years exhibited the population-level responses to lake land cover (i.e., 98.2% exhibited a negative Lake coefficient) and greenness (i.e., 94.4% exhibited a positive Greenness coefficient; Table 17). Caribou in test treatment groups selected habitats with more heath-forb landcover whereas caribou in the Control Group selected habitats with less heath-forb landcover (Figure 13; Table 16).

However, the CIs for the Control Group HeathForb coefficient were wide, indicating uncertainty about how caribou in the Control Group (i.e., further than 15 km from the AWAR and/or Mine) respond to heath-forb landcover. Response to growing degree days > 0°C interacted with step length was similar across treatment groups and caribou across all treatment groups moved non-directionally and slowly during the post-calving and summer seasons (Figure 13; Table 16).

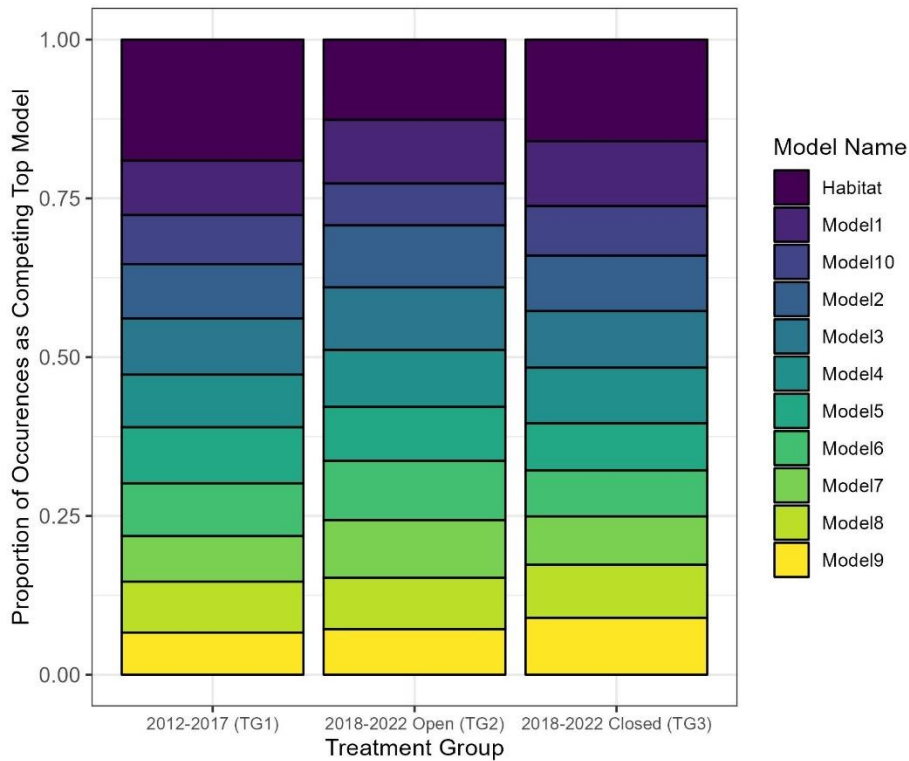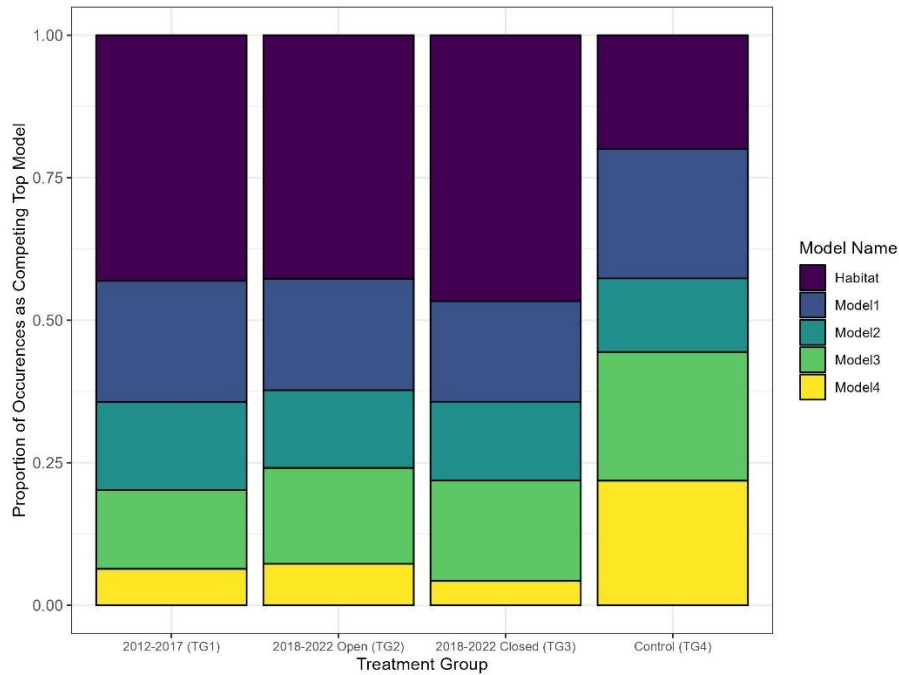**Figure 12: Proportion of occurrences as a competing top model for the control candidate set (presented in Table 11). Treatment Groups 1, 2, 3, and 4 were comprised of *n* = 107, 146, 155, and 393 caribou-years, respectively.**
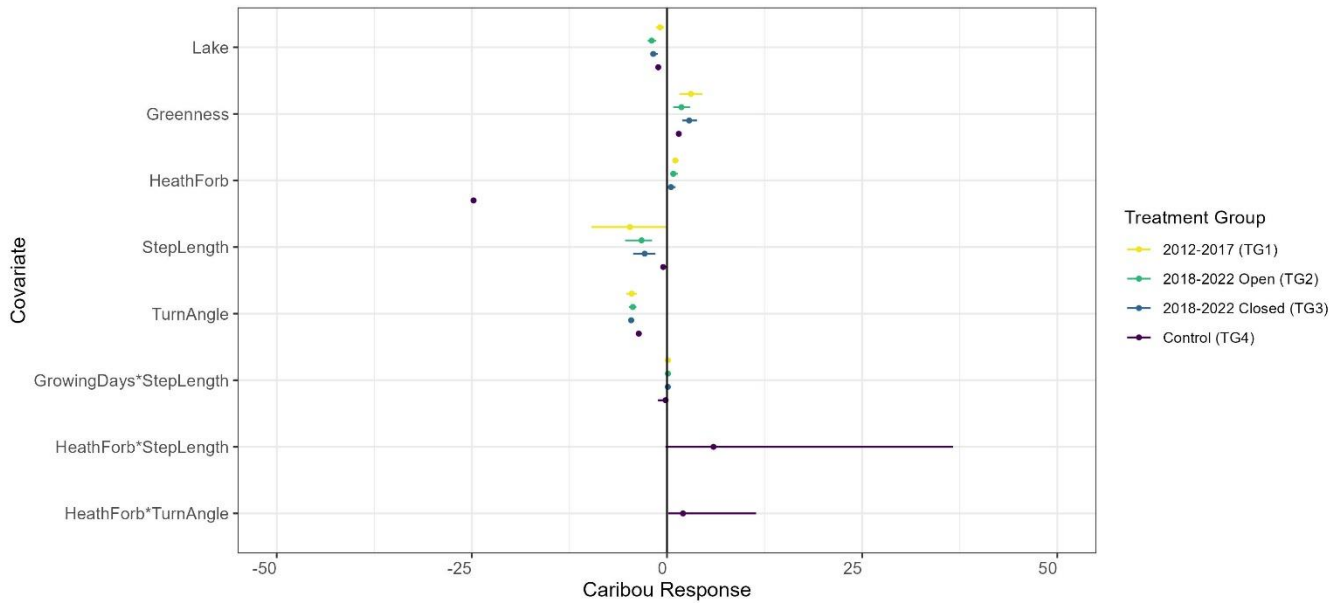
Figure 13: Predicted population response for covariates included in population models for Treatment Groups 1 to 4, based on results from the control candidate set. Predicted population responses (symbolized with circles) were informed by caribou-years with *n* ≥ 20 used steps. Horizontal lines indicate bootstrapped 95% confidence intervals (CIs). CIs that overlap 0 indicate no, or zero, population-level response. Treatment Group 4 HeathForb CIs were too wide to include in the figure but are reported in Table 16.

Table 16: Beta coefficient estimates (β) and upper and lower 95% confidence interval limits for covariates included in population models, per treatment group. Population estimates were informed from the control candidate set results and included caribou-years with *n* ≥ 20 used steps. The base habitat model was the population model for Treatment Groups 1 to 3; Model 1 was the population model for Treatment Group 4.

Covariate[a]	Treatment Group 1			Treatment Group 2			Treatment Group 3			Treatment Group 4		
	β	Lower 95% Limit	Upper 95% Limit	β	Lower 95% Limit	Upper 95% Limit	β	Lower 95% Limit	Upper 95% Limit	β	Lower 95% Limit	Upper 95% Limit
Lake	-0.89	-1.42	-0.36	-1.97	-2.47	-1.41	-1.76	-2.16	-1.17	-1.12	-1.18	-1.07
Greenness	3.07	1.58	4.54	1.85	0.79	2.94	2.84	1.95	3.84	1.51	1.35	1.62
HeathForb	1.06	0.70	1.50	0.81	0.38	1.42	0.51	0.24	1.10	-24.78	-142.60	-0.66
StepLength	-4.75	-9.71	-0.01	-3.25	-5.37	-1.90	-2.86	-4.34	-1.49	-0.48	-0.53	-0.43
TurnAngle	-4.52	-5.23	-3.87	-4.38	-4.88	-3.92	-4.59	-4.94	-4.28	-3.62	-3.71	-3.53
GrowingDays* StepLength	0.12	0.03	0.22	0.12	0.07	0.20	0.11	0.06	0.15	-0.18	-1.15	0.02
HeathForb* StepLength	NA									5.95	-0.21	36.64
HeathForb* TurnAngle										2.05	0.17	11.42

a)   An asterisk (*) indicates an interaction between two covariates.

Table 17: Percentage (%) of caribou-years with positive (+) and negative (–) responses to covariates included in the population model, per treatment group. Population estimates were informed from results of the control candidate set and included caribou-years with *n* ≥ 20 used steps.

Covariate[a]	Treatment Group 1		Treatment Group 2		Treatment Group 3		Treatment Group 4	
	+	**−**	**+**	**−**	**+**	**−**	**+**	**−**
Lake	25.9	74.1	5.3	94.7	10.0	90.0	1.8	98.2
Greenness	74.1	25.9	68.4	31.6	75.0	25.0	94.4	5.6
HeathForb	85.2	14.8	65.8	34.2	66.7	33.3	38.9	61.1
StepLength	37.0	63.0	15.8	84.2	20.0	80.0	14.0	86.0
TurnAngle	0.0	100.0	0.0	100.0	0.0	100.0	0.0	100.0
GrowingDays* StepLength	66.7	33.3	78.9	21.1	85.0	15.0	87.0	13.0
HeathForb* StepLength	NA						65.9	34.1
HeathForb* TurnAngle							42.7	57.3
Total caribou-years with *n* ≥ 20 used steps	27		38		60		393	

a)   An asterisk (*) indicates an interaction between two covariates.

4.0   DISCUSSION

The base habitat model included several covariates that were important for predicting general caribou habitat selection and movement in the study area. Regardless of treatment group, caribou selected habitats with higher greenness and lower lake land cover, which has also been observed in other caribou herds (Boulanger et al. 2012; Golder 2021). Caribou in the three test treatment groups selected habitats with higher heath-forb land cover, whereas caribou in the Control Group selected habitats with lower heath-forb land cover. This difference may be related to the broad spatial extent of the Commitment 38 study area and the much smaller area within 15 km of the AWAR and/or Mine, especially if other land cover types (e.g., lichen, graminoid) provide more forage for caribou in the Control Group. Generally, caribou in all treatment groups moved less directionally and more slowly, which supports that caribou in post-calving and summer seasons are likely exhibiting foraging movement patterns.

In many cases, 95% CI for bootstrapped population means were wide. Wide CI may be due to low sample sizes of telemetry points, which would corroborate the lower model convergence for test treatment groups and the variety of models arising as a top competing model per candidate set. Where possible, only those caribou-years with at least 20 used steps were used to bootstrap population means, which increased the precision of population-level responses.

