



Photo 9-5. Compliant snowbank (40 cm) at KM25.



Photo 9-6. Compliant snowbank (0 cm) with indications of snowbank management (feathering).



Photo 9-7. Snowbank management (in progress) to facilitate wildlife crossing and improve driver visibility.

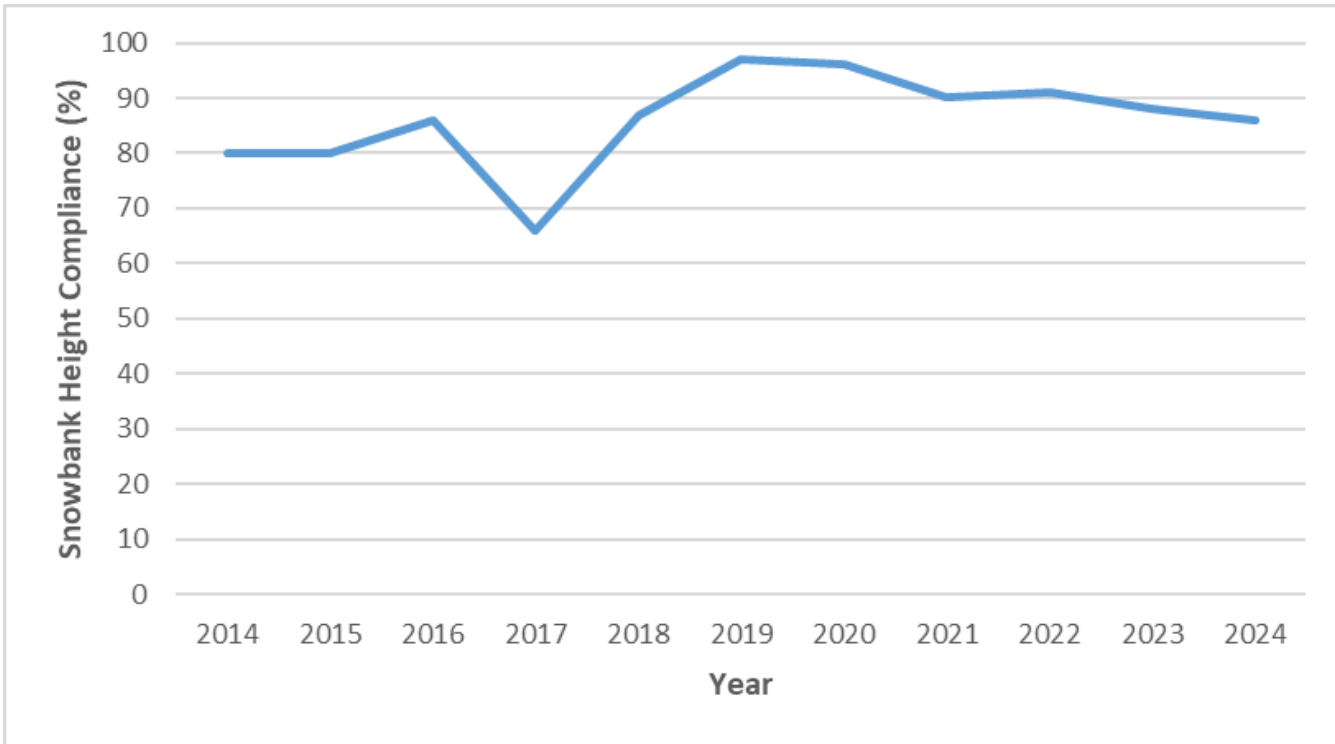


Figure 9-5. 2024 inter-annual trends — snowbank height compliance monitoring (2014 to 2024).

9.3 HEIGHT OF LAND SURVEYS

The following PCs were developed to monitor and mitigate potential disturbance to caribou calving near or interacting with the Project (Nunavut Impact Review Board 2020):

- **PC #53b** “Monitoring and mitigation measures at points where the railway, roads, trails, and flight paths pass through caribou calving areas, particularly during caribou calving times.”
- **PC #54b** “Monitoring for caribou presence and behaviour during railway and Tote Road construction.”
- **PC #58b** “A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behaviour and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails.”

To address these PCs, HOL surveys were initiated in 2013 to study caribou habitat use and behavioural reactions to human activities near the Project footprint—particularly during the calving season (i.e., May and June). Behaviour sampling can provide insight into responses to environmental stimuli (Martin and Bateson 1993). The HOL surveys are intended to examine if/how caribou (especially cows with calves) respond to Project-related activities and infrastructure. As of 2019, North Baffin caribou were at a low point in their 60 to 80-year population cycle (Government of Nunavut 2019), and caribou observations during surveys or recorded incidentally are infrequent. The HOL surveys will support long-term surveillance monitoring of caribou behaviour throughout the life of the Project and provide information to verify predicted Project-related effects on caribou movement and habitat use.



9.3.1 METHODS

The HOL survey methods were developed in consultation with the TEWG (specifically the Mittimatalik Hunters and Trappers Organization [MHTO]) and incorporated Inuit Qaujimajatuqangit into strategies for detecting caribou (EDI Environmental Dynamics Inc. 2019). The HOL surveys comprise observations from a high point of land (i.e., to increase the observable area) for a prescribed amount of time using binoculars and a spotting scope. The objective is to detect and record caribou in proximity to Project infrastructure. The 2024 HOL surveys were completed in early summer (May 29 to June 10, 2024) to observe caribou during the calving period. Opportunistic late-winter HOL surveys were not completed in 2024.

Surveys were completed at pre-established HOL stations (#1 to 24) distributed throughout the Project footprint, typically at the highest points of the landscape, to optimize the viewshed (Map 9-2). Project components (e.g., the Tote Road, accommodation complexes, Deposit No. 1) were visible from each station; however, a 360-degree viewshed was seldom achieved due to obstruction from landscape/terrain. The locations of the stations were selected based on strategic positioning along the Project footprint, elevation gain (i.e., for improved viewshed), and accessibility during spring conditions. Since the initiation of HOL surveys, stations 1 to 16 have generally been accessed on foot, whereas stations 17 to 24 have generally been accessed via helicopter (e.g., due to water bodies, terrain, and travel distances).

9.3.1.1 Data Collection

Two qualified biologists from EDI Environmental Dynamics Inc. (EDI) completed the 2024 HOL surveys with the participation of Baffinland personnel and two Inuit assistants. The survey procedure involved one observer scanning the viewshed with a spotting scope (i.e., focusing on the distant landscape) and three observers scanning the viewshed with binoculars (i.e., focusing on the intermediate and near landscape). The aim was to conduct a minimum of two surveys at each HOL station for at least 40 minutes per survey. Using field forms, the following information was recorded:

- station number (with georeferencing);
- location description (direction from road, aspect, terrain, other identifying features);
- general habitat description (vegetation and soil, if/where possible);
- presence of snow cover on landscape;
- photograph numbers (taken from multiple cardinal directions); and,
- survey observation timeframe (start/end times).

If caribou were observed, the survey team monitored behaviour following established protocols described in the 2013 Annual Monitoring Report (Baffinland Iron Mines Corporation 2019). Depending on the number of caribou, observations were made as either a scan or focal sample (Martin and Bateson 1993). Activity categories (e.g., walking, foraging, running, bedded) were assigned and tallied at two-minute intervals for scan sampling. For focal sampling, activity observations were recorded at two-minute intervals. Project-related activities or events (e.g., truck travel along the Tote Road) were also recorded to document any unique

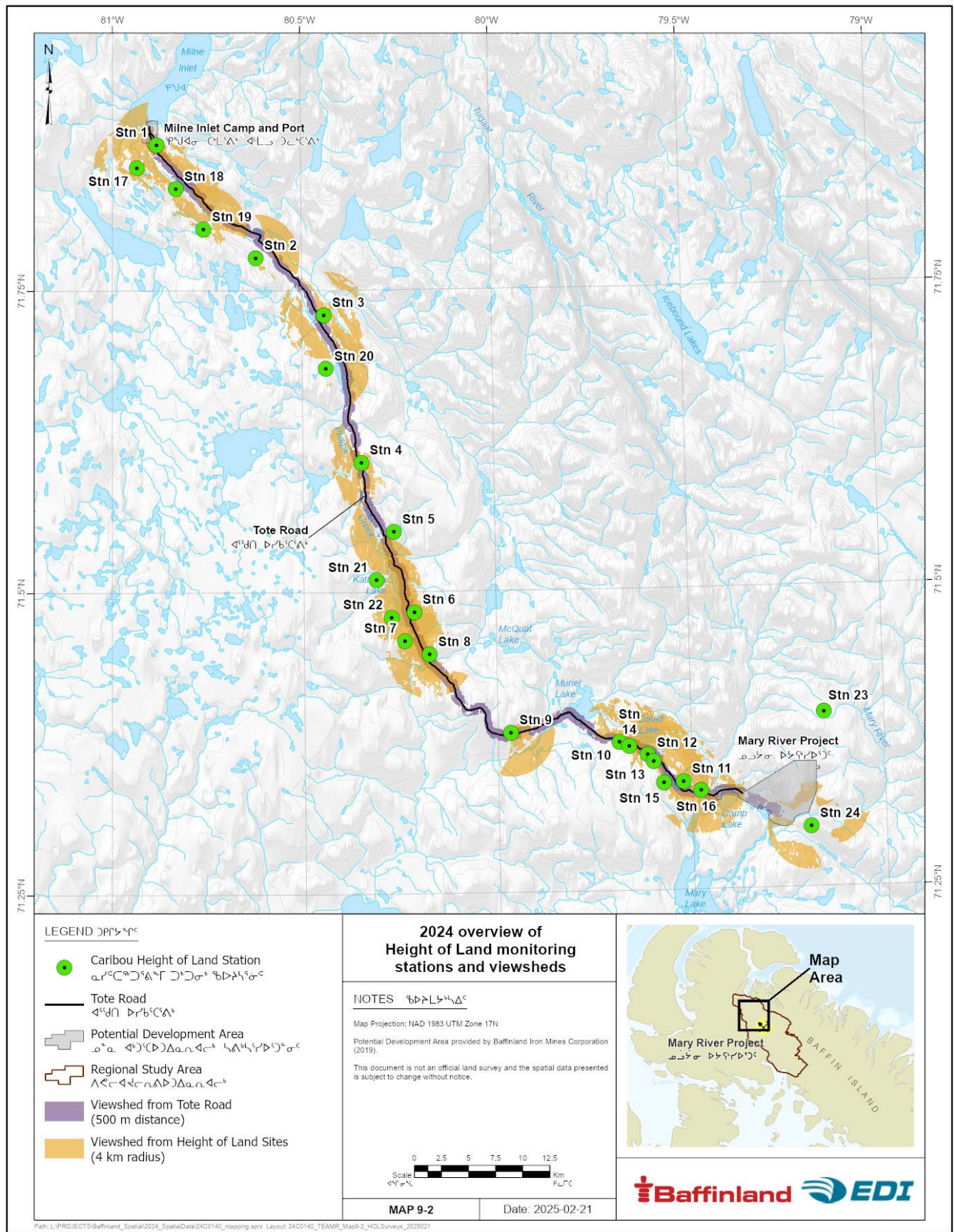


responses. Distances and directions of the observed individual or group to and from Project infrastructure were estimated (if/where applicable) and ground-truthed using a Geographic Positioning System (GPS).

9.3.1.2 Modifications to Survey Procedures

In 2016, viewshed modelling and mapping were completed to determine the amount of viewable area at each HOL survey station. A total of 227 km² were surveyed within the viewshed area, with viewshed ranging from 5 to 22 km² at each HOL station (Map 9-2). Refer to Section 4.3.1 of the 2016 Annual Monitoring Report for a detailed description of viewshed modelling and mapping (EDI Environmental Dynamics Inc. 2017).

During the June 2019 TEWG meeting, the MHTO suggested that HOL station locations be re-evaluated to incorporate historic migration, calving patterns, and any new information relevant to HOL goals and methodologies. In 2020, the survey time was increased (to what it is presently) by completing at least two station visits for 40 minutes (previously 20 minutes). To date, Baffinland has not been able to confirm alternate locations for the HOL stations with the MHTO, but will continue to consult with MHTO representatives on the program via the TEWG and other engagement methods.





9.3.2 RESULTS AND DISCUSSIONS

Fifteen caribou were observed during the HOL surveys in 2024 on June 3, 4, 5, and 8. Caribou were observed at four HOL stations (i.e., 12, 13, 14, and 24) in groups ranging from one to eight individuals. Although it was not possible to accurately sex and age the caribou due to observation distances, no 2024 calves were noted in the groups. No other indicators of caribou (i.e., fecal matter, hair, or evidence of foraging such as cratering) were observed during the HOL surveys.

In total, 32 hours and 25 minutes of HOL surveys were completed in 2024 with a targeted minimum of 40 minutes of survey time per station. Surveys were completed in early summer (May 29 to June 10, 2024) during the peak calving season. All stations except HOL station 23 (due to poor visibility) had two visits completed.

Visibility conditions during the HOL surveys were 'excellent' or 'good' during all surveys. Most stations had high snow cover (ranging from 80 to 100%) across the landscape.

Inter-annual Trend — Fifteen caribou were observed in the PDA during the HOL surveys in 2024. This is the first time since 2013 that caribou observations have coincided with the HOL surveys (Figure 9-6). This trend has previously been consistent (year-over-year) despite changes to survey procedures (i.e., increased survey time/effort) and supplementary/ancillary data capture (e.g., via deployment of remote cameras). The change in observations in 2024 may suggest caribou numbers are beginning to increase, and more caribou may be seen in the Project footprint in coming years.

As mentioned, the current caribou ecology on North Baffin Island (i.e., low population numbers and low movement) is a primary factor contributing to a lack of caribou observations. Caribou densities in the region would need to be considerably higher to evaluate potential change in caribou behaviour and/or habitat use due to the Project (EDI Environmental Dynamics Inc. 2022b). In the interim, HOL surveys provide important data on individual-level caribou response to Project interactions and inform potential mitigations.

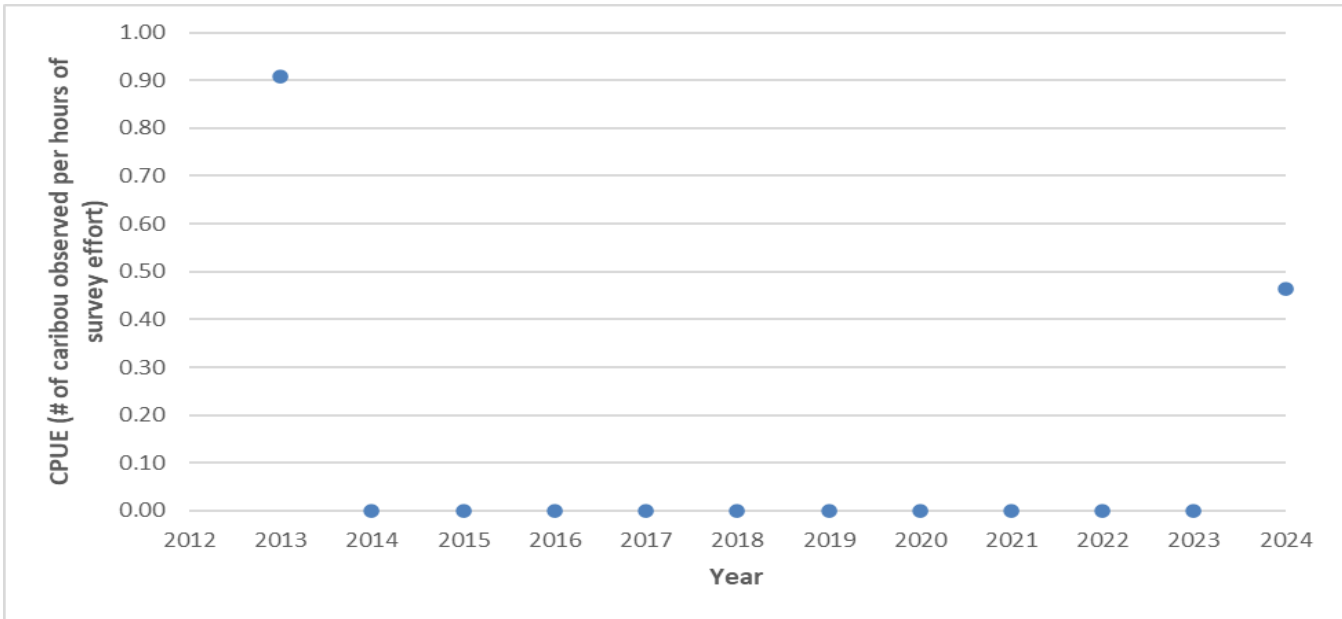


Figure 9-6. 2024 inter-annual trends — Height of Land surveys (2013 to 2024 – post-baseline).
Note: CPUE = Catch per unit effort (i.e., number of caribou observed per hour of survey effort).

9.4 REMOTE CAMERAS

The following PC was developed to address concerns regarding potential caribou crossings of linear features (i.e., train or vehicle traffic) and constraining of wildlife movement across roadways (Nunavut Impact Review Board 2020):

- PC #54dii** *“The Proponent shall provide an updated Terrestrial Environmental Management and Monitoring Plan which shall include...Snow track surveys during construction and the use of video-surveillance to improve the predictability of caribou exposure to the railway and Tote Road. Using the result of this information, an early warning system for caribou on the railway and Tote Road shall be developed for operation.”*

To address this PC—and related comments/recommendations from the MHTO and other TEWG members to increase the capacity for wildlife surveillance at the Project—a remote camera monitoring program was initiated in the summer of 2021. The program involves the deployment of remote cameras at HOL survey stations (described in Section 9.3) to supplement data capture and evaluation of caribou movement at the Project. Remote cameras provided a continuous observation alternative from January 2024 to December 2024.



9.4.1 METHODS

In the summer of 2021, EDI and Baffinland personnel deployed 12 Reconyx HP2x HyperFire 2 Professional Cover IR remote cameras (two per station) at strategic locations corresponding with HOL survey stations (i.e., stations 1, 3, 4, 6, 10, and 16; Map 9-2; Appendix D) to optimize wildlife observations along the Tote Road. Remote camera stations are shown on Map 9-2, and photo documentation of the camera stations (site conditions and installations) is provided in Appendix D.

Cameras were distributed across an open landscape with relatively few obstacles. Due to the large field of view, the image quality and detectability deteriorate further from the camera, reducing the ability to identify and locate distant wildlife accurately. Wildlife in the PDA do not necessarily have established and/or defined 'usage' trails. Therefore, predicting higher usage areas and movement corridors for larger wildlife species to inform camera deployment relied on knowledge of the Project setting and previous survey observations.

Baffinland personnel were responsible for camera care and maintenance (i.e., battery and SD card exchanges). The remote camera stations were accessed via helicopter, vehicle, or foot. Most cameras were established within 500 m of an access trail or road. Cameras were installed using a rock drill to anchor the units to the ground using a steel/rebar tripod affixed with steel clamps. Cameras were set approximately chest high and positioned to capture an optimal viewshed. Cameras were programmed¹⁶ before deployment and tested/checked on site (after installation) to verify proper function and viewshed.

After initial deployment in 2021, cameras were periodically checked (two to four times annually) to provide controls for camera malfunctions, realignment, and servicing of batteries and SD cards. Efforts were made to schedule checks at regular intervals to prevent large-scale data loss and, at times conducive to site personnel for logistical and safety reasons (i.e., avoidance of extreme cold temperatures and large distances from vehicles during winter). All cameras were checked by Baffinland staff in December 2023 and again by EDI staff in June 2024, in conjunction with the HOL surveys.