Alternatively, uncertainty in population-level responses may also be related to high variability among individuals of the QAM caribou herd. High intra-population variability was apparent in the results of the Control Group candidate set, which had several potential population models. Individual variation could be due to several factors, including sex, whether a caribou cow has a calf or not, and/or locations of an individual's range within the Commitment 38 study area. Intra-population variability was also apparent in the diversity of models supported in each analysis as multiple models were supported by different caribou-years. The presence of intra-population variability was also

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demonstrated by both positive and negative responses to the same covariates, including natural covariates among caribou-years, as previously noted. Intra-population variability illustrates that populations may be plastic and resilient to environmental change (Reed et al. 2003), which has been shown in QAM caribou (Mallory et al. 2020). Although individuals may vary in their response to different land cover or habitat variables, QAM telemetry data were representative of QAM herd movements (see results of assumption test in Appendix D).

The base habitat model was the population model for both the caribou movement candidate set and caribou harvest candidate set, which supports that the addition of AWAR and/or Mine, harvest, and AWAR traffic covariates in the iSSA did not improve model fit and are therefore not likely to be significant predictors of caribou directionality and speed. Likewise, the base habitat model was the population model for the deflection candidate set and paralleling candidate set. These results support that, at the population level, including proximity to AWAR and/or Mine and different land cover types as a function of deflection or paralleling steps did not improve model fit. For a small proportion of the population, deflection (4.4%) and paralleling (6.2%) movement behaviours were best represented by models that included proximity to AWAR and/or Mine but for most individuals, there was no measurable effect. One caribou, in 2021, was more likely to exhibit deflection movements when further from the AWAR and/or Mine and two caribou, before the construction of the Mine (i.e., 2016 and 2017), were more likely to exhibit parallel movements when closer to the AWAR and/or Mine. These two caribou's paralleling behaviours are therefore unlikely to be related to Mine activity.

Also, the base habitat model was the population model for the ZOI candidate set, indicating that the addition of breakpoints (or potential ZOI distances) did not improve model fit. Results do not support the presence of a ZOI on caribou movements due to the AWAR and Mine. Overall, several lines of evidence predict that the presence of the AWAR and Mine is not having a strong adverse influence on caribou habitat selection (i.e., indirect effects to habitat) or movement in the surrounding area.

The population-level model for Treatment Group 3 (i.e., telemetry data from 2018 to 2022 when the AWAR and/or Mine was closed) indicated that caribou were more likely to cross the AWAR and/or Mine if they had been in the vicinity for longer and if more caribou from the herd had crossed already. However, less than 10% of caribou-years demonstrated this population-level trend. For most (i.e., 90% or more) caribou-years, crossing steps were unrelated to time spent in the vicinity before crossing or whether other caribou had crossed the AWAR and/or Mine.

Several factors made estimating population-level models challenging. Few individuals within the QAM herd interact with the AWAR and/or Mine, which limited sample sizes available for testing effects of the AWAR and/or Mine on caribou movement and likely contributed to imprecise estimates (i.e., wide CIs) in population-level models. For instance, 32% of QAM caribou-years came within 5 km of the AWAR/Mine and 28% of QAM caribou-years interacted with (i.e., crossed) the AWAR and/or Mine. When individuals from the QAM herd did interact with the AWAR and/or Mine, they usually did not linger in the vicinity, which further reduced the telemetry data available for Treatment Groups 2 and 3. Specifically, 99% of caribou-years that encountered the AWAR and/or Mine interacted for less than 24 hours between 21 May and 22 August each year. The separate effects of the AWAR, Mine, and Rankin Inlet could not be disentangled; rather, the 'distance to AWAR and/or Mine' covariate should be interpreted as 'distance to AWAR, Mine, or Rankin Inlet' because these three covariates were perfectly correlated ($r = 1.00$; Appendix B). Similarly, local and Project-related AWAR traffic were also highly correlated, which prevented the separate effects of local (i.e., public) and Mine-related traffic to be tested. While sample sizes were low or time spent near the AWAR and/or Mine was short, this also means that only a small portion of the QAM herd experience possible effects from the AWAR and/or Mine and over a short duration.

The results presented herein support that QAM caribou movements during post-calving and summer seasons are best predicted by a combination of habitat variables, including vegetation greenness, cumulative growing degree days > 0°C, and nearby lakes and heath-forb forage. The lack of support for models that included distance to AWAR and/or Mine suggest that proximity to Mine-related disturbances are unlikely to influence caribou speed and directionality during post-calving and summer seasons.

5.0   CONCLUSIONS

Agnico Eagle collaborated with the KivIA, GKD, BHTO, NTI, and GN to develop a study design to fulfill Commitment 38. The collaboration included key considerations for the study design, such as an ecological definition of the study area to represent a sensitive time for QAM caribou and definitions for deflection and paralleling steps made by collared caribou. Other contributions from the KivIA, GKD, and GN included which natural factors (including those identified by IQ) and anthropogenic factors should be considered as covariates in analyses to explain collared QAM caribou movement behaviour in response to the AWAR and/or Mine. The KivIA, GKD, and GN also determined how a ZOI should be analyzed.

Making inferences about caribou movement behaviour based on visualization alone ignores the underlying process of habitat selection. Caribou movement and selection are linked, both in the relation to the landscape and their relationship with one another (Avgar et al. 2016; Prokopenko et al. 2017). Thus, collared QAM caribou data were analyzed using iSSA (Avgar et al. 2016), which was the approach developed collaboratively by the KivIA, GKD, and GN. The iSSA provided a robust framework for comparing observed caribou movements with available caribou movements, while accounting for underlying habitat selection. Ultimately, the iSSA allowed the fine-scale direct and indirect spatiotemporal effects of the AWAR and Mine on caribou movement and selection to be estimated simultaneously (Avgar et al. 2016; Prokopenko et al. 2017).

The results of Commitment 38 analyses indicated intra-population variability by collared QAM caribou in response to different environmental factors, that collared caribou movement behaviour is best predicted by natural factors, and no measurable presence of an adverse response by collared caribou to the AWAR or Mine. Less than one-third of collared QAM caribou occurred within 5 km of the AWAR and/or Mine and 99% of these individuals were present for less than 24 hrs, which may partially explain why anthropogenic factors were not supported as predictors of collared caribou movement behaviour at the population level. Results of the analyses indicate that the Mine's Final Environmental Impact Statement (FEIS; Agnico Eagle 2014) residual effects predictions were conservative and support the assessment conclusion of non-significant impacts to caribou. For example, predictions of indirect effects to caribou habitat made in the FEIS assumed the presence of 5 km and 14 km ZOIs for the AWAR and Mine, respectively, whereas the results of Commitment 38 analyses failed to detect a ZOI within 10 km. Commitment 38 results further support that the indirect effects to caribou habitat for the Meliadine Extension assessment have been over-estimated because the same FEIS ZOI assumptions were carried forward in the FEIS Addendum for the Extension as well as larger AWAR ZOIs assumptions as requested by the GN (Agnico Eagle 2023c).

Agnico Eagle appreciates the contributions by the KivIA, GKD, NTI, BHTO, and GN, and IQ holders that participated in meetings leading to the development and fulfillment of the Commitment 38 study design and analyses. While Commitment 38 is now complete, Agnico Eagle looks forward to future caribou collaborations and discussions with the KivIA, GKD, BLHTO, NTI, GN, and IQ holders.

Signature Page

We trust the above meets your present requirements. If you have any questions, please contact the undersigned.

WSP Canada Inc.

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APPENDIX A

Daily Movement vs. Calf Age Assumption Test

Methods of Assumption Test

The age at which calves should no longer influence cow movement was tested to inform the use of a calf age covariate in iSSA and the use of a five-km/day threshold for determining when a caribou may have calved. The KivIA suggested that cows with calves up to 21 days of age move less than five km/day and once calves are older than 21 days of age, move more than five km/day. To test this assumption, total distance moved (km) was calculated by summing step lengths per day for caribou where it was confirmed that parturition occurred and neonate mortality did not occur (i.e., M1 was top parturition model and was not competing with either M0 or M2). Then, based on the predicted parturition date for each caribou-year, daily movement was assigned a calf age, in days. Mean daily movement was calculated per day of calf age, across caribou-years. Mean daily movement was plotted as a function of calf age (Figure A-1).

To understand daily distances moved by caribou without calves as a function of day of year, total distance moved was summed per day for caribou where it was confirmed that parturition did not occur (i.e., M0 was the top parturition model and was not competing with either M1 or M2). Using the mean calving date for the QAM herd (i.e., Julian day 157, or 6 June for non-leap years), mean daily movement was assigned a 'calf age', then plotted as a function of calf age (Figure A-1).

Results of Assumption Test

Linear trendlines were plotted up to peak daily movement (i.e., up to calf age = 37 days) for caribou with calves and caribou without calves (Figure A-1). Linear trendlines for caribou with calves and caribou without calves had similar slopes (0.59 for caribou without calves; 0.62 for caribou with calves; Figure A-1) and different y-intercepts (3.87 for caribou without calves; 1.14 for caribou with calves; Figure A-1). Ultimately, daily movement increased as calf age increased for both caribou with calves and caribou without calves (representing an increase in daily movement as Julian day or day of year increased) but the minimum daily movement varied based on whether caribou had a calf or not (Figure A-1). Minimum daily movement for caribou with calves was 2.16 km, whereas minimum daily movement for caribou without calves was 6.26 km (Figure A-1). Caribou with calves moved further than five km/day when calves were 6.25 days old (Figure A-1).

Key Takeaways from Assumption Test

Results presented in Figure A-1 support that caribou with calves in the QAM herd reach the daily movement threshold of five km earlier than 21 days post-parturition and calves may only present a limitation to a cow's daily movement while the calf is less than seven days old. Figure A-1 shows that daily caribou movement decreases after approximately July 13 (i.e., Julian day 194), which coincides with peak vegetation green-up and, subsequently, reduced caribou movement while foraging. Based on the strong linear relationships between day of year and daily movement, Julian day was considered as a covariate in iSSA. However, Julian day was highly correlated with growing degree days > 0°C, so the latter covariate was included in base habitat model selection to account for variation in caribou movement as a function of day of post-calving/summer season.
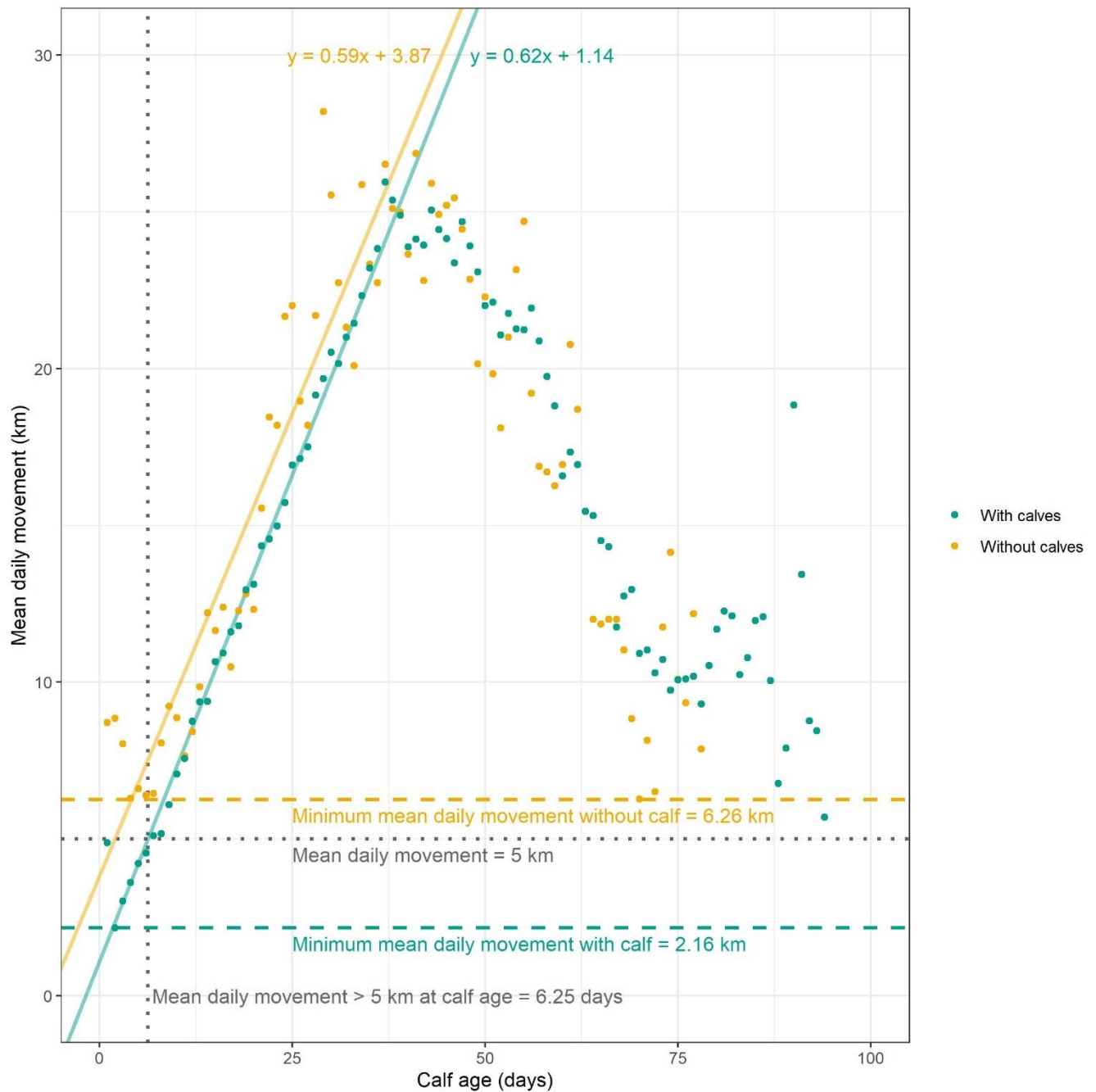
Figure A-1: Mean daily movement (km) as a function of calf age (days) for caribou with calves (teal) and caribou without calves (orange). Linear trendlines were fit to the data before peak daily movement, which occurred around a calf age of 37 days.