Data were relayed to EDI personnel for photo analysis of any/all wildlife observations, focusing on caribou and large carnivores. Wildlife activities were carefully investigated and documented. Data analysis applied image pre-screening using "EcoAssist": an open-sourced AI incorporating the MegaDetector¹⁷ model to identify animals, people, and vehicles in camera images. After pre-screening, photo analysis was streamlined using the third-party analytical software program Timelapse2 (Saul 2022). This program, and its sister software program, Timelapse Template Editor, facilitated the development of a custom template that extracted specified metadata from images and defined the Project-specific data collection. The image collection was filtered to review only wildlife, people, or vehicles, or set date ranges. Set date ranges of known caribou

¹⁶ The Reconyx HP2X HyperFire 2 Professional Covert IR cameras are motion and infrared triggered and were set to take three consecutive photos when activated ('Rapidfire' mode) with no delay between triggered events. The cameras were programmed to capture time-lapse photos each hour, 24 hours per day, to document baseline environmental conditions and surrounding landscape. Each photo was 'timestamped' (time/date/temperature).

¹⁷ This model is trained on several million images from a variety of ecosystems, and is especially useful in the data analysis workflow for eliminating blank images from datasets (i.e., images without animals, people, or vehicles), thus increasing the efficiency of image processing and data extraction (Fennell et al. 2022, Addax Data Science and Smart Parks).



occurrences as recorded by Tote Road users and site personnel were also used to refine selected images. The final image collection was then reviewed by a Qualified Wildlife Specialist who evaluated and recorded data metrics were recorded for each wildlife detection, including site ID, date and time, temperature, species, age, sex (where possible), number of individuals, behaviour, image trigger, sequence, episode, and general comments. If/when a cluster of interrelated wildlife detections were recorded, the set of images was classified as the same event when the images were taken less than 10 minutes apart. This allowed reviewers to determine minimum total counts that may include multiple sets of triggers and animals as they moved past a camera or an individual that was active in front of a camera for a long period of time.

9.4.2 RESULTS AND DISCUSSIONS

Over 336,000 photos (approximately 106 GB) were captured from the 12 remote cameras between January 2024 and December 2024. Table 9-4 summarizes the remote camera data returns at each HOL/camera station. Variability in the data capture was attributed to obstructions of the field of view (e.g., due to blowing snow, ice crystals, or fog) or camera stoppage (e.g., loss of power or exceedance of information storage capacity).

Fifty-eight wildlife detections were captured across all combined cameras. Nine species of mammals and birds were identified from the 12 remote cameras. No wildlife were recorded at the Baffin-8 or Baffin-12 remote cameras. As seen in Figure 9-7, the highest number of wildlife detections was tied between unidentified bird species and caribou (15 detections each), followed by Arctic hare (10 detections) and Arctic fox (7 detections). Observations of smaller mammals and birds were consistent with snow track and HOL surveys from 2024 and previous years (Figure 9-2, Figure 9-3). No carnivores (i.e., wolves or bears) were captured in photos taken by the remote cameras. Larger carnivores and ungulates are not commonly seen on site, and, therefore, have a low probability of being detected on the remote cameras.

The Baffin-6 remote camera recorded the highest species richness at six species (Figure 9-8). The Baffin-11 remote camera recorded the first images of caribou (Photo 9-8 to Photo 9-11) since the remote camera program was initiated in 2021. These images were flagged after manual vetting using known date ranges where caribou were seen and reported adjacent to the Tote Road (Section 9.7). All caribou images were manually vetted and flagged because the EcoAssist software did not successfully identify the caribou in the distance.

The Baffin-8 and Baffin-11 remote cameras stopped recording images before camera servicing in late May 2024 and again in early January 2025, likely because nearby vehicle traffic triggered excessive photo captures and drained the batteries.



Table 9-4. 2024 remote camera survey summary of remote camera data returns.

Site Name	Camera ID	Year 3 – Start Date	Year 3 – End Date	# Species Recorded	# Photos	Notes
HOL 6	Baffin-1	December 28, 2023	January 5, 2025	2	12,322	—
HOL 16	Baffin-2	December 25, 2023	January 2, 2025	1	10,064	—
HOL 1	Baffin-3	December 24, 2023	January 5, 2025	1	9,294	—
HOL 1	Baffin-4	December 24, 2023	January 5, 2025	2	12,754	—
HOL 6	Baffin-5	December 28, 2023	January 5, 2025	2	9,055	—
HOL 16	Baffin-6	December 25, 2023	January 2, 2025	6	30,137	Lots of road traffic triggers.
HOL 3	Baffin-7	December 28, 2023	January 5, 2025	1	9,132	—
HOL 4	Baffin-8	December 25, 2023	October 20, 2024	0	101,823	Excessive triggers from road traffic drained batteries (February 27, 2024) before June 2024 check.
HOL10	Baffin-9	December 25, 2023	January 2, 2025	2	9,060	—
HOL 4	Baffin-10	December 25, 2023	January 4, 2025	1	9,163	—
HOL 10	Baffin-11	December 25, 2023	October 18, 2024	2	114,930	Excessive triggers from road traffic drained batteries (March 14, 2024) before June 2024 check.
HOL 3	Baffin-12	December 28, 2023	January 5, 2025	0	8,967	—

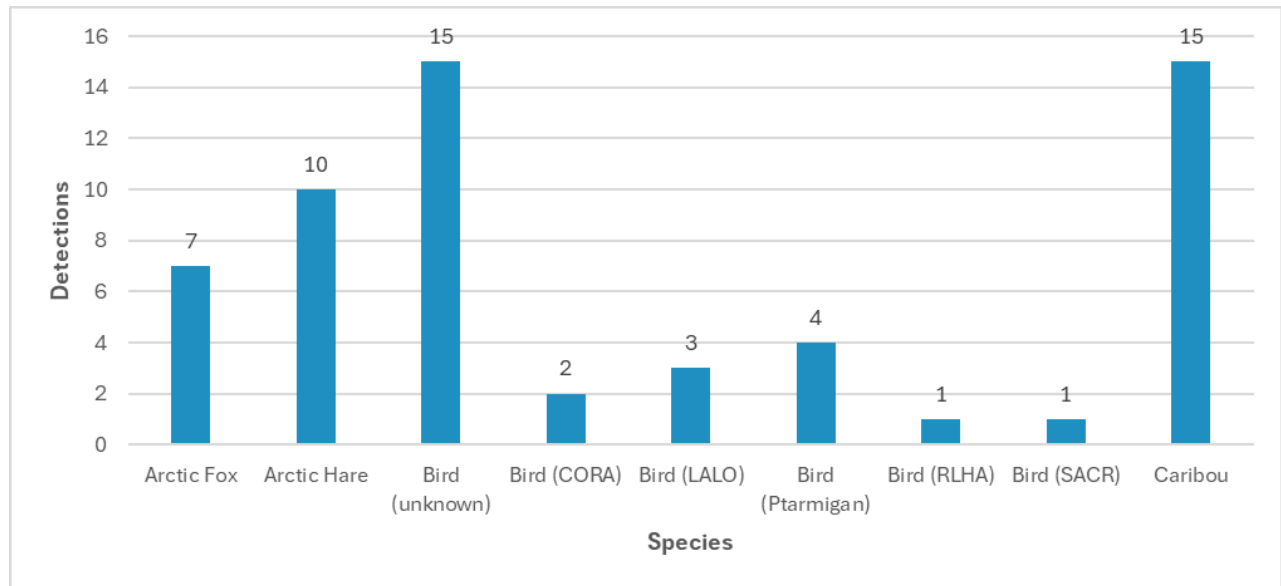


Figure 9-7. January to December 2024 remote camera survey – total wildlife detections per species.

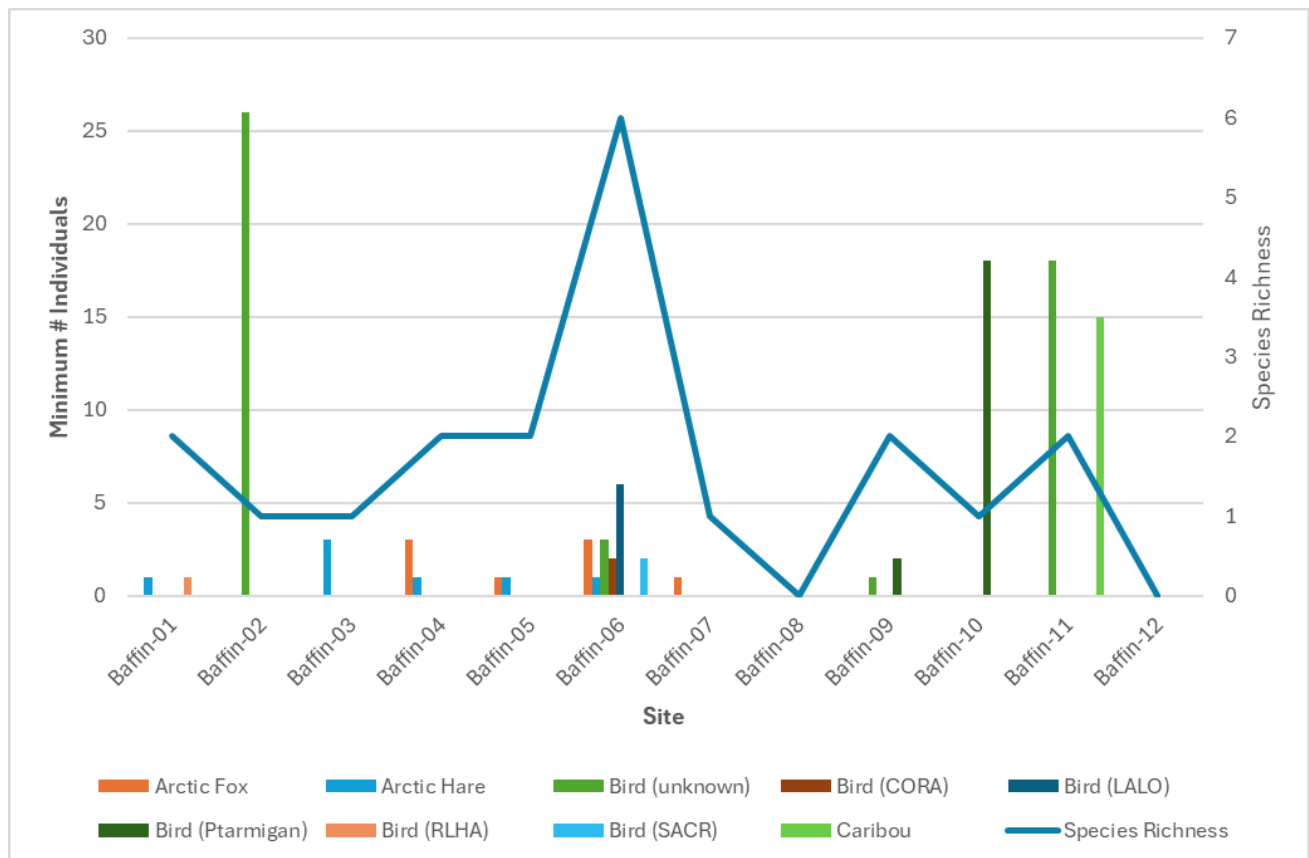


Figure 9-8. January to December 2024 remote camera survey – minimum number of species observations per camera station (bars) and species richness for each camera station (line).
Note: bird species codes = Common Raven (CORA), Lapland Longspur (LALO), Rough-legged Hawk (RLHA), and Sandhill Crane (SACR).



Photo 9-8. Three caribou foraging near the Tote Road on June 25, 2024. Site enviro truck stationed at the pull out on the left to monitor caribou response to traffic and make sure traffic is slowing down and following correct caribou response procedures.



Photo 9-9. Enlarged image of caribou seen in Photo 9-8 near the Tote Road on June 25, 2024.



Photo 9-10. A group of three caribou seen adjacent to the Tote Road via remote camera. The three caribou were first noted on June 25, 2024 (13:07) and were documented in various locations in the remote camera's field of view until June 26, 2024 (11:27). During the 22-hour window, a minimum of 39 B-Trains, five heavy pieces of equipment, and three light trucks were recorded on the cameras.



Photo 9-11. A group of three caribou seen adjacent to the Tote Road via remote camera. The three caribou were first noted on June 25, 2024 (13:07) and were documented in various locations in the remote camera's field of view until June 26, 2024 (11:27).



9.5 AERIAL CARIBOU SURVEY

The following PCs were developed to monitor and mitigate potential disturbance to caribou calving near or interacting with the Project (Nunavut Impact Review Board 2020):

- **PC #53b** *“Monitoring and mitigation measures at points where the railway, roads, trails, and flight paths pass through caribou calving areas, particularly during caribou calving times.”*
- **PC #54b** *“Monitoring for caribou presence and behaviour during railway and Tote Road construction.”*
- **PC #58b** *“A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behaviour and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails.”*

In early 2020, the TEWG discussed the status of caribou populations at the Project. Baffinland then proposed a decision framework and defined numerical triggers¹⁸ to initiate more comprehensive caribou monitoring (i.e., a GPS collar program to evaluate caribou movements and habitat selection in relation to the Project), which would be informed by an aerial survey of the wildlife RSA (EDI Environmental Dynamics Inc. 2022b). A late-winter (March 2023) aerial survey was completed to assess the occurrence (presence/absence), distribution, and total counts of North Baffin caribou within the wildlife RSA and nearby areas of interest (Map 9-3). The objective of this aerial survey was to estimate the abundance and density of North Baffin caribou in the northern (i.e., active) and southern (i.e., planned/future) subregions of the wildlife RSA (EDI Environmental Dynamics Inc. 2022b).

Note: This section was first reported in the 2023 Terrestrial Environment Annual Monitoring Report (EDI Environmental Dynamics Inc. 2024). The Result and Discussion section has been updated and reissued to ensure the completeness of the public record.

¹⁸ The decision framework emerged from the findings of a technical study on the barriers to caribou movement and potential indirect loss of caribou habitat (EDI Environmental Dynamics Inc. 2022b). The report identified two subregions within the Project area to independently assess potential effects based on active (northern) and planned (southern) phases of the Project. It was concluded that at least 35 collared caribou were necessary to complete robust statistical analyses on movement and habitat effects. To make sure that these 35 caribou are a representative sample of the subpopulation, >350 caribou (or >35 groups of caribou) should be present in the southern and northern subregions. Further monitoring will be initiated in a subregion only if the trigger is met in that subregion. This sample size trigger for each subregion was deemed reasonable in practice (i.e., in relation to the necessary field implementation effort) and necessary to facilitate appropriate statistical analyses.



9.5.1 METHODS

9.5.1.1 Study Area

The survey area (23,445 km²) is based on the Project's wildlife RSA (described in EDI Environmental Dynamics Inc. 2012). Based on ongoing discussions with the TEWG, two additions were made to the study area for the aerial survey: (1) an area to the north and west was added as requested by the Government of Nunavut (GN) to make sure enough area was surveyed beyond the potential zone of influence of the northern transportation corridor (i.e., the Tote Road; TEWG June 23, 2022 meeting minutes; Baffinland Iron Mines Corporation 2022); and (2) the Ikaluit Lake area on the wildlife RSA's north and east corner was added as requested by the MHTO at the February 2023 TEWG meeting (Baffinland Iron Mines Corporation 2023c). Both TEWG-requested additions were added to the wildlife RSA and are illustrated in (Map 9-3)

The survey area follows ecological and topographical boundaries. It overlaps portions of two population survey strata previously used in government surveys and management plans (Campbell et al. 2015, Government of Nunavut 2019). These overlapping subregions provide equal coverage of the mine footprint, per the study design recommendations discussed in EDI Environmental Dynamics Inc. (2022).

The *Caribou Monitoring: Triggers and Recommendations*¹⁹ report (EDI Environmental Dynamics Inc. 2022b) further identifies a northern subregion (11,706 km², corresponding with the active Project area) and a southern subregion (15,735 km², corresponding with the planned/future Project area) that are considered in further analyses and future monitoring activities, as discussed in that report.

¹⁹ This report more comprehensively describes the ecological setting, delineation of the Project's zone of influence, and investigative pathways (including baseline research, surveillance programs, and effects monitoring programs) needed to further inform mitigations and adaptive management at the Project (if/where necessary).





9.5.1.2 Survey Design and Protocols

The aerial survey was completed from March 24 to 27, 2023, in a fixed-wing Caravan equipped with a radar altimeter to maintain elevation at 122 m (400 ft) above ground level (agl) and travel at 150 km/hr. The survey design consisted of the ‘fly-over’ of 29 linear transects oriented east-to-west and spaced 8 km apart within the wildlife RSA. Transect lengths varied (minimum = 9 km, maximum = 163 km). The survey design did not include stratified flight lines for the northern and southern subregions. Instead, an equal survey effort was applied across the wildlife RSA, and the subregions were stratified *post hoc* during modelling and statistical analysis.

For continuity and alignment with previous aerial surveys, the survey design used methods that the GN applied during the March 2014 regional survey of the North Baffin strata (including the Mary River stratum, Campbell et al. 2015). The survey timeframe was also applied so that observations were made before calving (i.e., to minimize disturbance) and snow cover was more extensive on the landscape (thereby standardizing the observational setting and improving the detection of caribou on the landscape). In consultation with the GN’s regional wildlife biologist, the survey was planned to occur before the GN’s collaring activity (March/early April 2023) in the North Baffin region (Ringrose 2023).

A double-observer pair configuration (cf. Figure 8 in Campbell et al. 2015; Figure 9-9) was used to optimize wildlife detections on both sides of the aircraft. The field team (seven personnel and two pilots) was comprised of EDI wildlife specialists, alternating Qikiqtani Inuit Association (QIA) environmental monitors, and other Inuit participants (Photo 9-12):

- primary observers — Justine Benjamin (EDI Field Lead), Sean Munro (EDI Wildlife Specialist);
- secondary observers — Joe Bruce Nakoolak (QIA Monitor) / Tom Williamson (QIA Monitor), Victor Kadloo (Inuit Observer);
- tertiary observers — Joel MacFabe (EDI Wildlife Specialist), Jayko Tatatuapik (Inuit Observer); and,
- data recorder — Joel MacFabe (EDI Wildlife Specialist).

The observation and detection of caribou followed a distance sampling (DS) protocol whereby observations were classified according to five distance bins (i.e., 0–200 m, 200–400 m, 400–600 m, 600–1,000 m, and 1,000–1,500 m) that were marked on wing struts (cf. Figure 7 in Campbell et al. 2015; Figure 9-10). Figure 9-9 and Figure 9-10 demonstrate how the observer configuration and distance bin markers were implemented in the field. The primary observer called out caribou detections, including the number of individuals²⁰, locations, and distances, when they occurred at approximately 90-degree angles from the plane (i.e., perpendicular at either 9 o’clock [left] or 3 o’clock [right] off the transect line). To minimize duplicate observations and potential data artifacts, the primary observer had priority (to the extent possible) to ‘call out’ sightings ahead of secondary and tertiary observers. Secondary and tertiary observers had to wait until caribou had passed the 9 o’clock [left] or 3 o’clock [right] mark to confirm the sightings and/or ‘call out’ any additional sightings the primary observer may have missed. All observers then discussed the number of caribou detected to reconcile potential discrepancies in the data capture.

²⁰ Caribou individuals or clusters within ~100 m of each other were deemed to be a single group.



The recorder documented and categorized all observations using a standard data collection form. Key information included:

- spatial identifiers (latitude and longitude coordinates);
- group size and composition (if possible, adult/calf and sex);
- side of the plane (left or right), distance bin, observer(s) (primary, secondary, and tertiary); and,
- field-based habitat observations, including:
 - survey conditions (percent snow, percent cloud cover, and visibility [poor, good, or excellent]); and,
 - terrain (slope [flat, moderate, or steep] and topography [flat, moderate, or steep]).