APPENDIX B

Correlated Covariates

Table B-1: Correlation coefficients (*r*) between pairs of spatial covariates considered in Integrated Step Selection Analyses (iSSA). Highly correlated covariates (*r* ≥ 0.70) are bolded and shaded grey.

Covariate	DistAWAR	DistAWARMine	DistMine	DistRankin	Elev	TerrainRug	TopoPos	VectorTerr	EVI	NDVI	Graminoid	HeathForb	Lichen	NonVeg	Shrub	Lake
DistAWAR	1.00	**1.00**	**1.00**	**1.00**	**0.84**	-0.02	0.03	-0.05	0.40	0.39	-0.13	0.21	-0.28	-0.16	0.33	-0.07
DistAWARMine		1.00	**1.00**	**1.00**	**0.84**	-0.02	0.03	-0.05	0.40	0.39	-0.13	0.21	-0.29	-0.17	0.33	-0.07
DistMine			1.00	**1.00**	**0.84**	-0.02	0.03	-0.05	0.40	0.39	-0.13	0.21	-0.29	-0.17	0.33	-0.07
DistRankin				1.00	**0.85**	-0.02	0.03	-0.05	0.39	0.38	-0.13	0.20	-0.27	-0.16	0.33	-0.07
Elev					1.00	0.00	0.06	-0.04	0.37	0.34	-0.13	0.17	-0.14	-0.06	0.24	-0.14
TerrainRug						1.00	0.04	0.31	0.09	0.06	-0.03	0.06	0.05	0.04	0.00	-0.12
TopoPos							1.00	0.04	0.10	0.11	0.00	0.06	0.03	0.02	0.01	-0.11
VectorTerr								1.00	-0.01	-0.02	-0.03	0.00	0.03	0.03	-0.03	0.00
EVI									1.00	**0.90**	0.07	0.51	-0.08	-0.15	0.33	-0.69
NDVI										1.00	0.09	0.46	-0.11	-0.18	0.31	-0.59
Graminoid											1.00	-0.20	-0.02	-0.10	-0.08	-0.23
HeathForb												1.00	-0.38	-0.27	-0.12	-0.40
Lichen													1.00	0.11	-0.21	-0.23
NonVeg														1.00	-0.12	-0.15
Shrub															1.00	-0.17
Lake																1.00

Table B-2: Correlation coefficients (*r*) between pairs of spatial-temporal covariates considered in Integrated Step Selection Analyses (iSSA). MosquitoIndex and OestridIndex were moderately correlated; MosquitoIndex was retained.

Covariate	MosquitoIndex	OestridIndex	GrowingDays
MosquitoIndex	1.00	0.58	0.06
OestridIndex		1.00	0.05
GrowingDays			1.00

Table B-3: Correlation coefficients (r) between pairs of covariates used in caribou movement candidate set (Table 5). Highly correlated covariates (r ≥ 0.70) are bolded and shaded grey.

Covariate	DistAWARMine	Greenness	Graminoid	HeathForb	Lichen	NonVegetated	Shrub	Lake	Julian	MosquitoIndex	GrowingDays
DistAWARMine	1.00	0.49	-0.16	0.21	-0.29	-0.16	0.33	-0.09	0.58	-0.01	0.59
Greenness		1.00	-0.03	0.39	-0.27	-0.29	0.32	-0.38	0.33	-0.01	0.31
Graminoid			1.00	-0.29	-0.03	-0.11	-0.10	-0.15	-0.05	0.01	-0.05
HeathForb				1.00	-0.49	-0.31	-0.18	-0.27	0.20	0.00	0.20
Lichen					1.00	0.12	-0.23	-0.14	-0.26	0.00	-0.25
NonVegetated						1.00	-0.12	-0.11	-0.17	-0.01	-0.17
Shrub							1.00	-0.13	0.21	0.00	0.21
Lake								1.00	-0.11	-0.01	-0.11
Julian									1.00	0.06	**0.96**
MosquitoIndex										1.00	0.06
GrowingDays											1.00

Table B-4: Correlation coefficients (*r*) between pairs of covariates used in caribou harvest candidate set (Table 6). Highly correlated covariates (*r* ≥ 0.70) are bolded and shaded grey.

Covariate	DistAWARMine	Greenness	Graminoid	HeathForb	Lichen	NonVegetated	Shrub	Lake	Julian	MosquitoIndex	GrowingDays	Harvest	AWARTrafficLocal	AWARTrafficProject	AWARTrafficTotal	ATVTraffic
DistAWARMine	1.00	-0.01	0.03	-0.20	0.05	0.20	0.17	0.05	0.45	0.00	0.47	-0.22	0.38	0.38	0.38	-0.02
Greenness		1.00	0.04	0.45	-0.12	-0.41	0.11	-0.22	-0.10	0.01	-0.11	-0.01	-0.06	-0.06	-0.06	-0.03
Graminoid			1.00	-0.35	-0.13	-0.17	0.02	-0.18	0.04	0.00	0.06	-0.06	-0.03	-0.03	-0.03	-0.01
HeathForb				1.00	-0.39	-0.32	-0.06	-0.20	-0.20	0.00	-0.22	0.13	-0.13	-0.13	-0.13	0.01
Lichen					1.00	0.03	-0.08	-0.14	0.14	0.02	0.13	-0.07	0.17	0.17	0.17	0.03
NonVegetated						1.00	-0.04	-0.07	0.06	0.01	0.06	-0.06	0.06	0.06	0.06	-0.01
Shrub							1.00	-0.02	0.12	-0.02	0.12	-0.03	0.10	0.10	0.10	0.00
Lake								1.00	0.11	-0.01	0.11	0.04	0.09	0.09	0.09	-0.01
Julian									1.00	0.01	**1.00**	-0.12	**0.84**	**0.84**	**0.84**	0.07
MosquitoIndex										1.00	0.01	0.02	-0.03	-0.03	-0.03	-0.01
GrowingDays											1.00	-0.12	**0.83**	**0.83**	**0.83**	0.08
Harvest												1.00	-0.10	-0.10	-0.10	-0.03
AWARTrafficLocal													1.00	**1.00**	**1.00**	0.28
AWARTrafficProject														1.00	**1.00**	0.28
AWARTrafficTotal															1.00	0.28
ATVTraffic																1.00

APPENDIX C

Ecological Land Cover Groupings and Extent of Kivalliq Land Cover Data

Table C-1: Reclassification of Kivalliq ecological land cover into six reclassified groups

| Original Land Cover Classification	Reclassified Land Cover Groupings
Graminoid heath tundra	Graminoid
Graminoid tundra	
Wet graminoid	
Forb tundra	Heath-forb
Heath tundra	
Heath upland	
Shrub heath tundra	Lichen
Heath upland rock complex	
Lichen rock complex	
Lichen tundra	
Boulder gravel	Non-vegetated
Rock	
Sand	
Graminoid shrub tundra	Shrub
Shrub thicket	
Shrub tundra	
Ice	Water
Water	
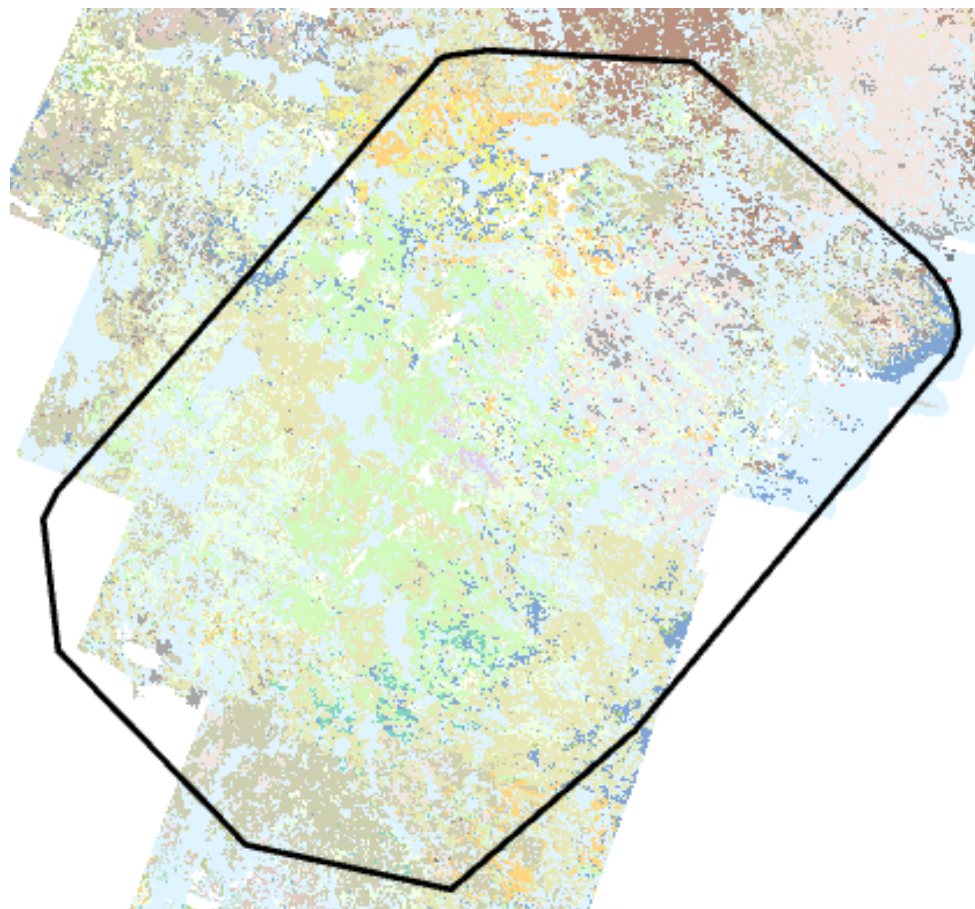
Figure C-2: Spatial coverage of Kivalliq Land Cover Data compared to Commitment 38 study area (black outlined polygon)

APPENDIX D

Ground-Based Observations vs. Telemetry Data Assumption Test

Methods of Assumption Test

Based on feedback from the TAG, observations of caribou from telemetry data were compared to ground-based observations of caribou to determine whether individuals being monitored with GPS collars are representative of the movements and migrations made by the QAM herd. Ground surveys were conducted on and/or near the AWAR and Mine between 19 June and 23 July 2022. Telemetry data were constrained to the same date range (i.e., 19 June to 23 July 2022) and to only locations of caribou collected within five km of the AWAR and/or Mine. The total number of caribou observed were summed per day for each data source, then compared using a Spearman rank correlation test, which produced a Spearman rank correlation coefficient (r).

Results of Assumption Test

Caribou were observed for 20 of the 35 days when ground surveys were conducted between 19 June and 23 July 2022. Ground-based observations ranged from 0 to 135,000 individuals, and telemetry observations ranged from 0 to 17 individuals. Maximum counts of caribou from ground surveys and telemetry data occurred on 12 July and 11 July, respectively. Caribou observed via ground surveys and telemetry data were highly correlated ($r = 0.74$; $p = < 0.005$; $n = 35$ days; Figure D-1).

Key Takeaways from Assumption Test

Daily caribou observations from collars and ground-based surveys were significantly highly correlated over the 35-day period when both types of data were available. The results of this assumption test support that the collared subset of QAM caribou are representative of the broader movements and migrations being made by the QAM herd. Specifically, collared QAM caribou are migrating through the AWAR and/or Mine vicinity at the same time as the QAM herd.
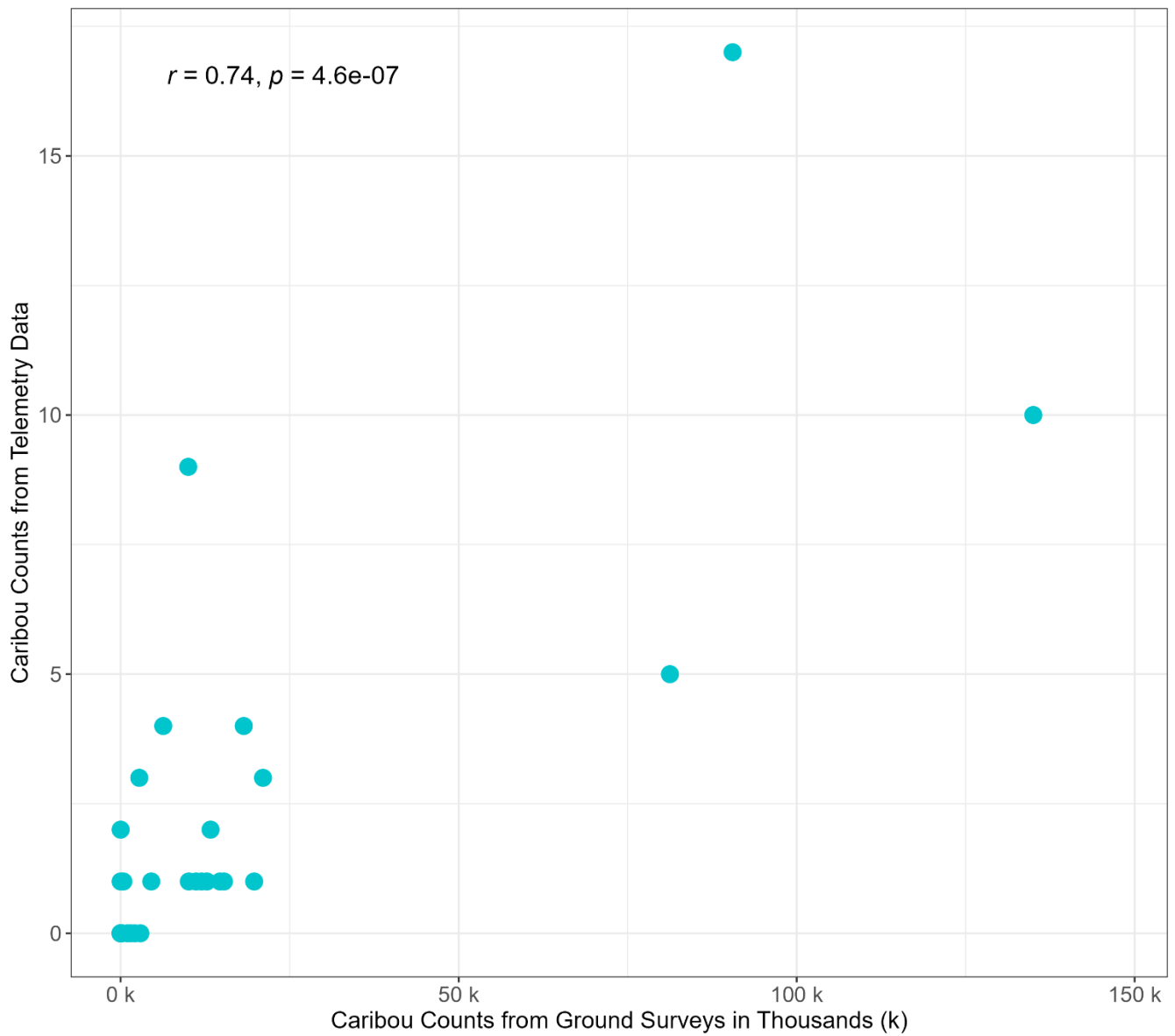
Figure D-1: Daily caribou counts from ground-based surveys, measured in thousands (k) of individuals, compared to caribou counts from telemetry collars, within five km of the All-Weather Access Road (AWAR) and Mine. Data were collected between 19 June and 23 July 2022. A Spearman rank correlation coefficient (r) and p-value is presented.

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TECHNICAL MEMORANDUM

DATE   18 August 2023   **Project No.** 22524250

TO   Manon Turmel
           Agnico Eagle Mines Ltd.

CC

FROM   Meghan Beale and Daniel Coulton   **EMAIL meghan.beale@wsp.com**

COMMITMENT 38 ANALYSES: ADDENDUM

1.0   INTRODUCTION

Agnico Eagle Mines Limited (Agnico Eagle) owns and operates the Meliadine Gold Mine (the Project), which is located approximately 25 km north of Rankin Inlet and 80 km southwest of Chesterfield Inlet in the Kivalliq Region of Nunavut. During technical discussions for the Meliadine Waterlines Project, the Kivalliq Inuit Association (KivIA) requested that Agnico Eagle complete an analysis of collared barren-ground caribou (*Rangifer tarandus groenlandicus*) movements relative to the Meliadine Mine (Mine) and All-weather Access Road (AWAR). Agnico Eagle committed (Commitment 38) to this analysis and to also include the KivIA, Ghotelnene Kohtineh Dene First Nation (GKD), and the Government of Nunavut (GN) for input into the study design, which was finalized in collaboration with these organizations at the Terrestrial Advisory Group (TAG) meeting in Winnipeg, MB on April 2023. The final version of the Commitment 38 analysis plan was issued to TAG members on April 24, 2023 (WSP 2023a).

On June 27, 2023 Agnico Eagle hosted a TAG meeting in Rankin Inlet, NU, where the results of Commitment 38 analysis were presented to the KivIA, GKD, GN, and Athabasca Denesuline Nene Land Corporation (ADNLC). The TAG members verbally provided comments at this meeting, which are summarized in Table 1. The GN committed to providing recommendations for the Commitment 38 analysis in writing; however, written recommendations from the GN were not received by Agnico Eagle at the time of this report. Many comments did not require additional analyses and were therefore integrated into the final version of the Commitment 38 analysis report distributed to TAG members on July 14, 2023 (WSP 2023b). Distribution of the final version of the report (i.e., WSP 2023b) completes the requirements of Commitment 38.

Although Commitment 38 has been completed, Agnico Eagle appreciates comments from TAG members on the results of the Commitment 38 analysis. Agnico Eagle has carried forward additional recommended analyses into this Commitment 38 addendum, which are listed below:

- Modelling deflection and paralleling movement behaviour during the summer when caribou move faster and more directionally.

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- Stratifying deflection and paralleling movement models to movements made upstream and downstream of the Mine and AWAR.

- Examining movement speeds upstream and downstream of the Mine and AWAR.

The methods, results, and discussion of these additional addendum analyses are provided in the following sections.

Table 1: Summary of additional recommended analyses for the Commitment 38 analysis, which were provided by the Government of Nunavut (GN), Ghotelnene Kohtineh Dene First Nation (GKD), and Athabasca Denesuline Nene Land Corporation (ADNLC) at the June 27, 2023 Terrestrial Advisory Group meeting.

Comment ID	Comment/Question	Agnico Eagle Response
GN-1	When you animate the collar movements, you can see that some but not all caribou are deflecting or paralleling the road at times.	Individual caribou movements made within 5 km of the Project and between 2018 and 2022 were reviewed as part of this addendum. Maps were created to visualize deflection and paralleling steps, as defined for the Commitment 38 analysis, to compare them with what the GN may be identifying as deflection or paralleling in an animation. The definitions for deflection and paralleling steps were updated to better reflect what the GN may be describing from animations of caribou movement. Updated definitions of deflection and paralleling are explained in Section 2.0.
GN-2	Is there evidence that over 10% of caribou are deflecting?	The Commitment 38 analysis (WSP 2023b) showed that in 2021, one caribou (i.e., caribou ID 'UK2018033'), or 0.4% of the population, had a higher likelihood of a deflection step as she moved further from the Mine and/or AWAR (i.e., lower likelihood of deflection as she moved closer to the Mine and/or AWAR). The direction of this effect was opposite to the predicted adverse response to the AWAR.
GN-3, GKD-1, ADNLC-1	Are there are any caribou not following the predominant population behaviour?	See responses to GN-2 and GN-6. The Commitment 38 analysis was completed by estimating candidate models on individual collared caribou, as agreed to by the TAG in April 2023 (WSP 2023a). The results of the Commitment 38 analysis indicate that some individuals respond differently to natural and anthropogenic factors (WSP 2023b) but that habitat was the most important factor influencing movements for the majority of individuals.
GN-4	Deflections are limited to when animals are very close to the road, 500 m to 1 km.	Constraining the spatial scale for Commitment 38 addendum analyses was explored. However, the reduction in sample size that would result by constraining deflection and paralleling movement models to within 1 km of the Mine and AWAR would measurably hinder model estimation. Further, the finest temporal resolution of collar data is 4-hour fix rate collars. Because caribou can easily move > 1 km in 4 hours, limiting the spatial scale of Commitment 38 addendum analyses to within 1 km of the Mine and AWAR does not match the scale of caribou telemetry data collected. Analyzing deflection and paralleling steps within 1 km of the Mine and AWAR would only be possible if finer resolution data were available (e.g., at most, 1 hour fix rate collars; ideally, 30-minute fix rate collars).

Table 1: Summary of additional recommended analyses for the Commitment 38 analysis, which were provided by the Government of Nunavut (GN), Ghotelnene Kohtineh Dene First Nation (GKD), and Athabasca Denesuline Nene Land Corporation (ADNLC) at the June 27, 2023 Terrestrial Advisory Group meeting.

Comment ID	Comment/Question	Agnico Eagle Response
GN-5	There are mass directional movements at the end of June versus more mingling/tortuous movements immediately after calving. This is a 'key period where it's possible to tease out the data for caribou that have crossed and are leaving a disturbance versus those that are approaching [a disturbance]' (June 27 TAG meeting minutes).	Commitment 38 addendum analyses have been stratified to include only the more directional caribou movements occurring later in June and in July.
GN-6, GKD-2	Caribou approaching road may slow down.	Caribou speed and directionality were compared as a function of direction of travel (i.e., whether that caribou was approaching, crossing, or departing the Project) in this addendum.
GN-7	Caribou are less likely to parallel road once they have crossed it.	This assumption was tested in the addendum analyses by comparing paralleling movements made by caribou while approaching and departing the Project.
GN-8, GKD-3, ADNLC-2	We'll see no response as a function of distance to mine/road if we dilute the modelling with both upstream and downstream movements. There needs to be distinction between upstream and downstream movements in analyses.	Classifying caribou movements as either upstream or downstream of the Mine and AWAR was not discussed at the April TAG meeting when the Commitment 38 analysis plan was finalized in collaboration with TAG members. Examination of upstream and downstream movements relative the Mine and AWAR is included in this addendum.
GN-9, GKD-4	What rate of paralleling or deflection are we seeing? How strong is that effect?	As presented in the Commitment 38 analysis (WSP 2023b), two collared caribou showed a higher likelihood of paralleling steps with proximity to the Mine and/or AWAR, which is a rate of 0.8% (2 of 227 caribou-years), at magnitudes of -0.43 (95%CI: -0.45 to -0.40) and -0.06 (95%CI: -0.06 to -0.05). No collared caribou had measurably higher likelihood of deflection steps with the Mine and/or AWAR proximity.

2.0   METHODS

Caribou steps used in the addendum analyses were first constrained to only those from four-hour fix collars (following Commitment 38 methods; WSP 2023b). Secondly, based on feedback from the GN (Comment GN-5; Table 1), caribou steps used in addendum analyses were constrained to Julian day 175 and later (i.e., June 24 and later), when caribou move faster and more directionally. The assumption that caribou move faster and more directionally after Julian day 175 was tested; results are presented in Appendix A. Thirdly, data were retained from 2018 and later, when the Project was in its Construction and Operations phase (WSP 2023b). Reducing addendum analyses to model only those caribou movements within 1 km of the Mine and AWAR was explored but it was determined that the 1-km spatial scale did not align with the scale of data available (see response to Comment GN-4; Table 1). Therefore, addendum analyses included caribou steps made within 5 km of the Project.