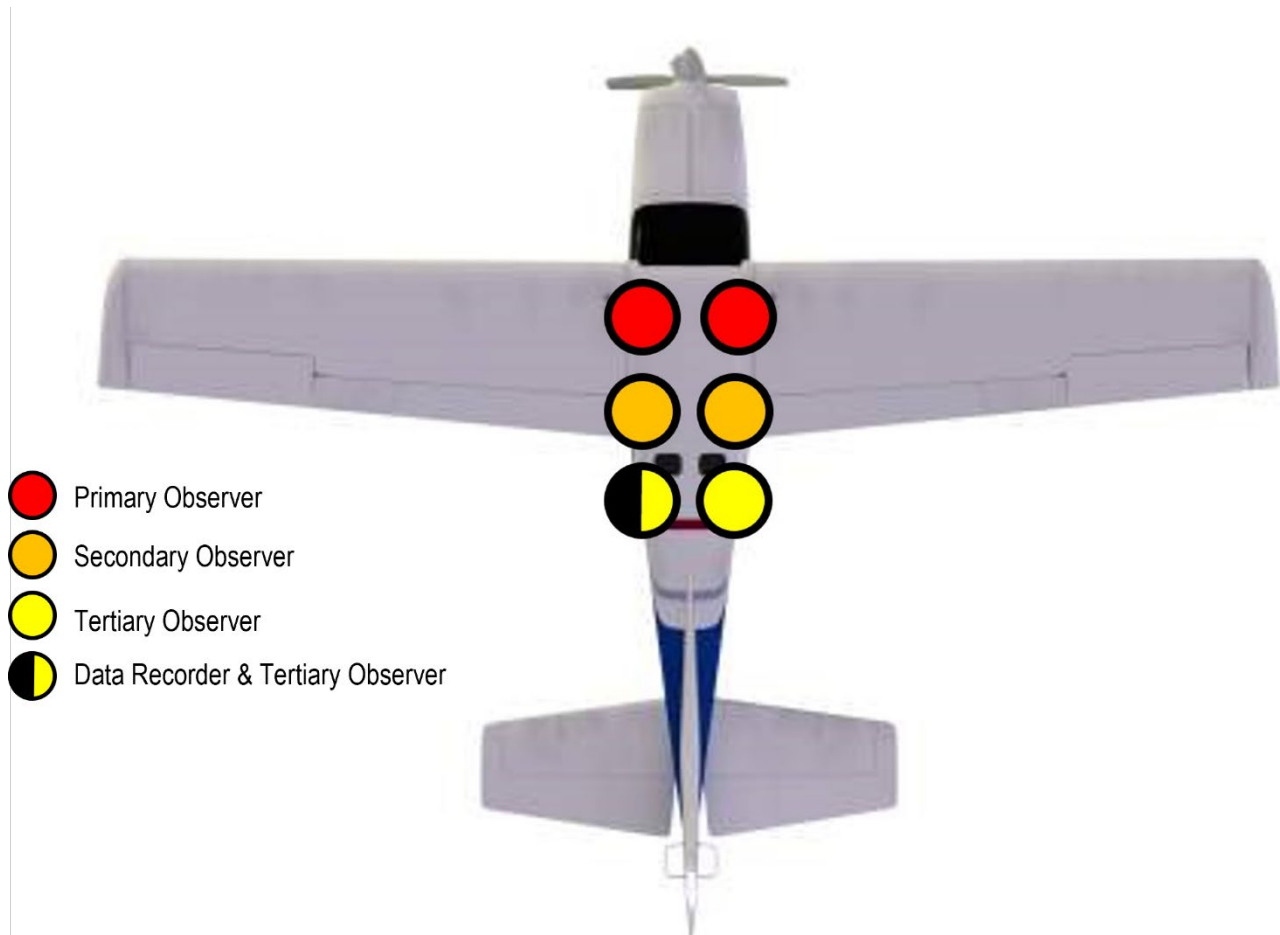


Figure 9-9. Schematic diagram of double-observer configuration.
Adapted from Figure 8 in Campbell et al. (2015).

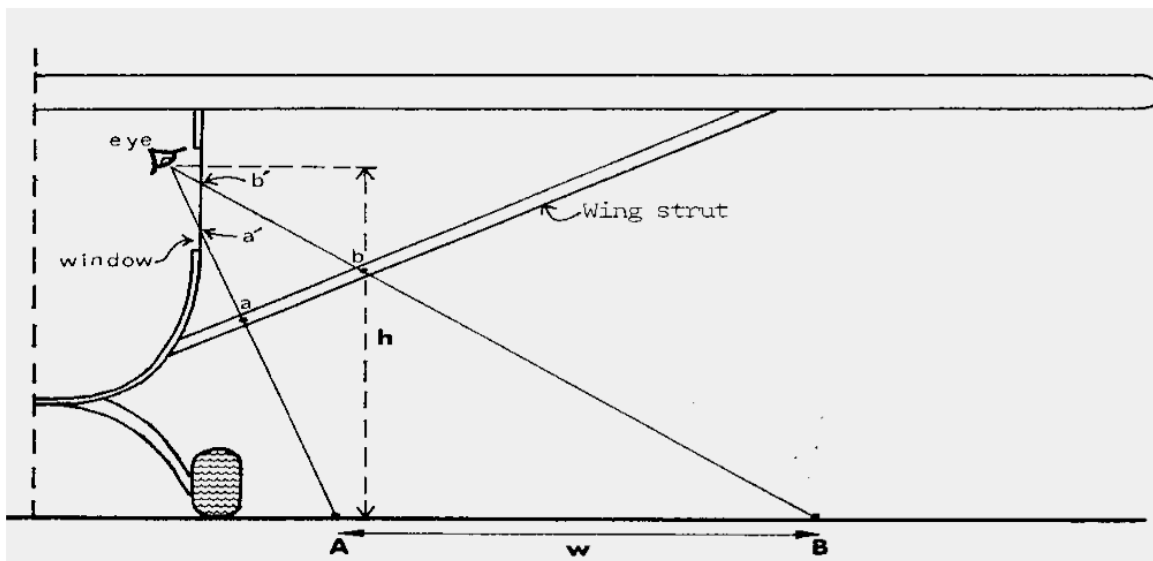


Figure 9-10. Schematic diagram of wing strut markings to identify distance bins from the aircraft.

Source: Norton-Griffiths 1978



Photo 9-12. Aerial caribou survey crew members on March 25, 2023.

From left to right: Joel MacFabe, Joe Bruce Nakoola, Jayko Tatatuapik, Sean Munro, and Victor Kadloo. Photo by Justine Benjamin. Missing: Tom Williamson.



9.5.1.3 Population Estimates

Analytical Framework

Two components were used to estimate the abundance and density of North Baffin caribou in the wildlife RSA:

- a model of the detection process (i.e., the probability that caribou are detected on the landscape); and,
- an unbiased estimator of abundance/density that accounts for the detection process.

The detection process considers the uncertainty in observing caribou when they are present. The detection process is estimated using observational data and then applied to an estimator (equation) to calculate abundance and density estimates. A mutual detection function was developed for the northern and southern subregions of the wildlife RSA. Estimates of abundance/density were stratified *post hoc* by subregion.

To model the detection process of caribou on the landscape, DS and mark-recapture (MR) methods were combined, termed mark-recapture distance sampling (MRDS). This approach combines two methods to calculate abundance while addressing shortfalls when either method is used independently. Mark-recapture distance sampling models have been successfully used to model caribou abundance on Baffin Island (Campbell et al. 2015). Distance sampling, a method commonly used to estimate wildlife populations, models animal detection as a function of distance from a transect line. Mark-recapture methods model abundance as a function of the portion of marked animals that are detected on a survey.

Two key assumptions of DS are often violated in population surveys: (1) animals on the transect are certain to be detected, and (2) animals are detected at their original location. As for MR models, the assumption that all animals are equally likely to be detected is often violated. By combining both MR and DS methods, these assumptions can be checked or addressed to remove bias in the abundance estimation. The MR model can check the assumption that all animals on the transect are detected and, if needed, model detection on the transect. The DS model can account for reduced detection farther from the transect. Mark-recapture distance sampling combines an MR model with a DS model. In this application, the MR component estimates the detection probability of caribou on/near the transect line, and the DS component estimates the decreased probability of detection at greater distances off the transect.

The ‘marking’ of animals for the MR model was done using a double-observer survey (Figure 9-9). The primary observer was considered ‘Observer 1’ and the secondary/tertiary observers were considered ‘Observer 2’. Animals were ‘marked’ when observed by one observer and ‘recaptured’ if observed by the other observer.

An MRDS model was developed with the following assumptions: (1) independence of observations made by the primary and secondary observers and (2) point independence. The independent observer configuration can be assumed when two observers search independently of each other and when animals are unlikely to have moved between detections made by those observers (i.e., no duplicate observations). Duplicate observations are less likely when both observers are in the same plane, as in this survey. Point independence



assumes that detections of caribou by observers are likely independent at any given location along a transect but become more correlated at farther distances. See Buckland et al. (2004) and Burt et al. (2014) for further details.

Under the point independence assumption, the overall detection probability is obtained by combining the MR model's intercept and the DS model's shape (Burt et al. 2014). In other words, the average detection probability was calculated for the MR (intercept) and DS (across distances) components, and the product of these probabilities equalled the overall MRDS detection probability.

The overall detection probability was used in a Horvitz-Thompson-like estimator (Buckland et al. 2004) to approximate the abundance and density of (a) individual caribou and (b) groups of caribou in the northern and southern subregions of the wildlife RSA.

All statistical analyses were completed in R software for statistical computing, version 4.2.1 (R Core Team 2022), using the package 'mrds' (Laake et al. 2022).

Model Fit and Assessment

A two-stage process was used to fit the combined MRDS model and estimate the overall detection probability of caribou on the landscape. First, an MR model was fit to the data while assuming full independence in observations. Second, a DS model was fit to the data alongside the chosen MR model while assuming point independence. In other words, the second step modified the DS model using the MR model to account for imperfect detection along and near the transect line.

Animals are not always visible. Terrain features may conceal an animal from observers. To account for factors that may alter the detection of caribou on the landscape, several covariates were included in the MR and DS models: percent snow, visibility, terrain ruggedness (terrain ruggedness index; Riley et al. 1999), and slope (degrees). Three additional non-landscape covariates were considered: distance bin (categorical), group size (numeric), and observer (categorical, primary [reference level], and secondary). Caribou group size may influence detectability because larger groups are more likely to be visible on the landscape than smaller groups. The effect of observer and distance (bin) accounted for the differences in detection between primary/secondary observers and the reduced detection of caribou at greater distances, respectively. The observer and distance covariates were explicit in the MR model but implicit in the DS model (i.e., not directly specified as covariates in model formulas).

In several combinations, covariates were included in the MR and DS models, and the most parsimonious model structures were chosen using Akaike's Information Criteria (AICc; Burnham and Anderson 2002). Model development was completed in an exploratory way with no *a priori* hypotheses considered. First, the best MR model structure was chosen from many covariate combinations. Then, that MR model structure was held constant while iterating through several covariate combinations for the DS model structure to develop and select the combined MRDS model.

The MR model was estimated using a logistic regression with a logit-link function to assess the probability of detection on the transect line.



The DS model considered two forms or ‘key functions’, which can predict detection probabilities as either half-normal or hazard-rate parametric functions (Buckland et al. 2004). An additional ‘key adjustment’ term (e.g., cosine or polynomial) is commonly used to modify the shape of the detection function to better fit observations across the distances sampled. However, Miller and Thomas (2015) advise caution when using key adjustments and covariates because including both cannot guarantee a monotonic non-increasing detection function (i.e., a function that does not continuously decrease with distance). Key functions were included in the MRDS model if they yielded sensible detection functions and improved model fit and parsimony (i.e., lower AICc score).

Before estimating abundance and density, the combined MRDS detection function was assessed using a chi-square goodness-of-fit test and a quantile-quantile plot of fitted versus empirical cumulative density functions.

9.5.2 RESULTS AND DISCUSSION

9.5.2.1 Field Observations

Thirty-six groups of caribou were observed during the aerial survey, with 112 individual caribou observed across all groups (Photo 9-13). All observed caribou occurred in the southern subregion of the wildlife RSA. Due to the elevation (122 magl), speed (150 km/hr), and intent of the survey (i.e., this was not a composition survey), no observations were classified by sex or age. Only two groups (nine individuals total) occurred in an overlapping portion of the northern subregion (Map 9-4). Detections of caribou occurred primarily in areas with exposed, windswept ground rather than areas of expansive snow cover. Weather and visibility on the first three days (March 24 to 26) were excellent, with clear skies and sunny conditions allowed observers to spot tracks and wildlife easily. The final day (March 27) had cloud cover periods, making detecting tracks and caribou more challenging at low light levels.

Information collected in each subregion was used to formulate a detection function for caribou across the landscape. One observation of three caribou (ObsID #50) in the southern subregion did not have recorded field-based covariate values; data imputation was required to include this observation in the analysis. Covariate values from a separate observation (ObsID #51) at the same time and location were assigned to ObsID #50 on different sides of the plane.





Photo 9-13. Caribou observed during the aerial survey.

9.5.2.2 Modelling Outcomes

The selected MR model included observer, group size, and percent cloud cover as covariates. It was chosen out of several candidates with similar AICc scores ($\Delta\text{AIC} < 2$ relative to the 1st-ranked model) because it had the best model fit (i.e., log-likelihood; Table 9-5). The top DS model, modified by the selected MR model, included group size and percent cloud cover scaled with a hazard-rate key function (Table 9-6). Although ranked 4th according to the information criterion, it had the highest log-likelihood and a $\Delta\text{AIC} < 2$ compared to the 1st-ranked model. To determine whether key adjustments (e.g., cosine and polynomial functions) were necessary to improve fit, 3rd-order cosine and 4th-order polynomial terms were included. However, these attempts either resulted in nonmonotonic detection functions or required too many parameters to estimate based on the number of distance bins used during the survey.

The combined MRDS detection function fit well with the observed data and matched theoretical expectations. Figure 9-11 shows the predicted detection probabilities for all (pooled) observers. The detection function curve follows the decrease in detection frequency at greater distances from the transect line. Generally, the primary observer had a high detection probability across distance categories and rarely missed observations made by the secondary observer (Figure 9-12). A chi-square goodness-of-fit test demonstrated a good match between observed and expected (theoretical) detections across the distance categories ($\chi^2 = 9.13$, $P = 0.17$), and a quantile-quantile plot of fitted versus empirical cumulative density functions met theoretical expectations (i.e., fell along the diagonal line of unity; Figure 9-13).



Table 9-5. Double observer, full independence mark-recapture (MR) model selection.

#	Model Structure	K	AICc	ΔAIC	Log-likelihood
1	MR: ~observer + cloud	3	196.47	0.00	-95.24
2	MR: ~observer + group size + cloud	4	197.03	0.56	-94.51
3	MR: ~observer	2	197.57	1.10	-96.79
4	MR: ~cloud	2	198.33	1.85	-97.16
5	MR: ~distance + observer	3	198.34	1.86	-96.17
6	MR: ~observer + group size	3	198.45	1.98	-96.23
7	MR: ~group size + cloud	3	198.88	2.41	-96.44
8	MR: ~observer + TRI	3	199.23	2.76	-96.62
9	MR: ~1	1	199.43	2.95	-98.71
10	MR: ~observer + slope	3	199.46	2.99	-96.73

Table 9-6. Double observer, point independence joint mark-recapture (MR) and distance sampling (DS) model selection.

#	Model Structure	Key Function	K	AICc	ΔAIC	Log-likelihood
1	MR: ~observer + group size + cloud DS: ~cloud	hr	6	174.08	0.00	-81.04
2	MR: ~observer + group size + cloud DS: ~cloud	hn	5	174.26	0.18	-82.13
3	MR: ~observer + group size + cloud DS: ~group size + cloud	hn	6	174.34	0.26	-81.17
4	MR: ~observer + group size + cloud DS: ~group size + cloud	hr	7	174.37	0.29	-80.19
5	MR: ~observer + group size + cloud DS: ~1	hn	4	174.59	0.51	-83.30
6	MR: ~observer + group size + cloud DS: ~group size + TRI	hn	6	174.63	0.55	-81.32
7	MR: ~observer + group size + cloud DS: ~group size + slope	hn	6	174.67	0.58	-81.33
8	MR: ~observer + group size + cloud DS: ~TRI	hn	5	175.46	1.38	-82.73
9	MR: ~observer + group size + cloud DS: ~1	hr	5	175.51	1.42	-82.75
10	MR: ~observer + group size + cloud DS: ~group size	hn	5	175.53	1.44	-82.76

The MR model was held constant across all DS model iterations. Only the top 10 models are provided. Hazard-rate (hr) and half-normal (hn) key functions were tested for the DS model component. The selected model, parameters, and statistics are **bolded**.

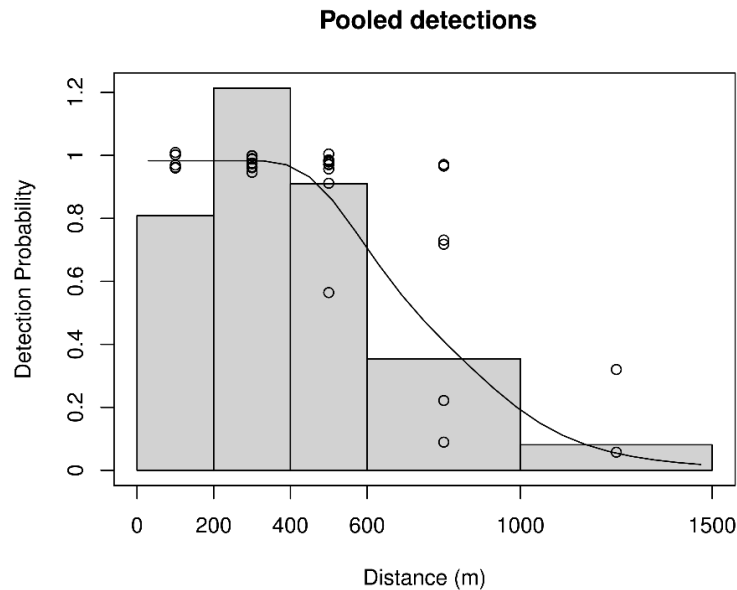


Figure 9-11. Pooled detection probabilities of caribou at increasing distance from the transect line.

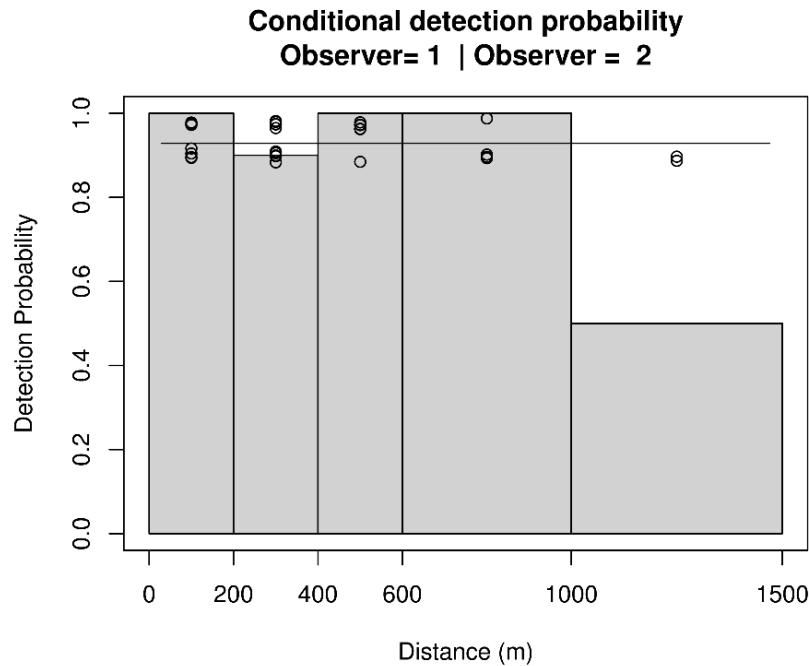


Figure 9-12. Conditional detection probabilities of the primary observer detecting caribou at increasing distance from the transect line.