Deflection steps followed the same definition applied in the Commitment 38 analysis (WSP 2023b) except deflection steps were assigned between subsequent four-hour steps for addendum analyses, rather than a 28-hour moving window. This change was made to better align deflection steps with what a human eye may classify as 'deflection' when reviewing caribou movement animations. An alternative definition of a parallel step was applied for addendum analyses to better align paralleling steps with what the human eye may classify as 'paralleling' when reviewing caribou movement animations (Appendix B). Paralleling was defined as any step that a caribou may take to avoid getting closer to the Mine and/or AWAR. Thus, distance to Mine and/or AWAR at the start of each step (d_1) was subtracted from distance to Mine and/or AWAR at the end of each step (d_2). The absolute difference between d_2 and d_1 (Δd) was calculated as a proportion of the entire step length (sl); steps where $\Delta d/sl \leq 0.15$ were considered parallel steps. For continuity between the Commitment 38 analysis and this addendum, analyses described herein were also applied using the original paralleling definition (results presented in Appendix B).

Steps used in addendum analyses were stratified based on whether the step was made 'upstream' of the Mine and AWAR or 'downstream' of the Mine and AWAR.. For addendum analyses, upstream movements were assumed to be any steps taken once the caribou came within 5 km of the Project and before the caribou crossed the Mine and/or AWAR (Figure 1). Downstream steps were assumed to be any steps taken once the caribou interacted with the Mine and/or AWAR until the caribou moved more than 5 km from the Project. Steps that interacted with the Mine and/or AWAR were assigned 'crossing' steps, which were mutually exclusive from upstream and downstream steps. Deflection and paralleling steps could occur when caribou were either approaching or departing the Project. Once an individual moved downstream more than 5 km from the Project, any subsequent steps back into the Project vicinity (or back within 5 km of the Mine and/or AWAR) were classified as upstream and not downstream. Upstream and downstream steps were reclassified as 'approaching' and 'departing' steps to clarify that steps could come from any direction and were not specifically steps that occurred as the caribou approached the Project from the north or departed to the south.

Available steps were retained based on the suite of used steps remaining once the above temporal constraints were applied, regardless of whether the available step ended further than 5 km from the Project. Used and available steps were compared as a function of habitat covariates and distance to Mine and AWAR using integrated step selection analyses (iSSA; Avgar et al. 2016), following the applied methods and covariates developed for the Commitment 38 analysis (WSP 2023b). Deflection and paralleling candidate sets of models from the Commitment 38 analysis (WSP 2023b) were applied for addendum analyses (Table 2; Table 3). Because data for addendum analyses were more constrained than data used in the Commitment 38 analysis, individual models could not be estimated per caribou-year. Data from caribou-years were pooled and generalized linear

models (GLMs) with a random effect for caribou-year were estimated. GLMs including a random effect did not converge; therefore, models were refit without the random effect. Excluding a random effect for caribou-year assumes that individuals from the Qamanirjuaq herd (QAM) respond similarly to different habitat features and the Mine and AWAR, and that the same individuals respond similarly between subsequent years. Model selection followed the same process as the Commitment 38 analysis (WSP 2023b); the population-level model with the lowest AIC was the top model.

To address Comment GN-6 (Table 1), caribou step length (i.e., speed) and cosine of turning angle (i.e., directionality) were compared for steps approaching, crossing, and departing the Mine and/or AWAR using a Kruksal-Wallis rank sum test. Post-hoc pairwise comparisons were estimated using a Wilcoxon rank sum test with a continuity correction for multiple comparisons.

Table 2: Candidate models used to evaluate caribou deflection movement behaviour in response to the All-Weather Access Road (AWAR) and Mine in the Commitment 38 analysis (WSP 2023b).

Model Name	Model Structure[a]	Hypotheses Being Tested
Habitat	Lake + Greenness + HeathForb + GrowingDays*StepLength + TurnAngle	Accounts for basic covariates expected to influence caribou habitat selection, regardless of AWAR and Mine, during summer.
Model 1	Habitat + DistMineAWAR*DeflectionStep	This model tests whether caribou deflection is a function of proximity to AWAR and/or Mine. For example, caribou may be more likely to deflect from their general path of movement if they are closer to the AWAR and/or Mine.
Model 2	Habitat + NonVegetated*DeflectionStep	These models test whether caribou deflection is related to land cover. For example, a caribou may deflect to avoid non-vegetated land cover or lakes, or may deflect to seek out forage (e.g., heath-forb, lichen).
Model 3	Habitat + Lake*DeflectionStep	
Model 4	Habitat + Shrub*DeflectionStep	
Model 5	Habitat + Graminoid*DeflectionStep	
Model 6	Habitat + HeathForb*DeflectionStep	
Model 7	Habitat + Lichen*DeflectionStep	
Model 8	Habitat + CrossingStep*DeflectionStep	This model tests whether caribou deflection is related to whether the caribou has to the cross the AWAR and/or Mine. For example, a caribou may deflect to avoid crossing the AWAR and/or Mine.

a)   An asterisk (*) indicates an interaction between two covariates.

Table 3: Candidate models used to evaluate caribou paralleling movement behaviour in response to the All-Weather Access Road (AWAR) and Mine in the Commitment 38 analysis (WSP 2023b).

Model Name	Model Structure[a]	Hypotheses Being Tested
Habitat	Lake + Greenness + HeathForb + GrowingDays*StepLength + TurnAngle	Accounts for basic covariates expected to influence caribou habitat selection, regardless of AWAR and Mine, during summer.
Model 1	Habitat + DistMineAWAR*ParallelStep	This model tests whether caribou paralleling is a function of proximity to AWAR and/or Mine. For example, caribou may be more likely to parallel the AWAR and/or Mine if they are closer to the AWAR and/or Mine.
Model 2	Habitat + NonVegetated*ParallelStep	These models test whether caribou paralleling is related to land cover. For example, a caribou paralleling the AWAR and/or Mine may not be related to the AWAR and/or Mine but instead related to avoiding non-vegetated land cover or seeking out forage (e.g., heath-forb, lichen).
Model 3	Habitat + Lake*ParallelStep	
Model 4	Habitat + Shrub*ParallelStep	
Model 5	Habitat + Graminoid*ParallelStep	
Model 6	Habitat + HeathForb*ParallelStep	
Model 7	Habitat + Lichen*ParallelStep	
Model 8	Habitat + CrossingStep*ParallelStep	This model tests whether caribou paralleling is related to whether the caribou has to the cross the AWAR and/or Mine. For example, a caribou may parallel the AWAR and/or Mine to avoid crossing the AWAR and/or Mine.

a)   An asterisk (*) indicates an interaction between two covariates.

3.0   RESULTS

3.1.1   Deflection

Model 1 was the top model for estimating caribou deflection when caribou were both approaching and departing the Mine and AWAR (Table 4). When caribou were approaching the Mine and AWAR, deflection was also well explained by Model 7, which was a competing top model (Table 4). Because Model 1 included the DistMineAWAR covariate of interest for addendum analyses, Model 1 was assumed to be the top model for caribou approaching the Mine and AWAR.

Model 1 included seven parameters from the habitat model (i.e., Lake, Greenness, HeathForb, GrowingDays, StepLength, GrowingDays*StepLength, and TurnAngle), as well as the Euclidean distance to Mine and/or AWAR (DistAWARMine). Caribou approaching and departing the Project selected habitat with a lower proportion of lakes nearby (Table 5). Caribou approaching and departing the Project had less directional movements, indicated by the negative turning angle β coefficient, and had longer step lengths, indicated by the positive step length β coefficient (Table 5). The 95% confidence intervals (CI) for vegetation greenness and heath forb landcover overlapped zero for caribou both approaching and departing the Project, indicating uncertainty in the relationship between these covariates and caribou habitat selection (Table 5). Unsurprisingly, caribou approaching the Project selected habitat closer to the Mine and/or AWAR (i.e., negative β for DistMineAWAR; Table 5) and caribou departing the Project selected habitat further from the Mine and/or AWAR (i.e., positive β for DistMineAWAR;

Table 5). Step length increased as cumulative growing degree days above 0°C increased for caribou approaching and departing the mine (Table 5).

Caribou approaching the Mine and/or AWAR were more likely to exhibit deflection movements as distance to Mine and/or AWAR decreased (i.e., as caribou got closer to the Mine and/or AWAR; β = -0.36), but 95% CIs overlapped zero indicating uncertainty in this relationship (Table 5). Lastly, caribou departing the Mine and/or AWAR were more likely to exhibit deflection movements as distance to Mine and/or AWAR increased (i.e., as caribou got further from the Mine and/or AWAR; β = 0.06) but the magnitude of this effect was small and 95% CIs overlapped zero indicating uncertainty in this relationship (Table 5).

3.1.2   Paralleling

Model 1 was the top model for estimating caribou paralleling movement when caribou were both approaching and departing the Mine and AWAR (Table 6). Caribou response to covariates included in the 'Habitat' model are described above (Section 3.1.1). Caribou approaching the Mine and/or AWAR were more likely to exhibit paralleling movements as distance to Mine and/or AWAR decreased (i.e., as caribou got closer to the Mine and/or AWAR; β = -0.27), but 95% CIs overlapped zero indicating uncertainty in this relationship (Table 7). Further, caribou departing the Mine and/or AWAR were more likely to exhibit paralleling movements as distance to Mine and/or AWAR increased (i.e., as caribou got further from the Mine and/or AWAR; β = 1.08) but 95% CIs also overlapped zero indicating uncertainty in this relationship (Table 7).

3.1.3   Speed and Directionality

Caribou movement speed differed significantly as a function of direction of travel (Kruskal-Wallis χ^2 = 50.702; df = 2; p < 0.001; Figure 1). Post-hoc pairwise comparisons corrected for multiple comparisons indicated that caribou moved significantly faster when crossing the Mine and/or AWAR than when approaching (p = < 0.001) or departing (p < 0.001) the Project (Figure 1). However, caribou movement speed was not significantly different when approaching or departing the Project (p = 0.14; Figure 1).

Caribou movement directionality (i.e., cosine of turning angle) differed significantly as a function of direction of travel (Kruskal-Wallis χ^2 = 6.7167; df = 2; p = 0.03; Figure 2). However, post-hoc pairwise comparisons corrected for multiple comparisons indicated that approaching and crossing, crossing and departing, and approaching and departing steps did not have significantly different directionality (all p > 0.05; Figure 2). The iSSA indicated a negative turning angle coefficient, which arose because used steps were compared with available steps and caribou were taking steps that had lower cosines of turning angle than available steps. When cosine of turning angle is compared for approaching, crossing, and departing steps, in the absence of an iSSA framework, cosine of turning angle is positive. Most importantly, Figure 2 indicates that cosine of turning angle does not significantly differ when caribou are approaching vs. crossings vs. departing the Project.

Table 4: Model selection for approaching (upstream) and departing (downstream) population-level deflection models. Model names, model structure, degrees of freedom (*df*), and delta Akaike Information Criterion (ΔAIC) are presented. Top models are bolded.

Model Name	Model Structure	*df*	ΔAIC
Approaching (n = 93 caribou-years)			
Model 1	**Habitat + DistMineAWAR*DeflectionStep**	**10**	**0.00**
Model 7	Habitat + Lichen*DeflectionStep	10	0.19
Habitat	Lake + Greenness + HeathForb + GrowingDays*StepLength + TurnAngle	7	7.35
Model 3	Habitat + Lake*DeflectionStep	9	7.62
Model 6	Habitat + HeathForb*DeflectionStep	9	8.13
Model 5	Habitat + Graminoid*DeflectionStep	10	8.15
Model 2	Habitat + NonVegetated*DeflectionStep	10	9.29
Model 4	Habitat + Shrub*DeflectionStep	*Did not converge*	
Model 8	Habitat + CrossingStep*DeflectionStep		
Departing (n = 89 caribou-years)			
Model 1	**Habitat + DistMineAWAR*DeflectionStep**	**10**	**0.00**
Model 4	Habitat + Shrub*DeflectionStep	8	7.01
Model 7	Habitat + Lichen*DeflectionStep	10	7.75
Habitat	Lake + Greenness + HeathForb + GrowingDays*StepLength + TurnAngle	7	8.53
Model 3	Habitat + Lake*DeflectionStep	9	8.54
Model 6	Habitat + HeathForb*DeflectionStep	9	8.88
Model 5	Habitat + Graminoid*DeflectionStep	10	10.22
Model 2	Habitat + NonVegetated*DeflectionStep	*Did not converge*	
Model 8	Habitat + CrossingStep*DeflectionStep		

Table 5: Beta coefficient estimates (β) and upper and lower 95% confidence interval limits for approaching and departing population-level deflection models.