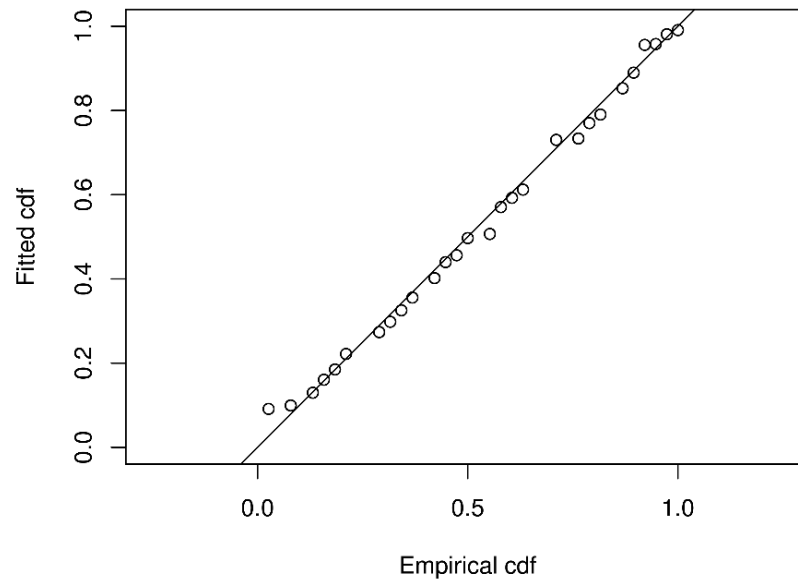


Figure 9-13. The quantile-quantile plot of fitted versus empirical cumulative density functions for the fitted mark-recapture distance sampling detection function.

9.5.2.3 Caribou Abundance and Density

The estimated abundance and density of caribou individuals and groups in the wildlife RSA were greater and more precise in the southern subregion than in the northern subregion (Table 9-7 and Table 9-8). The southern subregion was occupied by an estimated 613 caribou (95% CI = 314–1,198) in 189 groups (95% CI = 103–346) during March 2023, which yielded an average group size of 3.24 ± 0.25 caribou. In contrast, only 44 caribou (95% CI = 11–182) from nine groups (95% CI = 2–35) were estimated in the northern subregion during March 2023, with an average group size of 4.68 ± 1.09 caribou. The variation in abundance estimates can be compared using the coefficient of variation ($CV = \text{std. deviation} / \text{mean} * 100$). Estimates in the southern subregion had less variation ($CV_{\text{South}} = 0.34$) than the northern subregion ($CV_{\text{North}} = 0.76$). This was not surprising given that all caribou detections occurred in the southern subregion, but only two groups were detected in an overlapping portion of the northern subregion. Based on the estimated abundances and size of the respective subregions, the densities of caribou in the southern and northern subregions were 38.94 caribou/1,000 km² (95% CI = 19.93–76.11) and 3.74 caribou/1,000 km² (95% CI = 0.90–15.51), respectively. The estimated densities of groups were 12.00 groups/1,000 km² (95% CI = 6.54–22.01) in the southern subregion and 0.80 groups/1,000 km² (95% CI = 0.21–3.03) in the northern subregion.

A previous survey and analysis by Campbell et al. (2015) estimated an abundance of 224 caribou and a density of 5.69 caribou/1,000 km² from a count of 49 caribou in the Mary River stratum (39,357 km²). The Mary River stratum encompassed a much broader area beyond the wildlife RSA. Due to differences in surveyed areas and caribou densities across the Mary River stratum, this survey is not directly comparable to the 2014 survey by Campbell et al. (2015), nor was it intended to be directly comparable. Caution is warranted when comparing abundances and densities to make inferences on trends. The March 2014 estimates were much higher than the current March 2023 abundance (44 caribou) and density (3.74 caribou/1,000 km²) estimates for the northern subregion (11,706 km²; count = 9 caribou). But the March 2023 abundance (613 caribou)



and density (38.94 caribou/1,000 km²) estimates for the southern subregion (15,735 km²; count = 112 caribou) were substantially greater than those from March 2014.

Table 9-7. Estimated abundance of caribou individuals and groups in the northern and southern subregions.

Type	Subregion	Count	Abundance Estimate	Std. Error	CV	95% LL	95% UL
Individual	South	112	613	206	0.34	314	1198
	North	9	44	33	0.76	11	182
Group	South	36	189	57	0.30	103	346
	North	2	9	7	0.70	2	35

CV = Coefficient of Variance; 95% LL = Lower Confidence Interval Value; 95% UL = Upper Confidence Interval Value.

Table 9-8. Estimated density of caribou individuals and groups per 1,000 km² in the northern and southern subregions.

Type	Subregion	Area	Density Estimate	Std. Error	CV	95% LL	95% UL
Individual	South	15,735 km ²	38.94	13.09	0.34	19.93	76.11
	North	11,706 km ²	3.74	2.86	0.76	0.90	15.51
Group	South	15,735 km ²	12.00	3.64	0.30	6.54	22.01
	North	11,706 km ²	0.80	0.56	0.70	0.21	3.03

CV = Coefficient of Variance; 95% LL = Lower Confidence Interval Value; 95% UL = Upper Confidence Interval Value.

9.5.2.4 Summary Findings

During the survey, 112 caribou across 36 groups were observed. All observed caribou occurred in the southern subregion of the wildlife RSA, and only two groups (nine individuals total) occurred in an overlapping portion of the northern subregion. The application of MRDS methods led to estimates of approximately 44 caribou (3.74 caribou/1,000 km²) in the northern subregion and 613 caribou (38.94 caribou/1,000 km²) in the southern subregion of the wildlife RSA during the survey period.

9.6 INCIDENTAL WILDLIFE OBSERVATIONS

Incidental wildlife observations are recorded by on-site personnel via wildlife logs posted in various areas. These logs indicate wildlife species that occur near Project infrastructure or areas where exploration or monitoring occurs. Table 9-9 summarizes the 2024 incidental wildlife observations. Per the TEMMP (Baffinland Iron Mines Corporation 2016a). Increases in incidental wildlife observations trigger follow-up investigations by Baffinland personnel; follow-up action may include behavioral monitoring (refer to Section 9.7).

Caribou — A total of 141 caribou were recorded from 59 observations (commonly by haul truck drivers) between May 21 and August 26, 2024. Two observations were made near the Mine Site, where two caribou



were observed south of the Dyno Plant (May 30, 2024). In total, 97 caribou were seen across 34 observations from the Tote Road between May 21 and August 16, 2024. Group size ranged from one to nine individuals. No caribou were noted northwest of the kilometre 59 marker. Most groups were observed browsing adjacent to the Tote Road. The remaining 43 caribou were observed in remote or exploration areas southeast of the Project in July and August, generally during helicopter transport.

Birds — Twenty-eight bird species were recorded in the incidental wildlife logs in 2024. Examples of the most common species reported include: Sandhill Crane, ptarmigan, Common Raven, Snow Bunting (*Plectrophenax nivalis*), Snow Goose, Canada Goose, Rough-legged Hawk (*Buteo lagopus*), Long-tailed Duck (*Clangula hyemalis*), Cackling Goose (*Branta hutchinsii*), Peregrine Falcon (*Falco peregrinus tundrius*), Red-throated Loon (*Gavia stellata*), American Pipit (*Anthus rubescens*), Arctic Tern (*Sterna paradisaea*), Baird’s Sandpiper (*Calidris bairdii*), Common Merganser (*Mergus merganser*), Greater White-fronted Goose (*Anser albifrons*), Gyrfalcon (*Falco rusticolus*), Horned Lark (*Eremophila alpestris*), Pacific Loon (*Gavia pacifica*), Semipalmated Plover (*Charadrius semipalmatus*), Snowy Owl (*Bubo scandiacus*), Tundra Swan (*Cygnus columbianus*), and Yellow-billed Loon (*Gavia adamsii*).

Table 9-9. 2024 incidental wildlife observations in the Potential Development Area (Mine Site, the Tote Road, and Milne Port) and remote areas (based on wildlife logs).

Common Name	Scientific Name	Number of Observations			
		Mine Site	Tote Road	Milne Port	Remote Areas
Arctic hare	<i>Lepus arcticus</i>	30	4	11	2
Arctic fox	<i>Vulpes lagopus</i>	68	10	22	1
Canine spp.	<i>n/a</i>	0	1	2	0
Fox spp.	<i>Vulpes</i> spp.	14	0	5	0
Lemming	<i>Lemmus</i> spp.	1	0	2	0
Caribou	<i>Rangifer tarandus groenlandicus</i>	3	95	0	43
Polar Bear	<i>Ursus maritimus</i>	0	6	1	1
Arctic Wolf	<i>Canis lupus</i>	0	0	0	0

9.7 CARIBOU TOTE ROAD OBSERVATIONS

The following PCs were developed to monitor and mitigate potential disturbance to caribou calving near or interacting with the Project (Nunavut Impact Review Board 2020):

- **PC #53b** “Monitoring and mitigation measures at points where the railway, roads, trails, and flight paths pass through caribou calving areas, particularly during caribou calving times.”
- **PC #54b** “Monitoring for caribou presence and behaviour during railway and Tote Road construction.”
- **PC #58b** “A detailed analysis of wildlife responses to operations with emphasis on calving and post-calving caribou behaviour and displacements (if any), and caribou responses to and crossing of the railway, the Milne Inlet Tote Road and associated access roads/trails.”



To address these PCs, a combination of surveys such as incidental observations, snow track surveys, HOL surveys, snowbank height monitoring, remote camera deployment, and aerial surveys have been used to study caribou habitat use and behavioural reactions to human activities — particularly along the Tote Road. Behaviour sampling can provide insight into responses to environmental stimuli (Martin and Bateson 1993). Specific observations of caribou along the Tote Road are intended to examine if/how caribou (especially cows with calves) respond to Project-related activities and infrastructure. As of 2019, North Baffin caribou were at a low point in their 60 to 80-year population cycle (Government of Nunavut 2019). Caribou observations during surveys or recorded incidentally were generally infrequent. That said, incidental caribou observations at the project increased in 2024, thereby triggering follow-up investigations and behavioural monitoring (refer to Section 9.7).

9.7.1 METHODS

Caribou occurrences at or near the PDA are monitored through HOL monitoring (refer to Section 9.3) during the caribou calving period and through on-the-ground monitoring through continual incidental sightings (often by haul truck drivers; refer to Section 9.6). Where caribou are observed on or near the Tote Road, the caribou decision framework (Figure 9-14) comes into effect and guides the action of road users (Baffinland Iron Mines Corporation 2023d). Site personnel are informed of the caribou decision framework and trained to respond appropriately to these scenarios. Concurrently, the Environment Staff are notified of near-project observations and complete follow-up behavioural monitoring. The TEMMP (Baffinland Iron Mines Corporation 2016a) describes the data capture protocols and inputs for behavioural monitoring, and documents causes/effects and caribou response to traffic or construction, including:

- location description (direction from road, aspect, terrain, other identifying features);
- survey observation timeframe (start/end times);
- number of individuals, their sexes and behavioural responses.

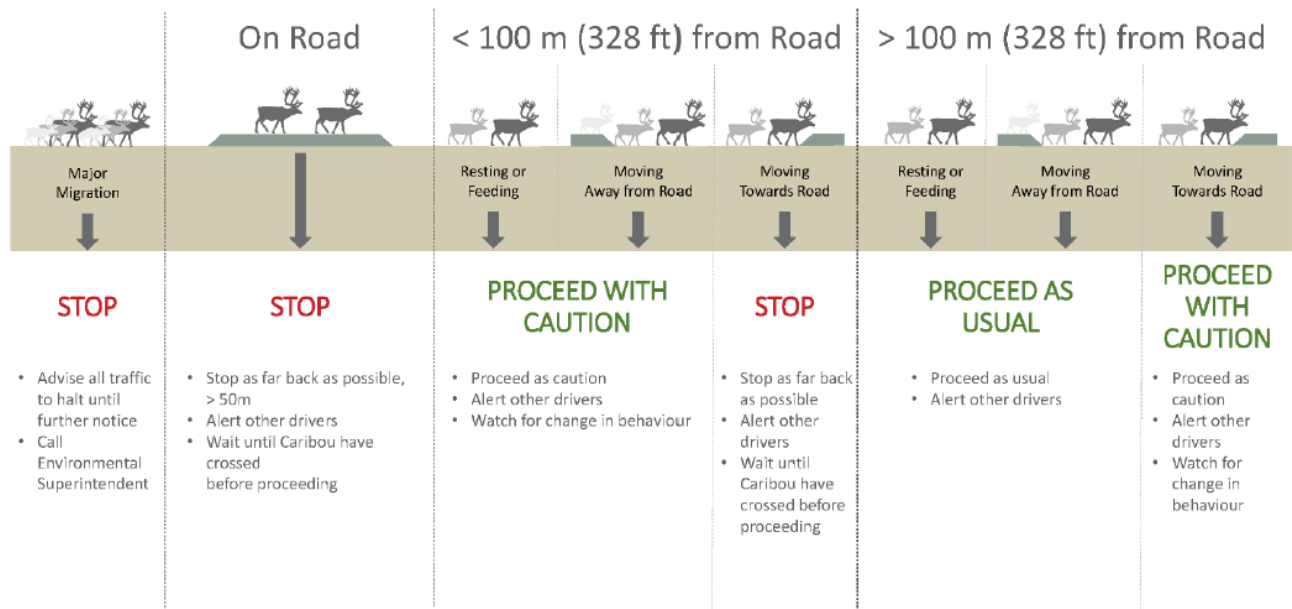


Figure 9-14. Caribou decision framework specific for the Tote Road as outlined in the Terrestrial Environment Mitigation and Monitoring Plan (2023).

9.7.2 RESULTS AND DISCUSSIONS

Fifty-one caribou incidental observations during 22 monitoring events were recorded along the Tote Road in 2024. As shown in Figure 9-15, most caribou observations (43) occurred in June, but also in May (5), October (2), and August (1). Caribou were observed as near as 20 m and as far as 4 km from the Tote Road (Photo 9-14 and Photo 9-15). No adverse behaviour toward the Tote Road and passing vehicles was noted during the 22 monitoring events. Behaviours noted included foraging/feeding, bedded animals, and animals travelling at a 'walking pace'.

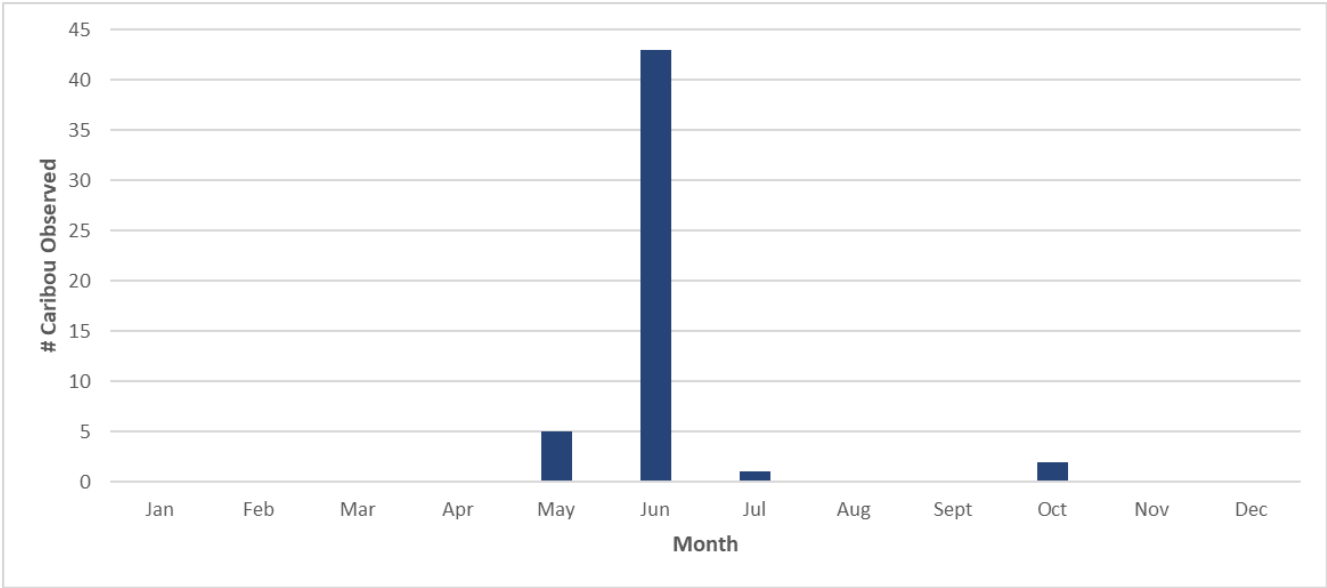


Figure 9-15. Caribou observations along the Tote Road by month in 2024.



Photo 9-14. Caribou observed along the Tote Road.



Photo 9-15. Caribou observed along the Tote Road.



9.8 HUNTER AND VISITOR LOG

Baffinland Security monitors land use and the presence of land users in the PDA via hunter and visitor logs that document travel or hunting within the PDA. This is an indirect and incomplete land use record, given that individuals are only required to populate the visitor logs if/when interacting with or using Baffinland facilities.

Four hundred and sixty-nine individual entries were recorded between January 1 and December 31, 2024:

- Mine Site camp: 136 individuals in 29 groups; and,
- Milne Port accommodations complex: 333 individuals in 75 groups.

Group size primarily ranged from 1 to 10 individuals, with the exception of one group of 49 individuals²¹. These hunter/visitors were typically hunting, fishing, or travelling between communities (Figure 9-16, Figure 9-17). Baffinland provided food, beverages, transportation, tools, supplies, fuel, and mechanical assistance to hunters and visitors, if requested and safe to do so. Log numbers decreased slightly from 2022 but were similar to 2018 and above pre-COVID counts.

In 2024, Baffinland assisted or was on standby in four separate search-and-rescue incidents (January 9, April 27, August 26, and October 30, 2024) for people reported missing or in distress. The incidents were often due to inclement weather, snowmobile mechanical breakdowns, or becoming stranded. One incident involved a medical emergency where Baffinland provided helicopter transport to site and assisted in arranging a medivac to the Iqaluit Hospital. In most cases, Baffinland provided aircraft support, staging, fuel, food, and accommodations.

Inter-annual Trend — The number of visitors recorded has increased since 2014. Substantial fluctuations occurred from 2019 to 2022 (Figure 9-18), coinciding with the COVID pandemic, but may begin to level out based on 2023 and 2024 data. The number of visitors each year often represents repeat groups at the start and end of their trips, making multiple trips within the year. Given that hunter and visitor registration is not mandatory, values do not represent all potential land users at the Project.

²¹ This group was passing through as part of the Nunavut Quest dog sled race.

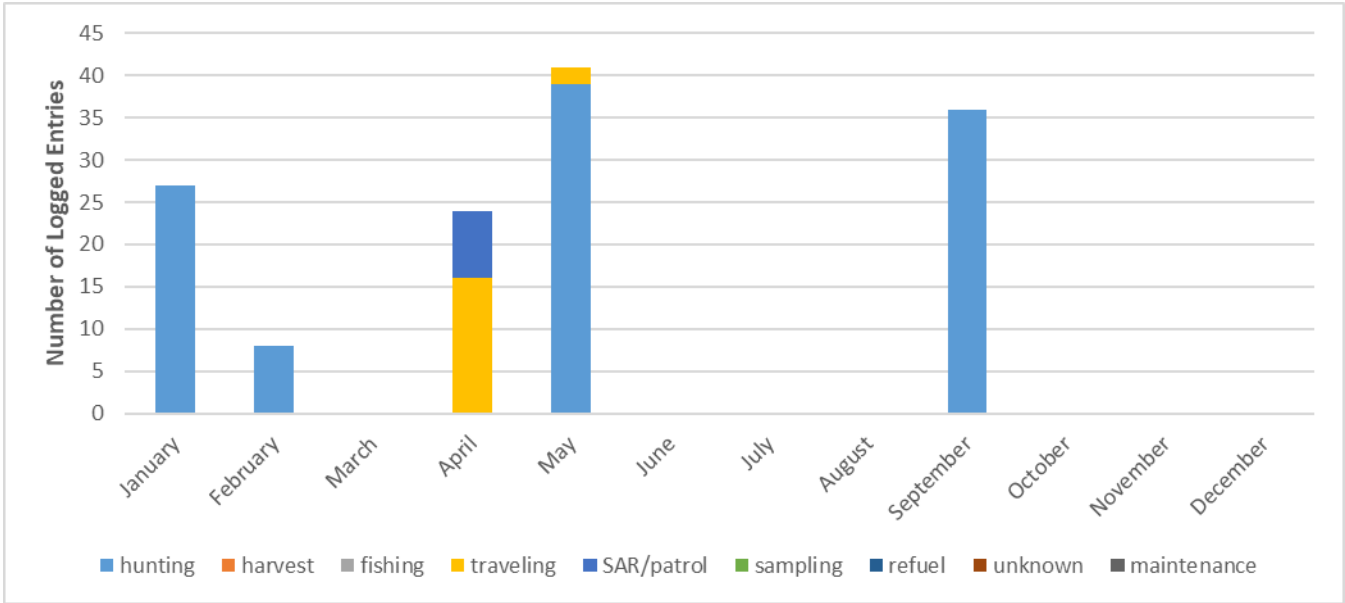


Figure 9-16. Mine Site visitor breakdown by month with check-in rationale.

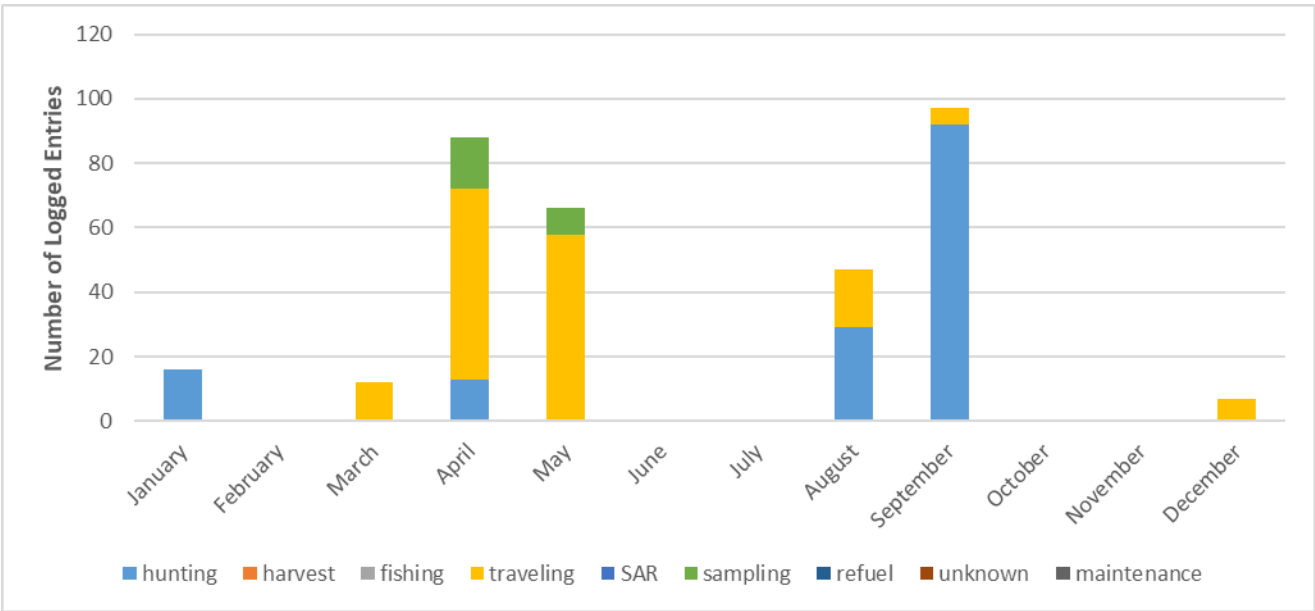


Figure 9-17. Milne Port visitor breakdown by month with check-in rationale.

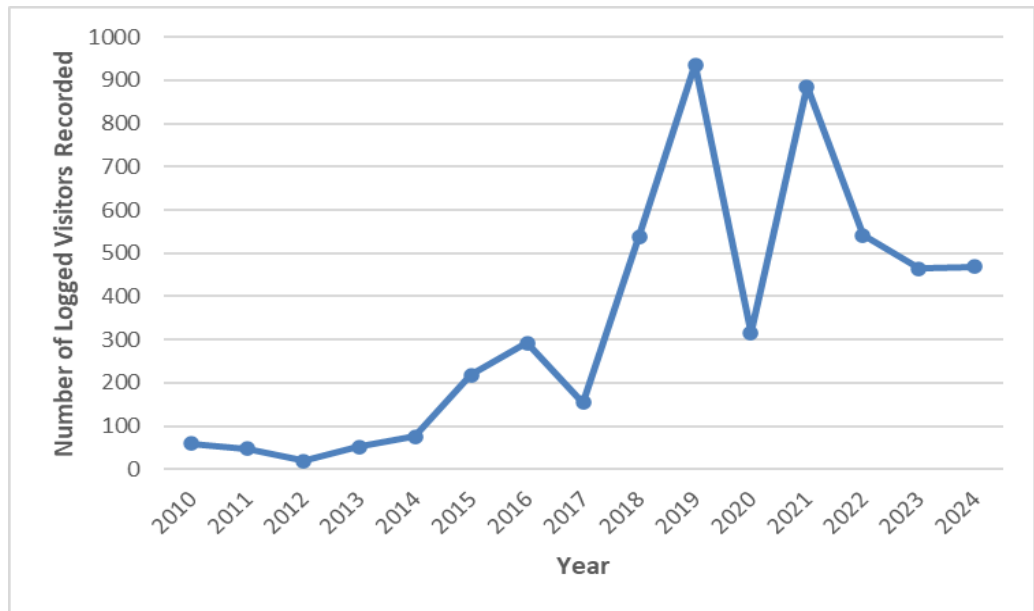


Figure 9-18. 2024 inter-annual trends in visitors recorded in hunter and visitor logs (2010 to 2024).

** The COVID pandemic resulted in little to no Inuit participation to minimize its spread.*



10 BIRDS

The following Project Condition (PC) addresses concerns regarding migratory birds and raptors at the Mary River Project (the Project) (Nunavut Impact Review Board 2020):

- **PC #74** *“The Proponent shall continue to develop and update relevant monitoring and management plans for migratory birds [...] key indicators for follow up monitoring [...] will include: Peregrine Falcon, Gyrfalcon, Common and King Eider, Red Knot, seabird migration and wintering, and songbird and shorebird diversity.”*

To address this PC, bird surveys at the Project have historically included effects monitoring of songbirds and shorebirds. Based on the 2012 and 2013 analyses of the Program for Regional and International Shorebird Monitoring (PRISM) plots and 2013 analyses of the bird encounter transects, it was identified that the level of detection for Project-related effects on songbirds and shorebirds was low due to the low number of birds present. In consultation with the Terrestrial Environment Working Group and Canadian Wildlife Service (CWS), it was resolved that effects monitoring for tundra breeding birds could be discontinued. Instead, Baffinland Iron Mines Corporation (Baffinland) would commit to the following:

- completing 20 PRISM plots every five years to contribute to regional monitoring efforts (completed in 2018; next scheduled for 2024 and to be led by Environment and Climate Change Canada);
- completing coastline nesting surveys of the identified islet near the proposed Steensby Port Site before the construction of the port;
- completing Active Migratory Bird Nest Surveys (AMBNS) before any vegetation clearing or surface disturbance during the nesting season; and,
- continuing monitoring programs for cliff-nesting raptors (annual occupancy and productivity) and inland waterfowl (roadside waterfowl surveys) when qualified biologists are available and on site (paused indefinitely since 2021 since no Project-related trends have been observed).

In 2024, bird surveys at the Project focused on AMBNS for active migratory bird nests (if/when necessary, before vegetation clearing or surface disturbance).

Birds Summary

Baffinland is committed to a range of surveys and monitoring programs designed to enhance baseline data and evaluate the effects of Project-related activities on birds. These programs include AMBNS to verify that no active nests are present before vegetation clearing or surface disturbance occurs. The following list highlights key findings from the bird monitoring programs completed at the Project in 2024.

- Four AMBNS were completed, covering approximately 41,927 m². No nests were detected.
- Raptor monitoring (completed from 2011 to 2020 in collaboration with Arctic Raptors Inc.) has been paused based on no evidence of Project-related effects on raptors.
- The PRISM plots were scheduled to be led and completed by Environment and Climate Change Canada in 2024 (awaiting results and report).



10.1 ACTIVE MIGRATORY BIRD NEST SURVEYS

The following PCs address concerns regarding migratory birds (Nunavut Impact Review Board 2020):

- **PC #66** *“If Species at Risk or their nests and eggs are encountered during Project activities or monitoring programs, the primary mitigation measure must be avoidance. The Proponent shall establish clear zones of avoidance based on the species-specific nest setback distances outlined in the Terrestrial Environment Management and Monitoring Plan.”*
- **PC #70** *“The Proponent shall protect any nests found (or indicated nests) with a buffer zone determined by the setback distances outlined in its Terrestrial Environment Mitigation and Monitoring Plan, until the young have fledged. If it is determined that observance of these setbacks is not feasible, the Proponent will develop nest-specific guidelines and procedures to ensure bird’s nests and their young are protected.”*

Active Migratory Bird Nest Surveys were completed before vegetation clearing or surface disturbance to verify that no active bird nests were near the Potential Development Area (Baffinland Iron Mines Corporation 2016a). To the extent possible, Baffinland resolved to pre-emptively clear areas designated for development before the breeding bird window (i.e., May 17 to August 19) to avoid or minimize potential effects on nesting birds. This section summarizes the methods and results of the 2024 AMBNS.

10.1.1 METHODS

In June 2024, EDI Environmental Dynamics Inc. facilitated on-site training for Baffinland personnel for AMBNS, applying search methods developed by the CWS (Baffinland Iron Mines Corporation 2016b). Methods included ‘rope drags’ and identification indicators for common species known to occur in the Potential Development Area. Rope-drag equipment was constructed following the template provided by the CWS (Rausch 2015).

Active Migratory Bird Nest Surveys were completed by at least two Baffinland searchers/observers in areas scheduled for approved construction activities during the breeding bird window (i.e., May 17 to August 19). During each survey, rope-drag equipment was systematically pulled across the search area as observers surveyed for potential breeding bird activities. Areas were surveyed for active nests up to five days before land clearing activities and one of the following mitigations were applied:

- if active nests were found, land clearing activities were postponed until the nests or nesting areas were no longer active;
- if no active nests were found, land clearing activities proceeded; or,
- if no land clearing activities occurred within the five-day survey window, the surveys were repeated.

If/where applicable, observers documented behavioural signs of nesting birds, including broken wing displays, alarm calls, and/or carrying food items or nesting materials. Species identifications varied depending on observer experience.



10.1.2 RESULTS AND DISCUSSION

To the extent possible, Baffinland prioritized land clearing activities outside of the breeding bird window in areas directly undisturbed by the Project. Four land disturbance/construction activities occurred during the breeding bird window, with four AMBNS completed within the breeding bird window (i.e., May 27, July 1, July 10, and August 3, 2024). No active or inactive nests were detected during the 2024 AMBNS. Approximately 41,927 m² (4.2 ha) of land were disturbed during three land clearing activities in 2024 (Table 10-1) within the disturbance window for Project infrastructure.

Table 10-1. Disturbed area in relation to the 2024 Active Migratory Bird Nest Survey (AMBNS) disturbance window.

AMBNS Disturbance Window	Disturbance Area (m ²)
Within (May 17 to August 19, 2024)	41,927
Outside (August 20, 2023, to May 16, 2024)	1,881
Total	43,808



11 WILDLIFE INTERACTIONS

Wildlife interactions and mortalities related to the Mary River Project (the Project) are uncommon. However, despite mitigation measures, wildlife interactions and mortalities may occur. Any incidents are recorded and carefully investigated to document leading causes and underlying circumstances.

Wildlife Interactions Summary

Baffinland Iron Mines Corporation (Baffinland) is committed to monitoring activities and mitigation measures to minimize wildlife interactions and mortalities at the Project. Wildlife incident and mortality logs note human-wildlife conflicts to identify and minimize current and potential wildlife-related issues. Since 2014, there have been no noticeable trends in wildlife interactions and mortalities, with relatively stable low numbers given the size of the Project. The following items highlight key findings and actions regarding wildlife interactions.

- In 2024, 10 individual wildlife mortality incidents were reported involving six species: four Arctic fox, one Arctic hare, one loon, two ptarmigan, one Snow Bunting, and one unknown songbird.
- Vehicle collisions were confirmed or suspected in all except three mortalities; two were unknown, and one was a result of incidental catch while completing other surveys.
- Baffinland continues to mitigate wildlife interactions in the Potential Development Area by training, enforcing, and monitoring waste management practices and guidelines and integrating preventive measures into road maintenance, infrastructure design, and the Environment Protection Plan (EPP).

11.1 WILDLIFE INTERACTIONS AND MORTALITIES

In 2024, ten individual wildlife mortality incidents were reported involving six different species:

- Arctic fox (4);
- Arctic hare (1);
- loon (1);
- ptarmigan (2);
- Snow Bunting (1); and,
- unknown songbird (1).

Vehicle collisions were confirmed or suspected in the Arctic fox, and Arctic hare, and mortalities. All avian mortalities were likely associated with building or infrastructure collisions.



11.2 WILDLIFE INTERACTIONS AND MORTALITY PREVENTION

Baffinland mitigates wildlife interactions at the Project through training, implementation, waste management practices, and guideline monitoring. All Project personnel (including managers, supervisors, and contract staff) attend mandatory EPP training. The EPP includes mitigations and protection measures for Arctic wolf, polar bear (*Ursus maritimus*), Arctic fox, and caribou, and waste management guidelines that are regularly reviewed, updated, and implemented. No major changes to policies and procedures occurred in 2024. Previous policy and procedure changes are described below.

Waste Management — Incineration and proper waste sorting are the most prominent deterrents used at the Project. Wildlife attractants such as food scraps and human waste are sorted and sealed in animal-proof containers and incinerated on site. Waste sorting guidelines clearly define where food and other attractants should be placed and are posted around each site.

Fencing — Significant effort was made in 2018 and 2019 to improve on-site waste management infrastructure to minimize human-wildlife interactions at the landfill. Site visits by the Nunavut Impact Review Board before 2018 resulted in recommendations to improve fencing at the landfill facility to reduce occurrences of windblown debris escape. A 275 m fence was installed on the landfill's west side (downwind) in the fall of 2018 to address these concerns. The fence also repurposed over 800 used tires as part of Baffinland's used tire disposal and recycling initiative. The fence effectively captures windblown debris from the landfill.

Other Prevention Measures — Wire skirting is used under the main camps at both sites, preventing wildlife (e.g., foxes and hares) from creating dens. As part of Baffinland's driver training, honking the horn before starting the vehicle helps scare off wildlife hiding in or near equipment. Wildlife have the right of way on all roadways unless they create a safety hazard. Snowbanks along the Tote Road are reduced where feasible by feathering back snow with equipment to ensure personnel along the Tote Road can view wildlife crossing the road. Feeding wildlife is strictly prohibited, and workers found to be feeding wildlife will face disciplinary action.

11.3 INTER-ANNUAL TRENDS

Inter-annual trends regarding wildlife interactions and mortalities are tracked at the Project. Most mortalities on site between 2014 and 2024 were attributed to collisions with vehicles or infrastructure (Figure 11-1). The increased number of building collisions in 2023 was attributed to a large group (13) of King Eiders striking the ship loader during the night in November. The first Arctic wolf mortality was recorded in 2023, likely struck by a vehicle. No inter-annual trends were identified for wildlife mortalities. No caribou mortalities have occurred thus far due to the Project (Figure 11-2).

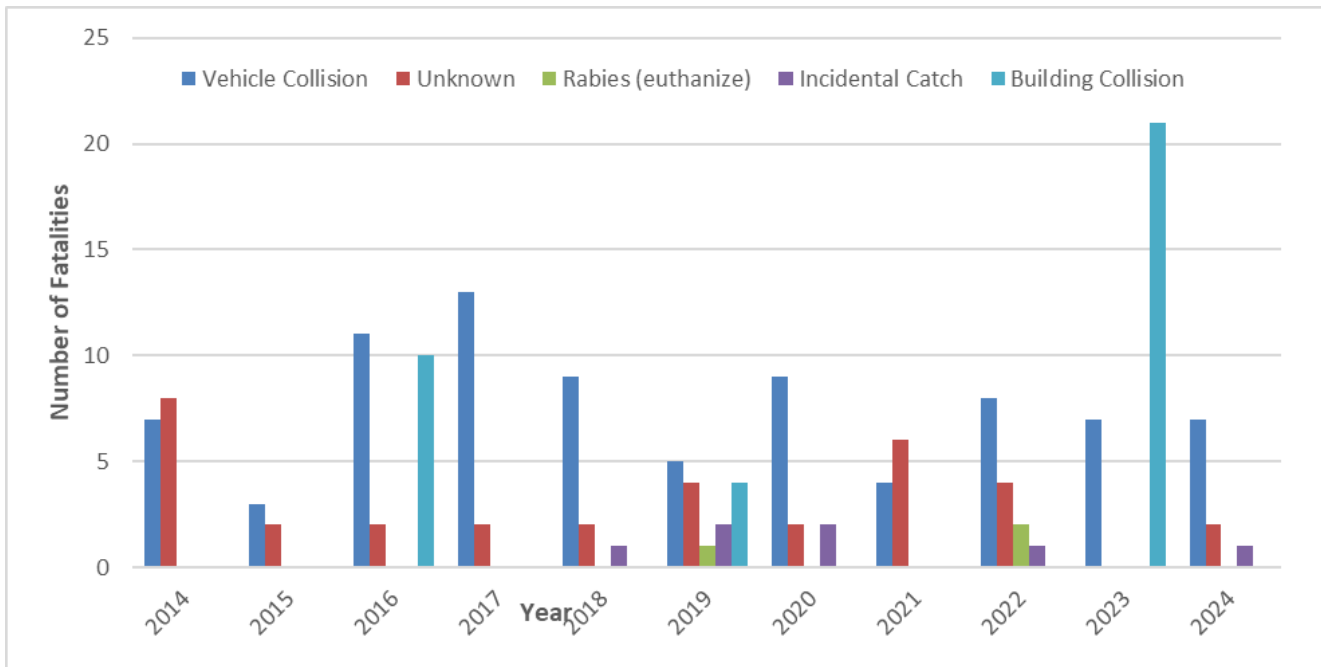


Figure 11-1. 2024 wildlife interactions – inter-annual mortality trends by cause of death (2014 to 2024).