Covariate[a]	Approaching			Departing		
	β	Lower 95% Limit	Upper 95% Limit	β	Lower 95% Limit	Upper 95% Limit
Lake	-0.73	-1.07	-0.39	-0.61	-1.10	-0.13
Greenness	0.13	-0.21	0.47	0.18	-0.24	0.60
HeathForb	-0.02	-0.22	0.19	0.20	-0.08	0.48
StepLength	0.79	0.52	1.05	0.53	0.12	0.95
TurnAngle	-0.74	-0.89	-0.59	-0.66	-0.90	-0.43
DistMineAWAR	-0.35	-0.69	-0.01	0.58	0.22	0.94
DistMineAWAR*DeflectionStep	-0.36	-0.85	0.13	0.06	-0.48	0.59
GrowingDays*StepLength	0.63	0.37	0.90	0.46	0.10	0.81

a)   An asterisk (*) indicates an interaction between two covariates.

b)   DeflectionStep = '1' was used as the reference category.

Table 6: Model selection for approaching (upstream) and departing (downstream) population-level paralleling models. Model names, model structure, degrees of freedom (*df*), and delta Akaike Information Criterion (ΔAIC) are presented. Top models are bolded.

Model Name	Model Structure	*df*	ΔAIC
Approaching (n = 93 caribou-years)			
Model 1	**Habitat + DistMineAWAR*ParallelStep**	**10**	**0.00**
Model 4	Habitat + Shrub*ParallelStep	9	12.19
Model 7	Habitat + Lichen*ParallelStep	10	13.18
Model 3	Habitat + Lake*ParallelStep	9	14.98
Model 6	Habitat + HeathForb* arallelStep	9	15.16
Model 5	Habitat + Graminoid*ParallelStep	10	15.56
Habitat	Lake + Greenness + HeathForb + GrowingDegreeDays*StepLength + TurnAngle	7	17.96
Model 2	Habitat + NonVegetated*ParallelStep	*Did not converge*	
Model 8	Habitat + CrossingStep*ParallelStep		
Departing (n = 89 caribou-years)			
Model 1	**Habitat + DistMineAWAR*ParallelStep**	**10**	**0.00**
Model 4	Habitat + Shrub*ParallelStep	8	5.74
Habitat	Lake + Greenness + HeathForb + GrowingDegreeDays*StepLength + TurnAngle	7	6.41
Model 5	Habitat + Graminoid*ParallelStep	10	7.17
Model 7	Habitat + Lichen*ParallelStep	10	7.37
Model 6	Habitat + HeathForb*ParallelStep	9	7.45
Model 3	Habitat + Lake*ParallelStep	9	7.74
Model 2	Habitat + NonVegetated*ParallelStep	*Did not converge*	
Model 8	Habitat + CrossingStep*ParallelStep		

Table 7: Beta coefficient estimates (β) and upper and lower 95% confidence interval limits for population paralleling model.

Covariate[a]	Approaching			Departing		
	β	Lower 95% Limit	Upper 95% Limit	β	Lower 95% Limit	Upper 95% Limit
Lake	-0.66	-0.98	-0.35	-0.65	-1.12	-0.18
Greenness	0.27	-0.05	0.60	0.15	-0.26	0.56
HeathForb	-0.04	-0.23	0.15	0.19	-0.08	0.47
StepLength	0.98	0.72	1.23	0.55	0.13	0.98
TurnAngle	-0.76	-0.89	-0.63	-0.51	-0.69	-0.33
DistMineAWAR	-0.62	-0.90	-0.34	0.53	0.21	0.85
DistMineAWAR*ParallelStep	-0.27	-1.16	0.61	1.08	-1.00	3.17
GrowingDays*StepLength	0.66	0.40	0.92	0.51	0.16	0.85

a) An asterisk (*) indicates an interaction between two covariates.

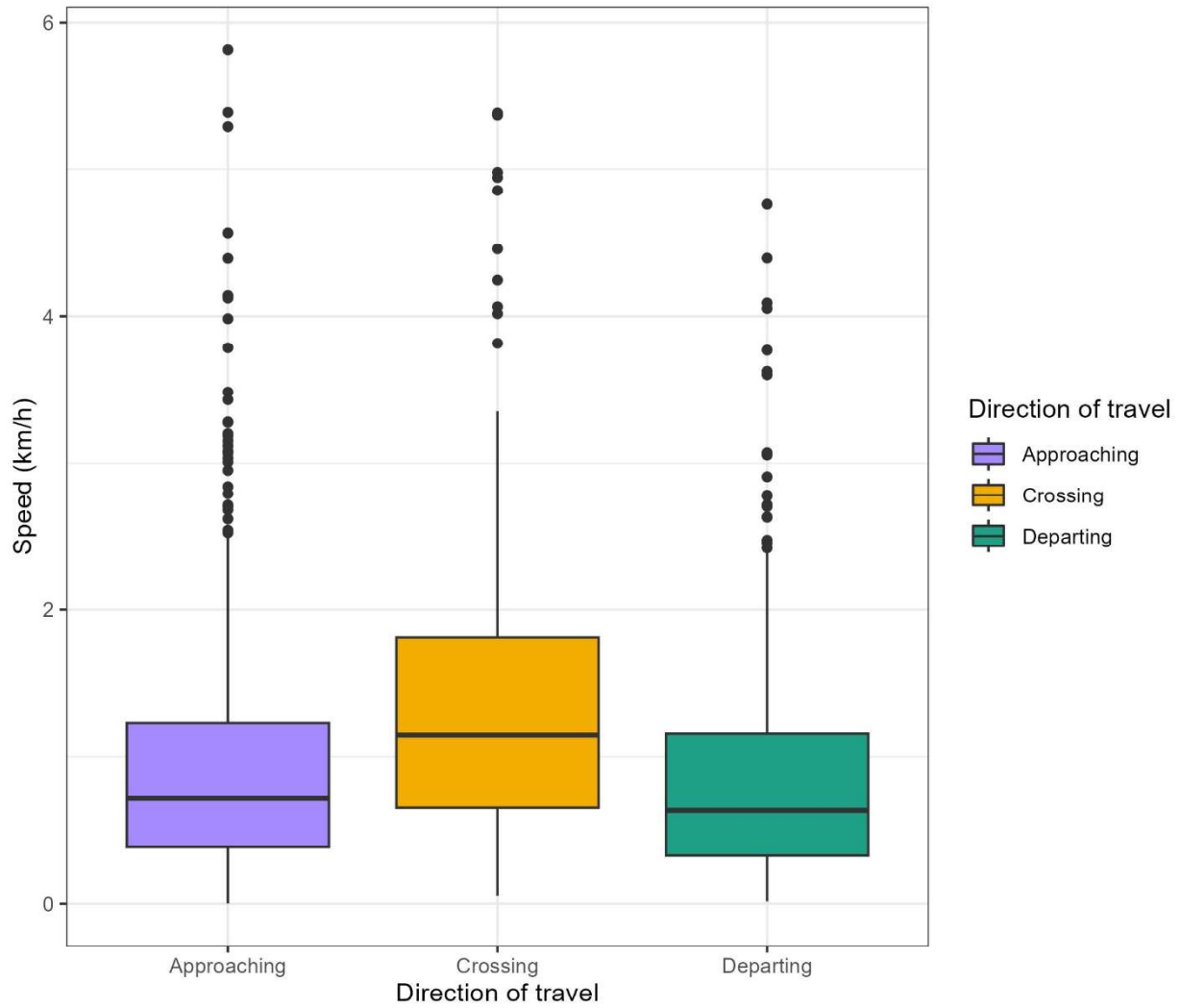b) ParallelStep = '1' was used as the reference category.

Figure 1: Boxplot comparing step speed (km/h) when caribou are approaching (n = 613), crossing (n = 157), and departing (n = 349) the Mine and/or All-weather Access Road (AWAR).
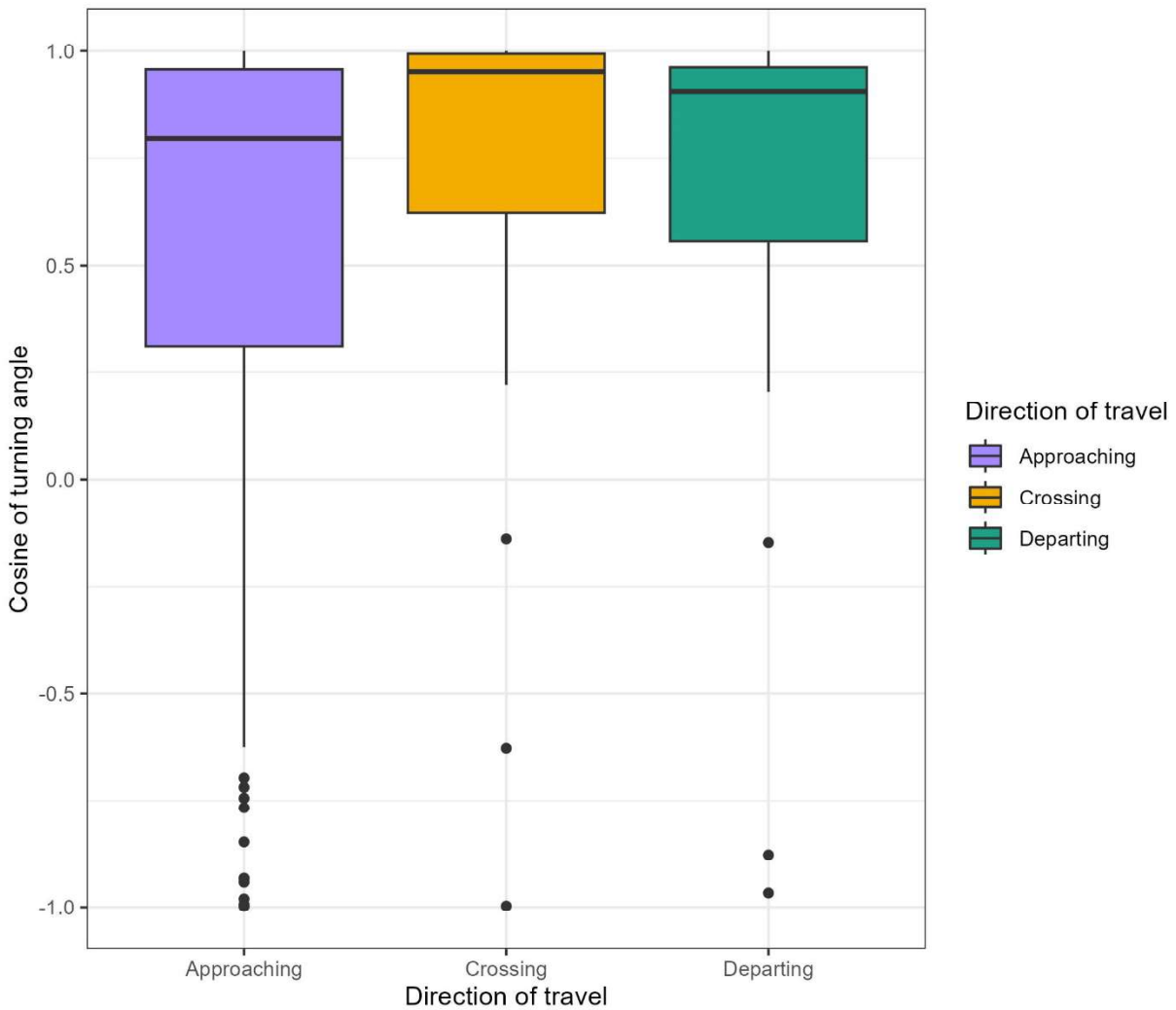
Figure 2: Boxplot comparing cosine of turning angle (i.e., directionality) when caribou are approaching (*n* = 613), crossing (*n* = 157), and departing (*n* = 349) the Mine and/or All-weather Access Road (AWAR). More positive cosine of turning angle values indicates more directional movement whereas negative cosine of turning angle values indicate less directional movement.