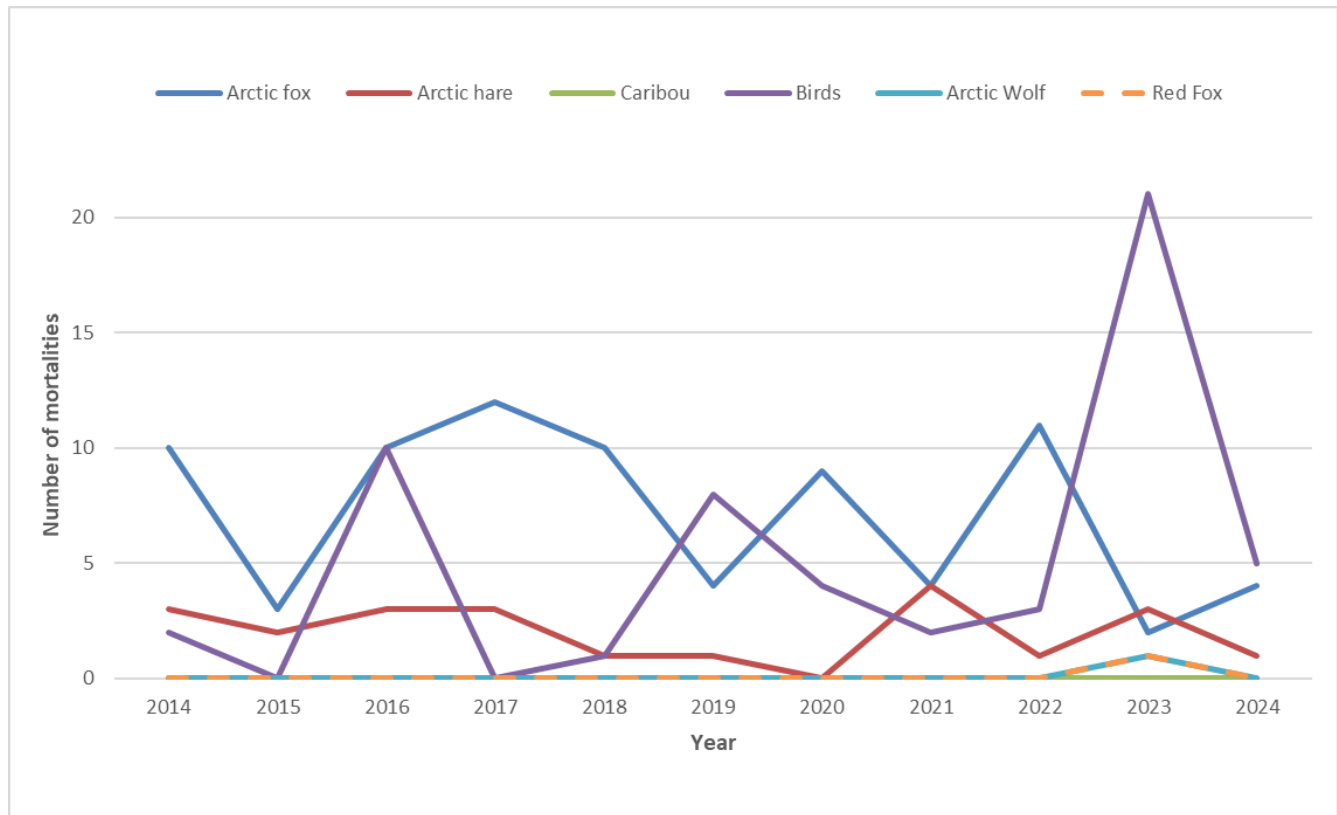


Figure 11-2. 2024 wildlife interactions – inter-annual mortality trends by species (2014 to 2024).



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APPENDICES



APPENDIX A 2023 TEAMR COMMENTARY AND BAFFINLAND RESPONSES

Table A.1: Response to Comments on Baffinland’s 2023 Annual Report to the NIRB

Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
DUSTFALL					
4	QIA 2023 NIRB DF#1.	Table 7-4 of the Terrestrial Environment Annual Report shows annual accumulations of dustfall from January 16, 2023, to January 7, 2024. The document states that “Extrapolated (winter) dustfall predictions were added to the observed dustfall amount.” No further information on the method for extrapolating summer annual dustfall data, or considerations of factors affecting dustfall deposition rates is mentioned (i.e., through comparisons of particle size in winter vs. summer, longer transport distances in winter vs. summer, etc.). For example, seasonal differences in particle size dispersion (if present) will affect extrapolation methods.	QIA requests that the proponent provide further justification for extrapolating summer dustfall monitoring data to the rest of the year.	<p>Document Name: Baffinland NIRB Annual Report, Appendix G.5.1 Terrestrial Environment 2023 Annual Monitoring Report</p> <p>Section: Table 7-4 Annual dustfall accumulation for sites sampled throughout 2023</p> <p>Page: 73</p>	<p>As is described in the 2023 TEAMR, dustfall monitoring stations that are >1km away from Project infrastructure are not visited monthly during winter due to accessibility and safety. Consequently, winter dustfall data are unavailable at stations >1km from the Project. A modeling approach was developed to extrapolate winter dustfall predictions to farther distances to address this data gap. Winter dustfall predictions are not made from summer dustfall data. Winter predictions for sites >1km are estimated using (1) mean dustfall during winter, and (2) the range of available data at each location (Mine, Milne Port, Tote Road); a linear slope across distance values that is either the same (i.e., a common slope term) or different (i.e., a season-by-distance interaction term) from summer dustfall predictions. This methodology is further detailed in a memo shared with and accepted by the QIA in February 2022 (EDI Environmental Dynamics Inc 2023).</p> <p>Reference EDI Environmental Dynamics Inc. 2023. Mary River Project — Winter Dustfall Predictions at Distance Monitoring Sites. Technical Memorandum. EDI File # 23Y0273. Prepared for Baffinland Iron Mines Corporation. 5 pp.</p>

Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
5	QIA 2023 NIRB DF#2.	<p>In Section 4.6.2, Baffinland noted that dustfall has exceeded FEIS predictions in some locations, but dust does not appear to have measurable impacts in other environmental media (e.g., vegetation, freshwater quality). There is no further discussion regarding the assessments that have been completed to evaluate dust-related impacts. Baffinland referred to PC No. 58 for more information about dustfall. From review of PC No. 58, there is further reference to PC No. 10, No. 34, and No. 54 for discussion of dustfall impacts on environmental media. Thus, the reviewer is redirected twice (i.e., once to PC No. 58 then again to PC No. 10, No. 34, and No. 54) before finding a discussion on the evaluation of dust impacts on environmental media. In the recommendations/lessons learned for PC No. 10, Baffinland noted: “Baffinland will continue with a number of projects to fully consider the 2023 Dust Audit Report (NunamiStantec, 2023) suggestions with assessment/implementation of accepted recommendations from the independent Dust Audit at the earliest opportunity.” The timeline for implementing these recommendations, any anticipated mitigative effect of implementing the recommendations to reduce dust impacts to those predicted within the FEIS, or the relative impact of the recommendations is not provided in the NIRB annual report. Further, Baffinland indicated for PC No. 27 and PC No. 187 that a follow-up report will be issued by the Dust Audit Committee in Q2 of 2024. It is unclear if and how this follow-up report will be used to inform actions to mitigate dust impacts at the project. Baffinland discussed dustfall monitoring programs for the project in PC No. 10 (dust monitoring and management as part of the Air Quality and Noise Abatement Management Plan and Roads Management Plan), PC No. 21 (Dustfall</p>	<p>With respect to Section 4.6.2:</p> <p>1. Clarify what assessments have been completed to support the claim that there are no measurable impacts to environmental media from dustfall.</p> <p>With respect to PC No. 10, No. 27, and No. 187:</p> <p>1. Clarify if the implementation of recommendations from the 2023 Dust Audit Report are anticipated to return dustfall to FEIS predictions?</p> <p>2. Clarify whether the follow-up report from the Dust Audit Committee will be used to inform dust mitigations in 2024.</p> <p>With respect to PC No. 10, No. 21, and No. 50:</p> <p>1. Discuss how the results of the Dust Audit outcomes will be used to inform the Dust Monitoring Program and whether updates to the Dust Monitoring Program are needed based on the Dust Audit results.</p>	<p>Document Name: Project Certificate Term and Condition No. 10, No. 21, No. 27, No. 34, No. 50, No. 54, and No. 187 (Section 4.6.2, 4.6.5, 4.6.6, 4.6.8, and 4.8.5)</p>	<p>With respect to Section 4.6.2:</p> <p>1. The Terrestrial Environment monitoring program evaluates multiple endpoints of the receiving environment, including changes in vegetation abundance and composition, and soil and vegetation base metals. These monitoring programs have not identified any measurable impacts or unifying trends.</p> <p>With respect to PC No. 10, No. 27, and No. 187:</p> <p>1. Implementation of recommendations from the 2023 Dust Audit Report and any independent dustfall mitigation activities identified by BIM will help the project decrease project-related dustfall. Mitigations do not each have related quantifiable predicted decreases in dustfall; therefore, it cannot be predicted if dustfall is anticipated to return to FEIS predictions.</p> <p>2. BIM evaluates all follow-up communications from the Dust Audit Committee and uses their input to inform dust mitigations.</p> <p>With respect to PC No. 10, No. 21, and No. 50:</p> <p>1. BIM appreciates the Dust Audit Committee’s feedback and has gained valuable insights from the Inuit Qaujimajatuqangit and community knowledge shared to date. BIM is open to adjustments to the Dustfall Monitoring Program when valid gaps are identified, and (where applicable) approved methodologies exist that can be implemented to bridge these gaps. These suggestions for revision may come from the Dust Audit Committee or other interested parties.</p>

Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
		Monitoring Program as part of the Aquatic Effects Monitoring Plan), and PC No. 50 (dustfall monitoring as part of the Terrestrial Environment Mitigation and Monitoring Plan). Baffinland did not discuss how the results of the Dust Audit may impact dust monitoring programs at the site. It is unclear whether the results of the Dust Audit have been considered in relation to dust monitoring at site and whether updates to the monitoring programs are needed based on the Dust Audit results			
10	QIA 2023 NIRB DF #7.	Baffinland used mixed effects models to test the relationship between distance from Project infrastructure and daily dustfall. These models appear to have included both distance from mine site and distance from road as variables, but Baffinland does not mention whether the collinearity of variables were assessed (e.g., via Spearman rank correlations)	QIA requests Baffinland confirm whether they tested for collinearity of variables used in their mixed effects models.	Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1; Section: Section 7.3.1.3 Page: p. 57	The mixed effects models used to test the relationship between distance from Project infrastructure and daily dustfall did not include distance from the mine site and road as variables; the model included the nearest distance to infrastructure, whether the road, mine or port. Since only one distance variable was used, no collinearity of variables was tested.
11	QIA 2023 NIRB DF #8.	Within section 7.3.2.3, Baffinland notes that “The annual dustfall values were compared with the annual EIS predictions, however, this modelling was updated in 2023, and presented as part of the Sustaining Operations Proposal (SOP) Air Quality Assessment (Nunami Stantec Ltd. 2023). As this proposal was approved in late 2023, the annual dustfall data for 2024 will be compared with the updated dustfall predictions.” (p. 72). Baffinland notes that the 2024 dustfall data will be compared with this new modelling, but does not note whether there will still be a comparison to the FEIS predictions.	QIA requests that Baffinland include a comparison to both the FEIS predictions and the updated dustfall model as part of the 2024 TEAMR. This will help to ensure that any dustfall impacts above those predicted in the FEIS are noted, and that Baffinland efforts to improve the current understanding of dust dispersion and impacts are shown.	Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1; Section: Section 7.3.2.3 Page: p. 72	The 2024 annual dustfall data presented in the 2024 TEAMR will be discussed in comparison with the FEIS predictions and the updated modelling results presented in the Sustaining Operations Proposal 2 (SOP2) Air Quality Assessment (Nunami Stantec Ltd. 2023).

Cmt. #	QIA Cmt. #	Reviewer's Detailed Comment	QIA Recommendations	Reference Section	Baffinland's Response
12	QIA 2023 NIRB DF #9.	<p>Within Table 7-4, Baffinland shows the annual dustfall accumulation for monitoring sites in 2023, which includes dustfall deposition above the FEIS predictions at 24 of the 43 dustfall monitoring sites.</p> <p>Continued dustfall deposition above the levels predicted within the FEIS continues to be a significant concern for QIA. QIA acknowledges that Baffinland has undertaken actions to improve dust mitigations and limit dustfall deposition, but notes that more actions can still be undertaken reduce dustfall deposition.</p> <p>As well in Tables 7-8 and 7-10, Baffinland notes the mean dustfall concentrations in areas of community concern based on satellite imagery analysis with Quarnak showing elevated dustfall concentrations relative to baseline and reference site concentrations.</p>	<p>QIA requests that Baffinland commit to the following:</p> <ol style="list-style-type: none"> QIA requests that Baffinland continue to monitor lichen-metal concentrations more frequently than currently scheduled, annually, so that if thresholds noted in the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP) are exceeded that suitable responses can be undertaken. QIA notes that they are still working with Baffinland on requested changes to the current draft of the TEMMP to address outstanding concerns which are related to thresholds and responses. Committing to undertaking a meeting with the QIA before September 2024 to resolve outstanding issues related to the isopleth modelling for the Project since February 2023. Baffinland to provide a review of operational and infrastructure controls that can be implemented throughout the ore handling chain to minimize dustfall by August 2024. Baffinland to commit to having a meeting with QIA to discuss proposed responses to threshold exceedances for dustfall before September 2024. 	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1;</p> <p>Section: Section 7.3.2.3; Table 7-4; Section 7.4.2; Table 7-8; 7-10</p> <p>Page: p. 72-73; p. 102</p>	<ol style="list-style-type: none"> Table 1-1 of the 2023 TEAMR summarizes the frequency of previous and next anticipated Terrestrial Environment Monitoring components. As defined in the TEMMP, both soil/vegetation base metals sampling and vegetation abundance monitoring are conducted per 3–5 year intervals; BIM has either met or exceeded the prescribed monitoring frequency for these components, which BIM will continue to do into the future. Based on the most recent soil/vegetation base metal monitoring campaign (2022 TEAMR), soil metals predominantly indicated no significant change or were significantly lower than baseline values across all Project areas and sample distances. Many mean lichen-metals concentrations across Project areas and sample distances showed no significant changes from baseline values, although some discrete increases have been recorded (i.e., attributed to occasional 'spikes' in metal concentration, sample variability, and/or proximity to Project operations). These findings suggest that soil/vegetation base metals currently present a low environmental and human health risk. Baffinland will discuss this with QIA. Baffinland requests that QIA provide a consolidated summary of comments on the isopleth model prior to the meeting occurring. Baffinland will continue to work with the QIA and is providing a written response to previous commitments to QIA around implementation of dust controls at the Project. Baffinland will discuss this with QIA
13	QIA 2023 NIRB DF #10.	<p>Within section 7.4.1.5, Baffinland notes that the dustfall concentrations for the imagery analysis were classified into 6 classes: 40 g/m². QIA notes that the FEIS predictions include 1–4.5, 4.6– 50, and ≥50 g/m², which differ from the classes provided by Baffinland and means that direct comparisons are difficult.</p>	<p>QIA requests that for future reporting on satellite imagery analysis that Baffinland using the following classes:</p> <p><1, 1–4.5, 4.5–10, 10–20, 20–40, 40-50 and ≥50 g/m². BY actioning this change, Baffinland will make it easier to make comparisons to FEIS predictions and</p>	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1;</p> <p>Section: Section 7.4.1.5</p> <p>Page: p. 87</p>	<p>Baffinland uses the dustfall concentration classes <1, 1–4.5, 4.5–10, 10–20, 20–40, and ≥40 g/m² for the dustfall satellite imagery analysis. The >40 g/m² class can be split into two classes, 40–50 g/m² and >50 g/m², as recommended by QIA, will be used in the 2024 reporting for easier comparison with the FEIS predictions.</p>

Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
			increase the utility of the satellite imagery analyses.		
TERRESTRIAL ENVIRONMENT					
53	QIA 2023 NIRB TE #3.	<p>Within section 5.2.1, Baffinland notes that “Non-compliant flights were primarily related to transits to Steensby Inlet.” (p. 23). In section 5.2.3, Baffinland notes that “...2023 had more flight hours within the Snow Geese area at 48.04 hours, second only to 2015 at 50.84 hours.” (p. 33). As Steensby Port and southern railway construction are proposed to occur in the near future, this association between non-compliant flights and transit to Steensby Inlet, and increase in flights in the snow goose moulting area are worrying as presumably the number of flights to Steensby Inlet will continue to increase.</p> <p>Within Section 5.2.2, Baffinland notes with regards to the increase in low level flights associated with poor weather days in the snow goose moulting area that “This increase is contrary to the mitigation protocol implemented in 2021 (summarized in EDI Environmental Dynamics Inc. 2022), which requires helicopters to travel around the Snow Geese area during the moulting season on days with poor weather. Further investigation into leading causes is recommended.” (p. 31). Baffinland does not provide any details of the investigative actions that will be undertaken to address this issue.</p> <p>QIA recognizes that health and safety is paramount and that there may not be feasible alternative measures to key project operations (such as slinging), but additional efforts must be made to investigate the impact this is having on breeding migratory birds and moulting Snow Geese. As shown on p.</p>	<ol style="list-style-type: none">QIA requests that Baffinland undertake proactive awareness training with pilots in advance of the moulting season to address non-compliance from helicopter flights.QIA requests that Baffinland provide their proposed investigation methods for review by the TEWG, to ensure that the investigation will identify the root causes of non-compliance.QIA requests that Baffinland provide the results of their investigation, and corrective actions they will undertake to determine why their mitigation protocol was not being followed correctly and how they can prevent this from occurring in the future. QIA expects that corrective actions will include:Moulting season orientation with pilots to emphasize the need to travel around the Snow Geese area during the moulting season on days with poor weather; and	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1</p> <p>Section: 5.2.2 Compliance Rationale; 5.2.3 Inter-annual Trends</p> <p>Page: p. 31; p. 33</p> <p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board</p> <p>Section: Section 4.6.8; Project Certificate Term and Condition No. 59</p> <p>Page: p. 228-234</p>	<ol style="list-style-type: none">Baffinland undertakes proactive awareness training annually when pilots arrive onsite. In addition, Baffinland’s Helicopter Guidelines were developed to provide information to pilots performing work for environmental, Projects and exploration programs at the Project. The guidelines outline the areas around the Project site that may have flight restrictions that must be considered when flying, including wildlife zones, sensitive environmental monitoring equipment, archeologic resources, blasting zones, and aircraft zones. All pilots who will be working at the Project, and all personnel who will be flying in a helicopter are required to review Baffinland’s Helicopter Guidelines and to sign-off that they have read and understood the requirements.Investigation methods will be included in the 2025 TEAMR following consultation and review with a third-party subject matter expert.Results of the investigation will be discussed in the 2024 TEAMR.Baffinland commits to completing moulting season orientation with pilots to re-emphasize the need to travel around the Snow Geese area during the moulting season on days with poor weather.Baffinland commits to completing a mid-moulting season assessment of pilot compliance and discussions with any pilots that have breached compliance of the 2021 migration protocol.The recommendation for helicopter overflight research is a reiteration of QIA 2022 NIRB TE#16, and has already been addressed by Baffinland (Baffinland 2023). Baffinland acknowledges that overflights below recommendations might be disturbing some birds and moulting snow geese. <p>References</p>

Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
		233, Baffinland has no plans to study migratory bird and snow goose response to helicopter disturbance.	<div>5. Mid-moulting season assessment of pilot compliance and discussions with any pilots that have breached compliance of the 2021 mitigation protocol.</div> <div>6. QIA requests that Baffinland conduct research on the effects of both non-compliance and “compliance with rationale” flights on migratory bird breeding and snow goose moulting. An appropriate study design should be used to avoid additional impacts, particularly during the snow geese moulting season. This commitment to conduct research should be captured in the “Recommendations / Lessons Learned” section of Section 4.6.8, PC Condition 59. Until this research has been conducted and findings demonstrate no significant impact of low-level flying, Baffinland must continue to conservatively assume and disclose that its operations are harmful to breeding migratory birds and snow goose moulting.</div>		Baffinland Iron Mines Corporation. 2023. Baffinland Response to Reviewer Comments on the 2022 NIRB Annual Report. NIRB Registry Document #346627. 222 pp.
54	QIA 2023 NIRB TE #4.	Baffinland has not provided reporting of helicopter flights routes relative to walrus haulout locations. This is concerning to QIA as potential disturbance from aircraft could lead to adverse effects on walrus and details of flight routes relative to these locations should be provided.	<div>QIA requests that Baffinland provide mapping of the helicopter flights routes relative to walrus haulout locations in future annual reports.</div> <div>QIA expects that Baffinland will provide the results of their investigative and corrective measures within the 2024 Terrestrial Environment Annual Monitoring Report.</div>	<div>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1</div> <div>Section: General Comment</div> <div>Page: N/A</div>	In 2023 Baffinland did not fly near any walrus haul outs, thus a map was not created. The walrus haul outs remain the same, and Baffinland did not fly near these areas. Baffinland can provide mapping of the helicopter flights routes relative to walrus haulout locations in future annual reports.
55	QIA 2023 NIRB TE #5.	Within Section 5, Baffinland notes that "No locations or boundaries of areas prescribed explicitly by the TEWG or areas of observed concentrations of other migratory birds were identified in 2023." (p. 22). It’s currently unclear how	<div>1. QIA requests that Baffinland provide details on the documentation process that Baffinland will follow when</div>	Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1	<div>1. If concentrations of migratory birds are observed, the area will be investigated to verify and delineate. Data and proposed locations will be submitted to TEWG members for comment.</div>

Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
		information of observed concentrations of other migratory birds would be documented by Baffinland and how this documentation would lead to eventual implementation of helicopter avoidance areas.	<p>concentrations of other migratory birds are observed.</p> <p>2. QIA requests that Baffinland provide details on the reporting and mitigation process that would follow this documentation, including details of who reported observations will be sent to, how they will determine if an avoidance area is needed, and the timeline for this process overall.</p>	<p>Section: Section 5 Helicopter Overflights</p> <p>Page: p. 22</p>	<p>2. Observations of concentrations of migratory birds within the Project area can be reported to BIM Environment staff, who will pass along information to the appropriate personnel. Areas will then be assessed, and similar standards for current avoidance areas will be applied, if applicable. If the TEWG collaborates on reasonable and informed approaches, new avoidance areas could be applied within 12 months of initial reporting.</p>
57	QIA 2023 NIRB TE #7.	Table 5 of the Snow Management Plan provides information on snow clearing along the Tote Road, and states that snow clearing will “avoid or minimize barrier effects on wildlife movement” (P13). No specific triggers or mitigative actions are provided in the document, although references to snowbank height monitoring (as part of the Terrestrial Environment Mitigation and Monitoring Plan - TEMMP) and the Roads Management Plan are provided. It is difficult to evaluate any potential impacts of the Tote Road snow clearing on wildlife mobility without specific information from the TEMMP snowbank height monitoring and Roads Management Plan. This information should be included in Table 5 of the Snow Management Plan, for ease of review and document completeness, providing a single streamlined document that can be consulted if snowbank height or Tote	QIA requests that Baffinland provide a more specific reference to the TEMMP snowbank height monitoring and Roads Management Plan, or provide pertinent information about the specific mitigative actions that will be taken if snowbanks on the Tote Road are found to be high enough to disrupt wildlife migration.	<p>Document Name: Baffinland NIRB Annual Report, Appendix G.8.8 Snow Management Plan</p> <p>Section: Table 5</p> <p>Page: 13</p>	<p>Snowbanks along the Tote Road are ‘feathered’ (i.e. pushed back and redistributed) out into the tundra to minimize snow bank height to ensure impacts to wildlife are minimized. This is completed on an as-needed basis and as weather conditions allow. Safety and topographical conditions are considered in the reduction of snow bank heights throughout the winter.</p> <p>References to applicable sections of the TEMMP, Roads Management Plan, and Snow Management Plan are as follows:</p> <ul style="list-style-type: none">Terrestrial Environment Mitigation and Monitoring Plan (TEMMP), BAF-PH1-830-P16-0027, Rev. 1, pages 52-53Roads Management Plan, BAF-PH1-830-P16-0023, Rev. 7, page 15 <p>Snow Management Plan, BIM-5200-PLA-0006, Rev. 7</p>

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		Road snow clearing are found to be disruptive to wildlife migration.			
58	QIA 2023 NIRB TE #8.	<p>Within Table 0 of the Summary section, Baffinland notes that wildlife mortalities "...were low overall and represented a very small proportion of overall populations, consistent with impact predictions." (p. xix). Baffinland noted that 13 King Eider mortalities were recorded, and 4 additional avian mortalities (3 snow bunting and an unknown songbird), for a total of 17 avian mortalities, which is not a low number of mortalities, especially relative to previous years. Within the FEIS, it is noted that “Potential influences on mortality for Eider within the terrestrial RSA will be similar to those described above for Snow Goose.” (p. 105), and under residual project effects to snow geese it is noted that “Direct mortality of any individual Snow Goose due to Project activities is not expected...” (p. 102). The mortalities of 13 King Eiders is concerning especially relative to FEIS predictions.</p> <p>As well, Baffinland has provided no explanation how it is tracking King Eider, and songbird abundance to substantiate its claim regarding a small proportion of the overall population. As well, Baffinland notes that “All avian mortalities were likely associated with building or infrastructure collisions.” (p. 194). Baffinland does not indicate whether a retrospective review of building strike mitigations will take place, nor do they provide any details on enhanced mitigations that might be used to mitigate building collisions.</p>	<ol style="list-style-type: none">QIA requests that Baffinland provide further details to explain how they determined the 17 mortalities represents small proportions of the overall populations, with reference to appropriate population estimates.QIA requests that Baffinland provide a summary of the existing mitigations to prevent bird strikes on buildings and provide options for possible enhanced mitigations to reduce bird strikes (e.g. American Bird Conservancy Bird Tape for windows to reduce possible window strikes associated with buildings)	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1;</p> <p>Section: Summary, Table 0; Section 11 Wildlife Interactions</p> <p>Page: p. xix; pp. 191-194</p> <p>Document Name: Baffinland Iron Mines 2012 Mary River Project Final Environmental Impact Statement Volume 6 Terrestrial Environment</p> <p>Section: Section 4.7 Common and King Eider; Section 4.6 Snow Goose</p> <p>Page: pp. 99-104</p>	<ol style="list-style-type: none">Population estimates for King Eider and snow bunting are available on public online data sources. The population estimate for King Eider in Canada is 600,000 birds (Government of Canada 2015a). The 13 mortalities represent 0.002% of the population in Canada. The population estimate for snow bunting is 5,000,000 –50,000.000 adults (Government of Canada 2015b). The two mortalities represent 0.00% of the Canadian population.The event which resulted in thirteen (13) King Eider mortalities as a result of contact with the shiploading structure at Milne Port was a unique event. High winds and blowing snow likely reduced visibility, resulting in the collision. The shiploading structure includes a large conveyor and steel frame tower structures with lighting that is angled to minimize potential for attracting birds or other wildlife. Following completion of the 2023 shipping season, the shiploader was winterized and therefore the lighting was significantly reduced. Baffinland reviewed documentation of wildlife interactions and found no previous mortalities at the shiploader have occurred. Should this event be repeated for this facility, additional mitigation measures will be considered in accordance with Baffinland’s Terrestrial Environment Mitigation and Monitoring Plan (TEMMP). <p>Additionally, general site mitigation measures to limit Project effects on bird species are implemented across the Project as per section of 3.2.1 of the TEMMP.</p> <p>References:</p> <p>Terrestrial Environment Mitigation and Monitoring Plan (TEMMP), BAF-PH1-830-P16-0027, Rev. 1, pages 44-45</p> <p>Government of Canada. 2015a. Population Status: King Eider (<i>Somateria spectabilis</i>). (https://wildlife-species.canada.ca/bird-status/tendance-trend-eng.aspx?sY=2019&sL=e&sB=KIEI&sM=p1&sT=f3852f38-83b4-4a30-9432-57f27231100e). Accessed July 25, 2024.</p> <p>Government of Canada. 2015b. Snow Bunting (<i>Plectrophenax nivalis</i>). (https://wildlife-species.canada.ca/bird-status/oiseau-bird-eng.aspx?sY=2019&sL=e&sM=a&sB=SNBU&wbdisable=false). Accessed July 25, 2024.</p>

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59	QIA 2023 NIRB TE #9.	Within Section 11, Baffinland notes that there were 13 King Eider, 3 snow bunting, and 1 unknown songbird mortalities in 2023, and that the 17 bird mortalities were likely associated with building/infrastructure collisions. In figure 11-1 Baffinland notes for 2023 that there were more than 20 building collision mortalities, and 7 vehicle collision mortalities. The difference between the number of mortalities noted in Section 11 and Figure 11-1 is concerning, as it's unclear which accurately reflects the mortalities that occurred.	QIA requests that Baffinland revise section 11 or figure 11-1 to reflect the true number of building collision mortalities.	Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1; Section: Section 11; Figure 11-1; Page: p. 191-193	Figure 11-1 will be updated to reflect Project –related mortalities.
60	QIA 2023 NIRB TE #10.	Within Table 1-1, Baffinland notes that caribou fecal pellets were collected in 2011–2014 and 2020. Baffinland does not provide any details on the analyses or reporting that were completed as part of the fecal pellet collection programs.	QIA requests that Baffinland share the results of the caribou fecal pellet programs and associated reporting.	Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1; Section: Table 1-1, Page: p. 2	No analyses were conducted on the fecal pellets collected in 2011–2014 because the age of the pellets was unknown. No relevant information to the project effects was to be gained from an analysis of the 2020 fecal pellets.
61	QIA 2023 NIRB TE #11.	Baffinland notes in Section 9.1.1 that "If/when wildlife tracks were suspected, personnel would further investigate on foot to confirm the identity of the species and follow the tracks (to or from the roadway) to document the patterns of movement, behaviour, and habitat use (if/where possible)." (p. 148-149). Baffinland does not indicate how far personnel travelled to monitor the deflection. Baffinland noted results of the track surveys as either deflections, paralleling, or crossing. QIA notes that it is possible for wildlife to be deflected from the road, cross it eventually, or parallel the road until it connects with the mine site or Milne port. From the details provided from Baffinland it's unclear for what distance tracks were followed to confirm the ultimate response of the individual wildlife (i.e. were tracks followed until the animal crossed the road, turned away, or for a specified distance).	QIA requests that Baffinland clarify whether or not staff follow the tracks until the tracks indicate the animal crossed the road, turned away from the road or for a specified distance (e.g. 1 km). QIA would expect that Baffinland staff would be undertaking these surveys to ensure all efforts are being made to document possible deflections through following tracks until they cross the road, are deflected or until 1 km of paralleling has been reached.	Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1; Section: Section 9.1.1.; Section 9.1.2 Page: pp. 148-149, pp. 149-152	Baffinland confirms that snow track survey staff follow tracks to document animal patterns of movement (i.e. to identify whether animals deflected, travelled along, or crossed the road). Snow tracks observed along the Tote Road are followed on foot within a reasonable distance to document patterns of movement, as well as, animal behaviour, and habitat use (if/where possible). Surveys are completed after all snowfall events and all tracks are documented on foot unless it is unsafe to do so (i.e. where the road is narrow or where there are blind corners or dips). If tracks are seen travelling along the Tote Road for longer distances, generally >100m when safe conditions exist), the survey crew will follow the tracks in a light truck traveling at a speed of ~30 km/hr until the tracks either cross the road or veer off into the Tundra.
62	QIA 2023 NIRB TE #12.	Regarding height of land surveys in 2023, Baffinland notes that "Efforts were made to visit all sites a second time but due to helicopters being grounded for safety reasons, a full second round was not able to be completed." (p. 160).	QIA requests that Baffinland provide more details on the safety reasons that led to helicopter being grounded, which impacted the completion of a second round of height of land surveys. Further to this, QIA request that Baffinland plan for	Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1;	Baffinland appreciates the QIA's comments on survey logistics and contingency planning, and can assure QIA that all reasonable efforts are made to plan for unexpected circumstances. We can confirm that contingency planning for inclement weather is always accounted for when planning field programs.

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		Baffinland does not provide a rationale as to why the full second round was not able to be completed. This is concerning as it would be beneficial to understand why surveys were limited in 2023, so that the same situation can be planned for and avoided during subsequent years.	these possible eventualities in the future, so that a second round of surveys can be completed (e.g. planning to have a couple extra/spare days in case of bad weather to ensure staff and equipment are available).	Section: Section 9.3.1.1 Page: page 160	In this specific case, an aviation incident that caused significant damage to one of the helicopters onsite resulted in the extended grounding of the entire fleet until a full investigation could be completed. The time required to complete the investigation which included the Transportation Safety Board far exceeded the contingency planning room within multiple field program schedules. Of importance, in order to resume grounded helicopter operations, all rotary winged aircraft must be released/approved by the Transportation Safety Board and Transport Canada. We hope the QIA can appreciate that this kind of event is not possible to plan for.
63	QIA 2023 NIRB TE #13.	<p>Regarding incidental wildlife, Baffinland provides a list of common species recorded on wildlife log in 2023 and notes piping plover (<i>Charadrius melodus</i>) among the common species observed. Baffinland provides no further details of the observations of piping plovers.</p> <p>QIA notes that both subspecies of piping plover (<i>Charadrius melodus circumcinctus</i> and <i>Charadrius melodus melodus</i>) are list as Endangered under the <i>Species at Risk Act</i> (ECCC, 2022; EC 2006), and that further details should be provided on these observations, as the current known range of piping plover in Canada does not include Nunavut, and potential impacts of the project on piping plover were not assessed as part of the FEIS.</p>	<p>QIA requests that Baffinland provide further details on the incidental observations of piping plovers (e.g. location of observations, timing, photos or descriptive details).</p> <p>QIA also requests what Baffinland provide details of what measures were taken once piping plovers were identified to reduce potential disturbance of individuals and their habitat.</p>	Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1; Section: Section 9.6 Page: p. 183 Other Documents: Environment and Climate Change Canada. (2022). “Recovery Strategy (Amended) and Action Plan for the Piping Plover melodus subspecies (<i>Charadrius melodus melodus</i>) in Canada.” <i>Species at Risk Act</i> Recovery Strategy Series. Environment and Climate Change Canada, Ottawa. viii + 124 pp. Environment Canada. (2006). “Recovery Strategy for the Piping Plover (<i>Charadrius melodus circumcinctus</i>) in Canada.” <i>Species at Risk Act</i> Recovery Strategy Series. Environment Canada, Ottawa. vi + 30 pp.	<p>Baffinland thanks QIA for bringing this observation forward. Incidental observations are made by staff at site, including non-expert observers. There are inherent limitations to characterizing species, age, or sex of bird or wildlife groups or individuals. The requested information is not available. Upon reflection, the birds were unlikely piping plover because Mary River is completely outside of the range but BIM will endeavour to be as accurate in the incidental observations as possible.</p>
64	QIA 2023 NIRB TE #14.	Within Section 9.6, Baffinland notes that 103 caribou were recorded as part of the incidental wildlife observations in 2023. Baffinland does not provide a map of the location of these caribou observations, nor do they provide details on the group sizes for all of the caribou observations. QIA notes that further details on the location of caribou (e.g. a map), and group sizes would be provide greater clarity on the	QIA requests that Baffinland provide mapping of the location of caribou observations and details on groups sizes for these observations made during 2023, as well as previous years where possible. For future annual reports QIA requests that Baffinland record the approximate locations of wildlife observed as part of	Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1; Section: Section 9.6	The incidental observation logs are intended to capture awareness of and general observations of wildlife by project personnel at the Project. Some observations are made well outside the terrestrial RSA (e.g., during travel to/from exploration areas). For caribou group sizes and observations, the 2023 aerial survey or other surveys specific to caribou (i.e., having clearly defined methodology and data collection and

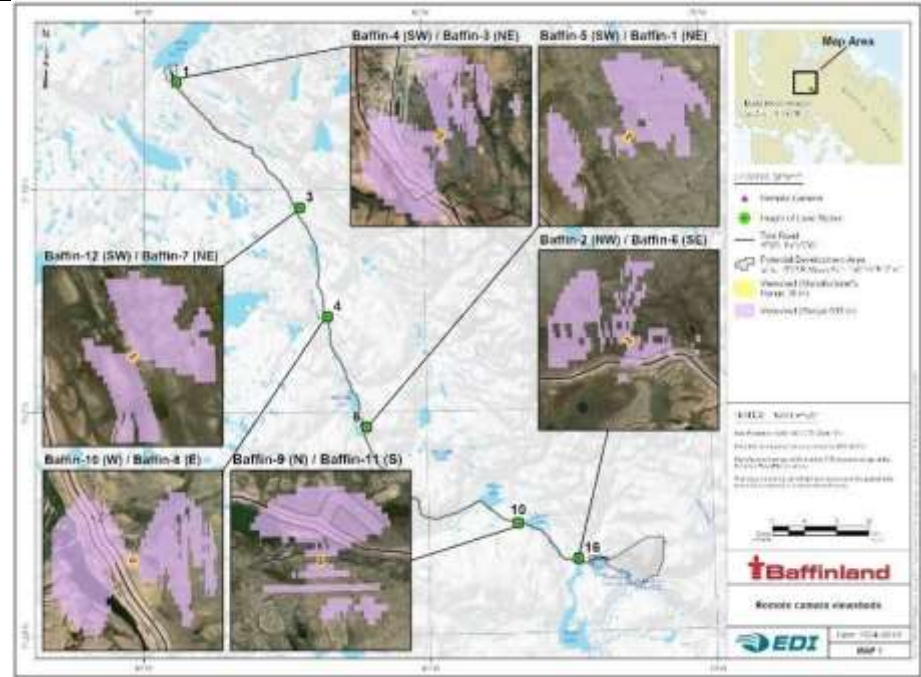
Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
		context of the observations, and contribute to informative data on trends in caribou observations over the life of the project.	the incidental wildlife monitoring and include mapping of observations within the annual reports, and details of the different group sizes observed.	Page: p. 183-184	analysis procedures) should be reviewed to quantify the details requested by the QIA.
65	QIA 2023 NIRB TE #15.	<p>Within Section 10, Baffinland notes that as part of activities to address PC 74 “In consultation with the Terrestrial Environment Working Group and Canadian Wildlife Service (CWS), it was resolved that effects monitoring for tundra breeding birds could be discontinued. Instead, Baffinland Iron Mines Corporation (Baffinland) would commit to the following:</p> <ul style="list-style-type: none">• completing coastline nesting surveys of the identified islet near the proposed Steensby Port Site before the construction of the port;• continuing monitoring programs for cliff-nesting raptors (annual occupancy and productivity) and inland waterfowl (roadside waterfowl surveys) when qualified biologists are available and on site (paused indefinitely since 2021 since no Project-related trends have been observed).” (p. 188) <p>With the construction of the southern railway and Steensby Port due to commence in the near future, QIA is concerned about potential project-related impacts to cliff nesting raptors and waterfowl, and that important components of the bird monitoring programs are currently not planned in the future. QIA notes that while Baffinland previously completed cliff nesting raptor and roadside waterfowl surveys, these were associated with the Milne Port, Tote Road and Mine site, the construction and operation of the southern railway and Steensby Port may produce different effects on cliff nesting raptors and waterfowl and should be monitored. As it currently stands with no monitoring in place for future years, adverse effects may occur and there would be no mitigative response.</p> <p>Additionally, within Table 1-1, Baffinland notes that no surveys are scheduled but that they “may reassess in future years” (p. 2). QIA notes that the cliff nesting raptor surveys</p>	<p>QIA requests that Baffinland undertake the following monitoring in future years:</p> <ul style="list-style-type: none">• Updated coastline nesting surveys of the identified islet near the proposed Steensby Port Site;• Cliff-nesting raptors (annual occupancy and productivity) surveys around the Mine site, southern railway route, and Steensby Port;• Peregrine nesting (annual occupancy and productivity) surveys around the Tote Road, and Milne Port; and• Roadside/railside waterfowl surveys around the Mine site, southern railway route, and Steensby Port. <p>By undertaking these surveys, Baffinland will help to ensure that potential project related effects on birds are being monitored and that mitigative measures can be implemented if needed.</p>	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1;</p> <p>Section: Section 10; Table 1-1</p> <p>Page: p. 188; p. 2</p>	<p>Baffinalnd offers the following in response to QIA’s request:</p> <ul style="list-style-type: none">• The islet survey will be conducted before southern commercial shipping begins.• Cliff-nesting raptor surveys are unlikely to be re-instituted. The disturbances associated with the southern operation are either no different or less than those observed in the northern operation.• Peregrine falcon occupancy and productivity surveys will not be continued along the Tote Road or Milne Port. The data collection and analyses to date were sufficient to illustrate no relationship between occupancy and productivity and distance to disturbance. <p>As the potential to develop the Steensby Component approaches with more certainty, Baffinland will engage the QIA and TEWG to carry out thorough discussions on this topic to ensure that all parties understand the results of monitoring programs to date and their applicability to southern operations effects monitoring.</p>