4.0 CONCLUSIONS
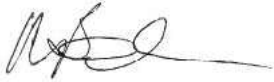
Addendum results support that caribou exhibited similar habitat selection and movement patterns when approaching and departing the Project. Results do not support that caribou deflection and paralleling movement behaviours differ significantly when approaching compared to departing the Project. Deflection and paralleling movement behaviours might be more likely as caribou approach and move closer to the Mine and/or AWAR but 95% CIs suggest that these relationships could be neutral or that the opposite trend could be possible. Further, addendum results support that caribou moved at similar speeds and similar directionality when approaching and departing the Project. However, caribou moved significantly faster when crossing the Mine and/or AWAR than when they were approaching or departing.

Given the scale of telemetry data (i.e., fixes were acquired every 4 hours), estimating fine-scale movement models within 1 km of the Project was not possible. The spatial scale of analysis should be at least as large as the mean distance a caribou could move within four hours (or to be even more conservative, at least as large as the maximum distance a caribou could move within four hours). For the Commitment 38 analysis, the mean distance moved by collared caribou was 2.7 km in four hours, which supports that the spatial scale of analyses was appropriate given the data. If collars were programmed to acquire fixes at finer intervals (e.g., 30 minutes), the addendum analyses could likely be constrained to within 1 km of the Project. Constraining the existing telemetry data to within 1 km of the Project would have reduced the sample size of used steps available for modelling. Even while including data within 5 km of the Project, random effects could not be estimated (i.e., models did not converge when random effects were included) due to the small number of used steps per caribou-year. If telemetry fixes were collected at shorter fix intervals more used steps would be available for modelling, which would increase the likelihood that movement models estimated within 1 km of the Project would converge.

Although Commitment 38 has been fulfilled (WSP 2023b), Agnico Eagle undertook additional analyses to address comments and questions about Commitment 38 analysis results made by TAG members in the June 27 TAG meeting. In summary, deflection and paralleling definitions were improved to better approximate deflection and paralleling movements observed by the GN in animations and, subsequently, better capture and test these observed patterns in iSSA. Caribou telemetry data were constrained to represent only the later summer when caribou moved faster and more directionally. Finally, caribou movements within 5 km of the Project were stratified into three categories to test whether caribou exhibit deflection and/or paralleling movement behaviours differently when approaching, crossing, or departing the Project. Agnico Eagle appreciates the contributions by the KivIA, GKD, and GN, and IQ holders that participated in meetings leading to the development and fulfillment of the Commitment 38 study design, analyses, and addendum.

We trust that the above meets your present requirements. If you have any questions please contact the undersigned.

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Attachments: Appendix A - Directionality of Movement as a Function of Julian Day
Appendix B - Examples of Parallel Steps

https://golderassociates.sharepoint.com/sites/162716/project files/5 technical work/commitment 38 analysis/08_addendum_memo/03_final/commitment38_addendum_techmemo_final_20230818.docx

5.0 LITERATURE CITED

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APPENDIX A

Directionality of Movement as a Function of Julian Day

The assumption that caribou have more tortuous movements immediately post-calving and more directional movements in late-June (e.g., summer) was tested before constraining addendum analyses to summer. Using 4-hour and 6-hour fix rate collars, mean speed (km/h) and mean cosine of turning angle (unitless) were calculated per caribou-year and Julian day, between May 21 and August 22 each year. The mean speed and mean cosine of turning angle were also calculated per Julian day for the entire population by pooling caribou-years. Mean speed and mean cosine of turning angle were plotted as a function of Julian day to understand whether caribou have higher speeds and more directional movement (i.e., positive cosine of turning angle values) in late June and July.

To better understand when caribou from the QAM herd move through the vicinity of the Project, the number of caribous steps within 5 km of the Mine and/or AWAR were plotted as a function of Julian day. This step was necessary to understand whether constraining Commitment 38 addendum analyses to only those caribou movements for Julian day 175 or later would remove a substantial portion of caribou interacting with the Project.

Figures A-1 and A-2 show that caribou begin to move faster and more directionally after Julian day 175 (or June 24 in non-leap years). Figure A-3 indicates that most caribou movements in the vicinity of the Project occur after Julian day 175.
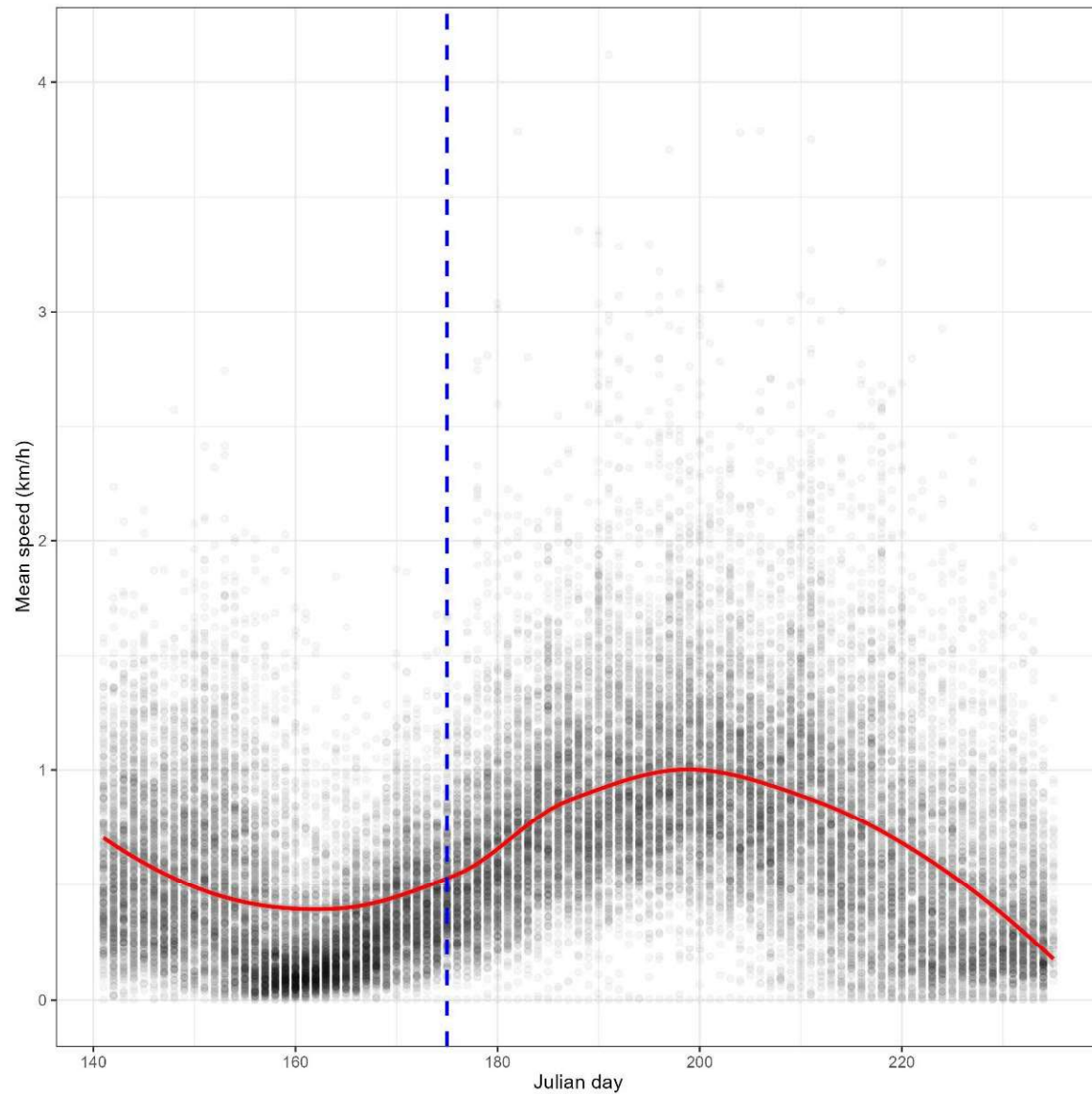
Figure A-1: Mean caribou speed (km/h) as a function of Julian day for *n* = 438 caribou-years. Black translucent points represent mean caribou speeds per caribou-year and the red line represents smoothed population speeds. Julian days 141 and 235 correspond to 21 May and 23 August in non-leap years, respectively. The blue dashed line indicates the approximate inflection point when mean speed changes from decreasing to increasing (Julian day 175, or June 24 in non-leap years).
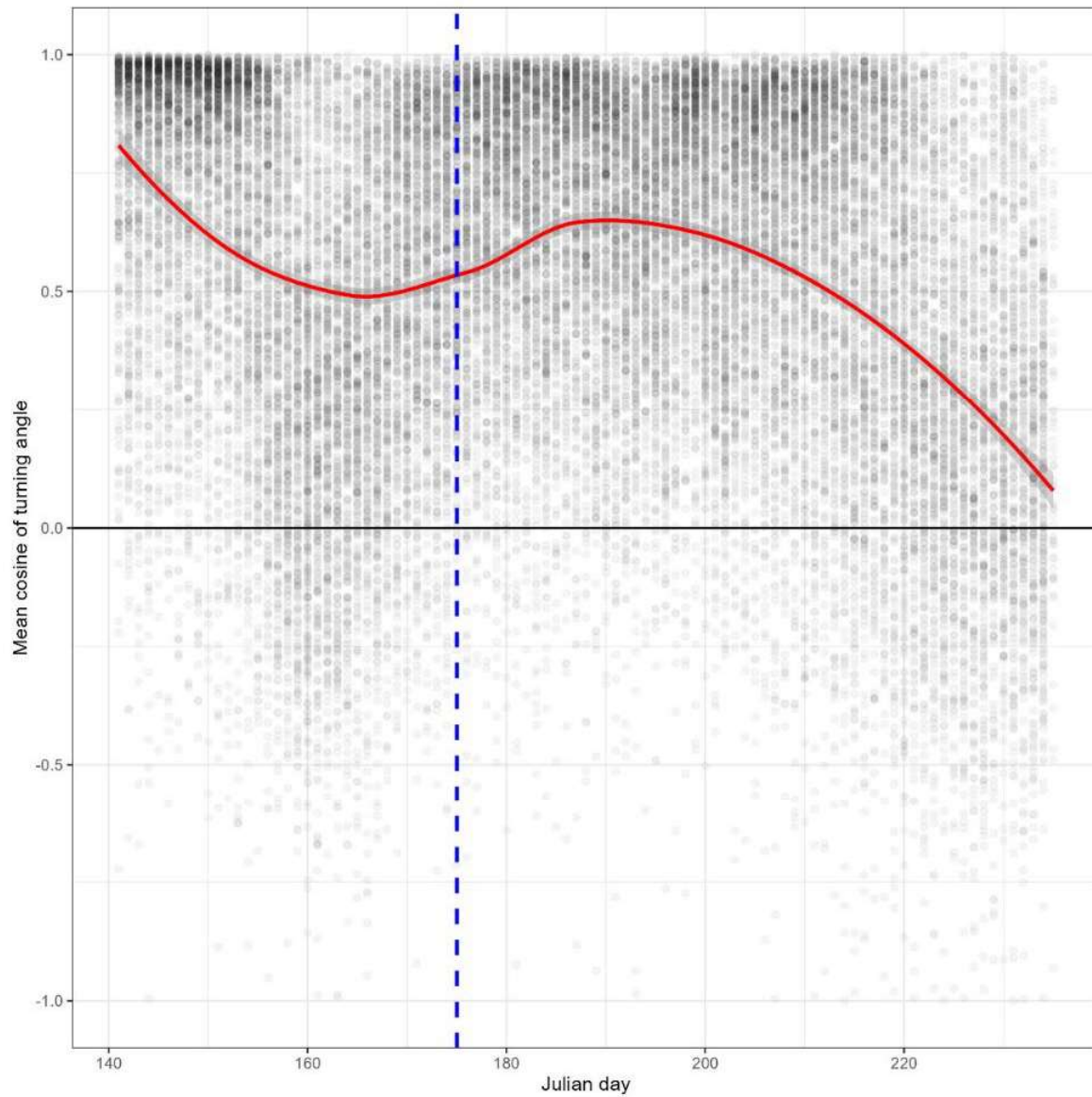
Figure A-2: Mean cosine of caribou turning angle as a function of Julian day for *n* = 438 caribou-years. Black translucent points represent mean cosine of turning angle per caribou-year and the red line represents smoothed population cosine of turning angle. Julian days 141 and 235 correspond to May 21 and August 23 in non-leap years, respectively. The blue dashed line indicates the approximate inflection point when mean cosine of turning angle changes from decreasing to increasing (Julian day 175, or June 24 in non-leap years).
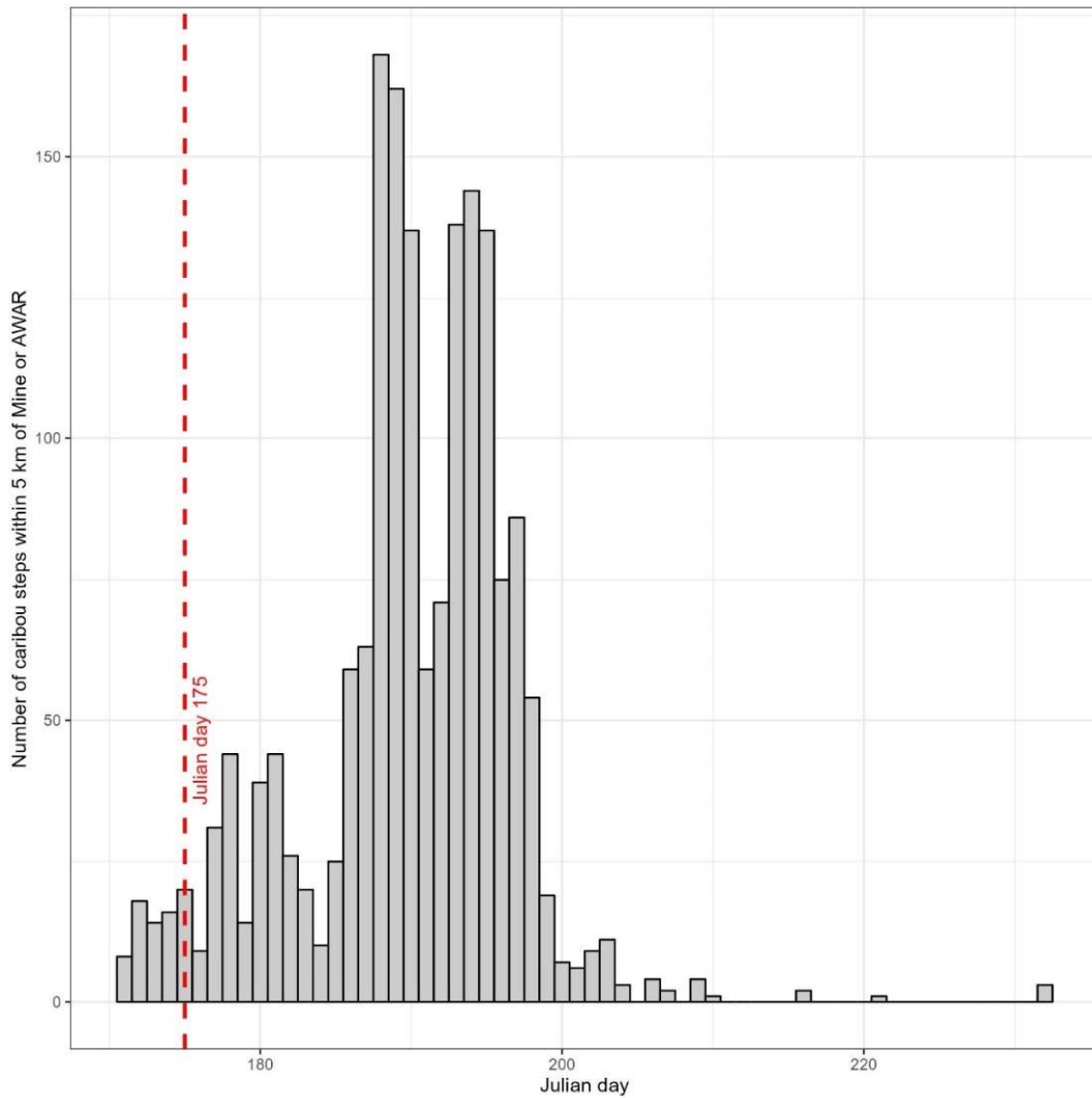
Figure A-3: Number of caribou steps within 5 km of the Mine or All-Weather Access Road (AWAR) by Julian day. The red dashed line indicates Julian day 175 (or June 24 in non-leap years), when caribou movements become faster and more directional.
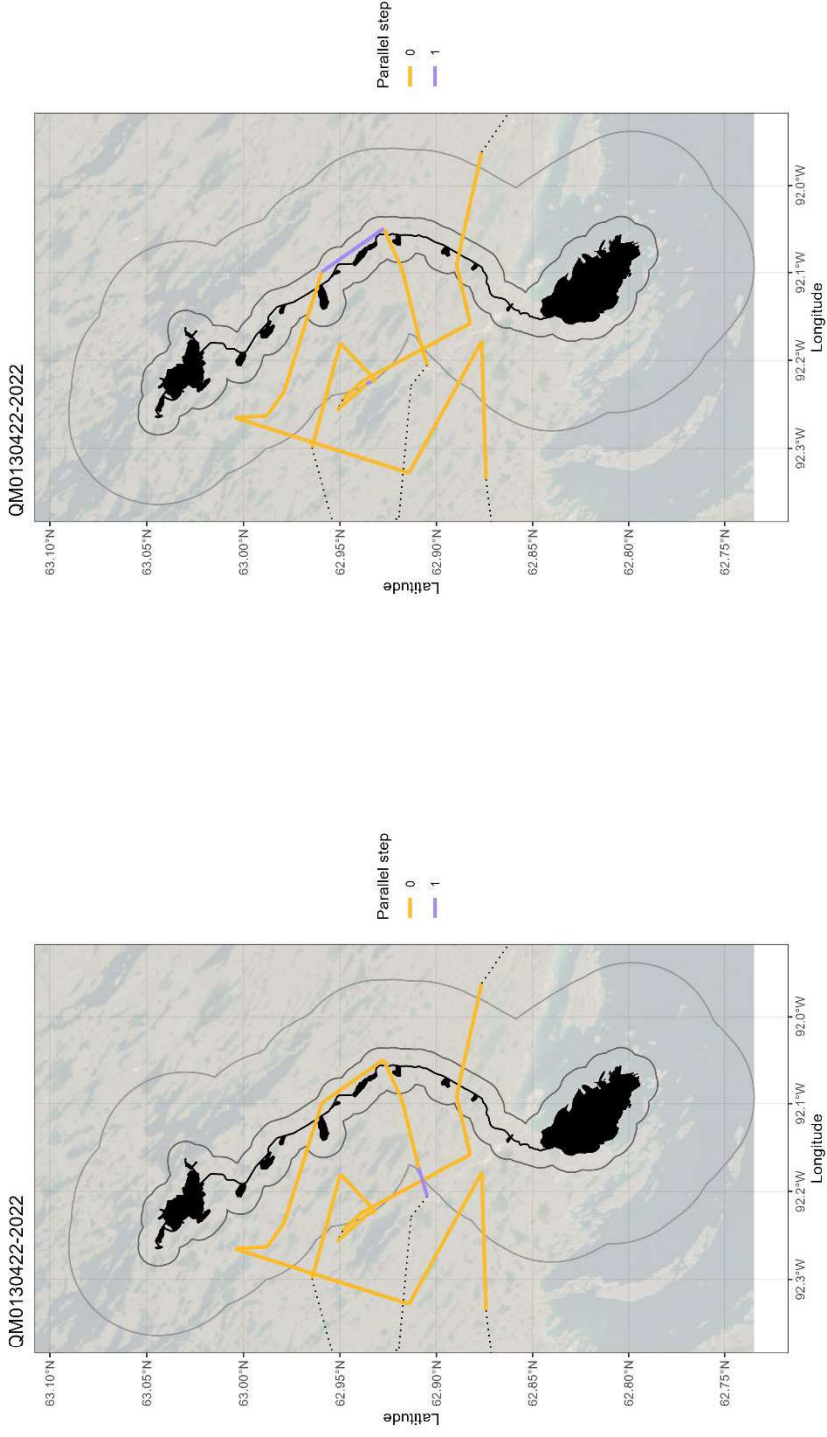
APPENDIX B

Examples of Parallel Steps

Figure B-1: Example of parallel steps for caribou-year QM0130422-2022 defined using the Commitment 38 analysis definition (left) and using the addendum definition (right). Parallel steps are shown in purple. The addendum definition better approximates steps that the human eye may classify as 'paralleling' when reviewing caribou movement animations.
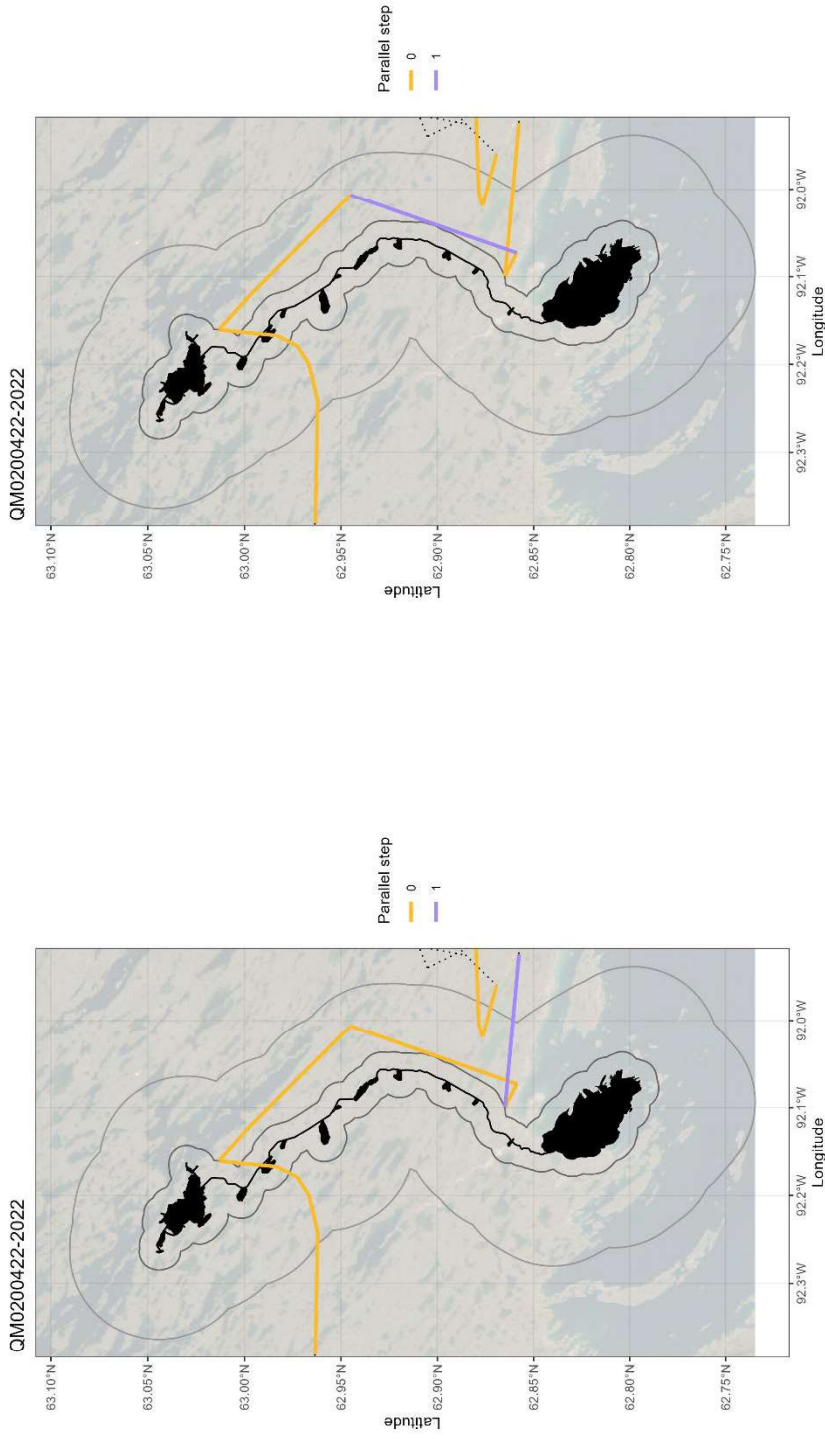
Figure B-2: Example of parallel steps for caribou-year QM0200422-2022 defined using the Commitment 38 analysis definition (left) and using the addendum definition (right). Parallel steps are shown in purple. The addendum definition better approximates steps that the human eye may classify as 'paralleling' when reviewing caribou movement animations