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		<p>appeared to show a slight declining trend in peregrine falcon nest occupancy before the program was discontinued.</p> <p>As well, QIA notes that the coastline nesting surveys were last completed in 2012 and that conditions may have changed in the past 12 years, which could lead to a mischaracterization of project effects on coastline nesting birds. An updated coastline nesting survey would provide a more robust assessment of current conditions for coastline nesting birds, which future monitoring could compare against to assess potential project effects.</p>			
66	QIA 2023 NIRB TE #16.	<p>Within Section 4.6.6, Baffinland provides an overview of the terms and conditions related to vegetation and the associated vegetation monitoring they undertake, including lichen-metal sampling. Baffinland notes that lichen-metal sampling was not undertaken in 2023, but that the next sampling period would be between 2025 and 2027. QIA remains concerned by the statistically significant increases in lichen-metal concentrations relative to baseline levels shown in 2022 (i.e. arsenic, cadmium, copper, lead, selenium), especially with some far sampling sites (e.g. arsenic, cadmium, and selenium at the Mine Site far sampling sites) and one reference sampling site (i.e. selenium at the Tote Road reference sampling site) showing these statistically significant increases for certain contaminants of potential concern.</p> <p>QIA is concerned that, by not having consistent annual monitoring, potential statistically significant increases or increases above lichen indicator values could occur and there would be no timely mitigative response engaged.</p>	<p>QIA requests that Baffinland continue to monitor lichen-metal concentrations more frequently than currently scheduled, annually so if thresholds noted in the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP) are exceeded that suitable responses can be undertaken.</p> <p>QIA notes that they are still working with Baffinland on requested changes to the current draft of the TEMMP to address outstanding concerns which are related to thresholds and responses.</p>	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board;</p> <p>Section: Section 4.6.6, Project Certificate Term and Condition No.</p> <p>Page: p. 147</p> <p>Document Name: Baffinland Iron Mines Corporation Mary River Project 2022 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1 – 2022 Final Terrestrial Environment Annual Monitoring Report</p> <p>Section: Table 9-16</p> <p>Page: p. 163</p>	<p>This QIA Comment/Recommendation relates to the 2022 TEAMR, and reiterates QIA 2023 NIRB DF #9, bullet #1 (above).</p> <p>As defined in the TEMMP, both soil/vegetation base metals sampling and vegetation abundance monitoring are conducted per 3-5 year intervals; BIM has either met or exceeded the prescribed monitoring frequency for these components. Increasing the sampling frequency is not warranted.</p> <p>Based on the most recent soil/vegetation base metal monitoring campaign (2022 TEAMR), soil metals predominantly indicated no significant change or were significantly lower than baseline values across all Project areas and sample distances. Many mean lichen-metals concentrations across Project areas and sample distances showed no significant changes from baseline values. However, some discrete increases have been recorded (i.e., being attributed to occasional ‘spikes’ in metal concentration, sample variability, and/or proximity to Project operations). Altogether, these findings suggest that soil/vegetation base metals currently present a low environmental and human health risk.</p>
67	QIA 2023 NIRB TE #17.	<p>Regarding Term and Condition No. 35, Baffinland notes that, for the potential launch of a caribou tissue sampling program based out of the Mine Site and Milne Port, “Teeth aging would be completed at Matson’s Lab in Montana, USA, as no Canadian facilities currently offer this analysis.” (p. 157). QIA</p>	<p>1. QIA suggests that Baffinland explore potentially looking at Canadian options for teeth aging such as the Wildlife Analytics Lab at Lethbridge College (led by Dr. Everett Hanna),</p>	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board;</p>	<p>1. Baffinland thanks the QIA for the suggestion.</p> <p>2. Baffinland has consulted with the Government of Nunavut and industry specialists and is using the same methods, payment, and analysis as the GN program. There are parameters (blood, hair and skin) that the GN collected that Baffinland is not collecting and therefore the price is commensurate with</p>

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		<p>notes that there are Canadian facilities that offer this analysis.</p> <p>As well, Baffinland notes that, regarding compensation for samples, "Baffinland confirms that it does not intend to offer increased compensation for the proposed on site caribou tissue sampling program under discussion, as this may deter participation from other regional monitoring programs." (p. 157). QIA remains concerned by the low number of samples submitted to the GN and NCP programs, and notes that compensation should be at a minimum on par with those two programs.</p>	<p>who offer fee-for-service cementum analysis of wildlife teeth.</p> <p>2. QIA requests that Baffinland provide at a minimum \$120 for sampling kits submitted through their proposed on site caribou tissue sampling program so it is on par with the compensation for GN and NCP sampling kits.</p>	<p>Section: Section 4.6.6; Project Certificate Term and Condition No. 35</p> <p>Page: p. 157</p>	<p>what the GN paid for the same samples (liver, kidney, teeth, muscle). Baffinland is looking specifically at metal accumulation and the liver and kidney. Baffinland is also testing muscle, as it is a primary food source and teeth for aging.</p>
68	QIA 2023 NIRB TE #18.	<p>Term and Condition No. 53 stipulates that Baffinland shall consider the "Development of a surveillance system along the railway corridor to identify the presence of caribou in proximity to the train tracks and operational protocols for the train to avoid collisions and enable caribou to cross the train tracks unimpeded." (p. 205). Baffinland notes that the TEMMP "...will include an updated surveillance system once the railway becomes viable." (p. 207). Baffinland does not provide details of the timeframe that corresponds with railway viability. As well, Baffinland does not indicate when the operational protocols will be developed.</p> <p>This is concerning to the QIA: to ensure adverse impacts to caribou are avoided, a surveillance program and operational protocols should be developed well in advance of railway operations. The details of the surveillance plan and operational protocols should be provided to the QIA for review and comment in advance of railway operations to ensure that the program is sufficiently robust and protective of caribou.</p>	<p>QIA requests that Baffinland provide details of the planned timing of the development of the surveillance program and operational protocols relative to the initiation of railway operations. QIA expects at a minimum that Baffinland will provide the proposed surveillance program and operational protocols to the QIA and TEWG within two years in advance of the operation of the railway for their review and comment.</p>	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board;</p> <p>Section: Section 4.6.8; Project Certificate Term and Condition No. 53</p> <p>Page: p. 205-207</p>	<p>Baffinland commits to providing the caribou surveillance program and operational protocols related to caribou for the Steensby Railway to the QIA and TEWG for review in advance of the start of railway operations. At present, experimental design for this monitoring activity has not yet been formalized. Program details will be shared at the appropriate time/venue.</p>
69	QIA 2023 NIRB TE #19.	<p>Term and Condition No. 55 notes that Baffinland will "...develop an adaptive management plan applicable to wolves and wolf habitat..." (p. 214), and that considers:</p>	<p>QIA requests that Baffinland:</p> <ul style="list-style-type: none"> Provide estimates for the available esker habitats within the RSA and PDA; and 	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board;</p>	<p>Baffinland (2012) FEIS Appendix 6F highlighted that there is low abundance of wolves in the RSA. As the potential to develop the Steensby Component approaches with more certainty, Baffinland will undertake the work to develop baseline information along the southern railway corridor and Steensby Port location.</p> <p>Reference: Baffinland (2012). Final Environmental Impact Statement. Volume 6 – Terrestrial Environment. Appendix 6F Terrestrial Wildlife Baseline Report. Feb. 2012.</p>

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		<p>B. “Estimating the available (glacio-fluvial materials) esker habitat within the Regional Study Area/PDA and identifying such habitat as ecologically sensitive;” (p. 214)</p> <p>C. “Developing “wolf indices” for presence/abundance of wolves (by conducting studies) to set a baseline pre-construction baseline;” (p. 214)</p> <p>QIA is not aware of the estimation of esker habitat or the development of indices for presence/relative abundance of wolves.</p> <p>With the construction of the southern railway proposed to occur as noted in Sustaining Operations Proposal 2 (SOP2), QIA is concerned by the lack of progress made on estimating the available esker habitat within the RSA and PDA, and development of a wolf indices for presence/abundance of wolves to set a baseline. QIA notes that the results of the 2023 caribou survey showed that caribou numbers have increased to meet the threshold for a potential collaring program; based on this increase it is plausible that wolf numbers have also increased or will increase in the near future.</p>	<ul style="list-style-type: none">Undertake work to develop baseline information and associated indices for wolf presence / abundance particularly along the southern railway corridor / Steensby Port area.	<p>Section: Section 4.6.8; Project Certificate Term and Condition No. 53</p> <p>Page: p. 214-215</p>	
70	QIA 2023 NIRB TE #20.	<p>Regarding Term and Condition No. 74, Baffinland notes that “Upon the recommendation of CWS-ECCC, Red Knot monitoring using ARUs will resume before increasing activities in the southern transportation corridor.” (p. 263). Baffinland does not provide details on:</p> <ul style="list-style-type: none">Number of ARUs that will be deployed;Length of deployment of the ARUs;ARU deployment timing; andLocation ARUs will be deployed. <p>Without these details it is difficult to determine how effective the proposed monitoring program will be at detecting red knots.</p>	<p>The QIA requests that Baffinland provide the methods for the proposed ARU deployment for their review and comment in advance of undertaking the program so that their comments and concerns can be addressed before the ARUs are deployed. Specifically, QIA requests that the methods include the following details:</p> <ul style="list-style-type: none">Number of ARUs that will be deployed;Length of deployment of the ARUs;ARU deployment timing;Location ARUs will be deployed;Proposed data analysis approach	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board;</p> <p>Section: Section 4.6.9; Project Certificate Term and Condition No. 74</p> <p>Page: p. 262-263</p>	<p>Baffinland welcomes discussion on this topic with the TEWG, particularly seeking input from ECCC-CWS and their thoughts on the utility of this program and the likelihood/concern with finding Red Knots in the southern portion of the RSA</p>

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71	QIA 2023 NIRB TE #21.	<p>Baffinland continues to avoid sharing information on the directional orientation of the remote cameras selected for this program as well as information on proximity of remote cameras to project components (e.g., X m west of the Tote Road). It would be useful for Baffinland to start reporting on this information to assist with interpreting the results.</p> <p>Using the detection range provided (i.e. 30 meters / 100 feet) as per QIA’s request in 2022, it would be useful for Baffinland to quantify the maximum area covered by remote cameras, similar to the viewshed modelling and analysis that has been provided for HOL surveys. This context is necessary to interpret the results of remote camera monitoring, and whether study design is sufficient to maximize the potential for detection of caribou and other wildlife species.</p> <p>QIA notes that this unknown information contributes to QIA’s overarching concerns regarding the effectiveness of Baffinland’s overall program to monitor the potential effects of the project on caribou, including their avoidance of project components and calving areas. Until this issue and other deficiencies related to the caribou monitoring program are addressed, QIA does not consider Baffinland to be in compliance with Term and Condition 53</p>	<p>To better understand how remote camera monitoring results provide insight on caribou avoidance of the project area and improve compliance with Term and Condition 53, Baffinland Is requested to report on and analyze the following for the 2024 remote camera monitoring program:</p> <ul style="list-style-type: none">orientation of each remote camera deployed (e.g., north, east south, west);if relevant, proximity of each remote camera / HOL station to project components, including distance and type of component. QIA notes that project components within at least 500m should be reported; anduse the detection range provided to quantify a maximum total viewshed for each camera and HOL station (a map of each remote camera viewshed, relative to the HOL viewshed would be also ideal) to assist with interpreting the findings of remote camera monitoring, including its spatial limitations.	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1</p> <p>Section: Section 4.6.8; Project Certificate Term and Condition No. 53; Section 9.4</p> <p>Page: p. 205-210; 164-170</p>	<p>Baffinland would like to remind QIA that their comments/recommendations on the Wildlife Remote Camera program have been discussed at length (cf. Comments on 2022 TEAMR/NIRB report, QIA 2022 NIRB TE# 8). The current/ongoing remote camera program was also discussed at the 13-14 December 2023, TEWG meetings.</p> <p>Experimental design parameters (and limitations) are described in the 2022 Terrestrial Environment Annual Monitoring Report (TEAMR; EDI, 2023; refer to 10.4 Remote Cameras, 10.4.1 Methods; pg.226-227). Remote Camera Locations are described in Appendix D, including HOL Site Name, Camera ID, Location (Tote Road Marker), Camera Orientation, Latitude/Longitude coordinates, and representative Site Photo. Distance to/from Project Infrastructure can be added as part of future reporting.</p> <table><tr><th colspan="7">Distance to</th></tr><tr><th>HOL #</th><th>Camera</th><th>PDA (m)</th><th>Height</th><th>Lati</th><th>Longitude</th><th>Direction</th></tr><tr><td>1</td><td>Baffin-3</td><td>0.0</td><td>1.4</td><td>71.87102</td><td>-80.8828</td><td>NE</td></tr><tr><td>1</td><td>Baffin-4</td><td>0.0</td><td>1.4</td><td>71.87102</td><td>-80.8828</td><td>SW</td></tr><tr><td>3</td><td>Baffin-7</td><td>482.2</td><td>1.4</td><td>71.72974</td><td>-80.4418</td><td>NE</td></tr><tr><td>3</td><td>Baffin-12</td><td>482.2</td><td>1.4</td><td>71.72974</td><td>-80.4418</td><td>SW</td></tr><tr><td>4</td><td>Baffin-8</td><td>55.8</td><td>1.4</td><td>71.60734</td><td>-80.347</td><td>E</td></tr><tr><td>4</td><td>Baffin-10</td><td>55.8</td><td>1.4</td><td>71.60734</td><td>-80.347</td><td>W</td></tr><tr><td>6</td><td>Baffin-1</td><td>593.6</td><td>1.4</td><td>71.48321</td><td>-80.213</td><td>NE</td></tr><tr><td>6</td><td>Baffin-5</td><td>593.6</td><td>1.4</td><td>71.48321</td><td>-80.213</td><td>SW</td></tr><tr><td>10</td><td>Baffin-9</td><td>142.8</td><td>1.4</td><td>71.3732</td><td>-79.6859</td><td>N</td></tr><tr><td>10</td><td>Baffin-11</td><td>142.8</td><td>1.4</td><td>71.3732</td><td>-79.6859</td><td>S</td></tr><tr><td>16</td><td>Baffin-2</td><td>96.4</td><td>1.4</td><td>71.33213</td><td>-79.4779</td><td>NW</td></tr><tr><td>16</td><td>Baffin-6</td><td>96.4</td><td>1.4</td><td>71.33213</td><td>-79.4779</td><td>SE</td></tr></table> <p>Viewshed analysis is provided below (refer to inset figure) based on the camera manufacturer’s specifications. It is unclear if/how QIA recommendation/request regarding viewshed would assist or improve data interpretation.</p>	Distance to							HOL #	Camera	PDA (m)	Height	Lati	Longitude	Direction	1	Baffin-3	0.0	1.4	71.87102	-80.8828	NE	1	Baffin-4	0.0	1.4	71.87102	-80.8828	SW	3	Baffin-7	482.2	1.4	71.72974	-80.4418	NE	3	Baffin-12	482.2	1.4	71.72974	-80.4418	SW	4	Baffin-8	55.8	1.4	71.60734	-80.347	E	4	Baffin-10	55.8	1.4	71.60734	-80.347	W	6	Baffin-1	593.6	1.4	71.48321	-80.213	NE	6	Baffin-5	593.6	1.4	71.48321	-80.213	SW	10	Baffin-9	142.8	1.4	71.3732	-79.6859	N	10	Baffin-11	142.8	1.4	71.3732	-79.6859	S	16	Baffin-2	96.4	1.4	71.33213	-79.4779	NW	16	Baffin-6	96.4	1.4	71.33213	-79.4779	SE
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					 <p>References:</p> <p>Environmental Dynamics Inc. (EDI), 2022. 2021 Mary River Project Terrestrial Environment Annual Monitoring Report - Prepared for Baffinland Iron Mines Corporation. April 2022.</p> <p>Environmental Dynamics Inc. (EDI), 2023. 2022 Final Mary River Project Terrestrial Environment Annual Monitoring Report - Prepared for Baffinland Iron Mines Corporation. April 28, 2023.</p>
72	QIA 2023 NIRB TE #22.	<p>QIA has previously recommended that Baffinland take reasonable measures to prevent field of view obstructions due to blowing snow, ice, or fog. Examples provided to Baffinland in response to the 2021 and 2022 TEAMR included installing a cover or shelf or a protective case, using silica gel packs to prevent moisture build-up in cases, and applying anti-fogging products. There is no indication in Section 9.4 of the 2023 TEAMR that Baffinland attempted any of these measures.</p> <p>In the 2023 TEAMR (Appendix E), Baffinland reasoned that "there are limitations to implementation due to the project setting and climate." Baffinland has failed to provide explicit</p>	<p>To maximize remote camera monitoring data to provide insight on caribou avoidance of the project area and improve compliance with Term and Condition 53, Baffinland is requested to implement measures to minimize field of view obstructions due to snow, ice, or fog, including:</p> <ul style="list-style-type: none"> installing a protective case and shade on each deployed camera 	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1 – 2023 Final Terrestrial Environment Annual Monitoring Report</p> <p>Section: Section 4.6.8; Project Certificate Term and Condition No. 53; Section 9.4</p> <p>Page: p. 205- 210 of 623; 159-163</p>	<p>Baffinland would like to remind QIA that their comments/recommendations on the Wildlife Remote Camera program have been discussed at length (cf. Comments on 2022 TEAMR/NIRB report, QIA 2022 NIRB TE# 9. The current/ongoing remote camera program was also discussed at the 13-14 December 2023, TEWG meetings.</p> <ol style="list-style-type: none"> As highlighted in the BIM response to QIA 2023 NIRB TE #21 (above), weather-related obstruction of the camera view field appears specific to only two (2) camera locations and represents a localized issue. BIM will review the proposed mitigation to minimize the accumulation of fog and ice. BIM will improve the log we have and can review it with QIA onsite monitors at their request. <ul style="list-style-type: none"> Cameras are already contained in a protective case Viability of anti-moisture packs will be evaluated.

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		<p>rationale for what these limitations are and explain why each of QIA’s provided suggestions would be ineffective. As shown in Table 9-2 (p. 167), cameras positioned at HOL station 6 still incurred a high number of days where the camera field of view was obstructed. Baffinland commented on the high occurrence of view obstruction in Appendix E stating that “...only 2 cameras (Baffin-a, Baffin-5 at HOL 6) were excessively affected by fog and ice crystals suggesting that this issue may be localized.” If the issue is localized, what is Baffinland doing to avoid this issue in the future? What modifications, if any, will be undertaken to ensure cameras at HOL station 6 have less view obstructions in subsequent survey periods?</p> <p>While QIA acknowledges that weather events are beyond Baffinland’s control, Baffinland should at least attempt to implement easy potential solutions or provide rationale and evidence that the proposed solution has not worked in the past in similar contexts. If the measures do not work, then this can be reported on in the following year’s TEAMR. In addition, in Section 9.4.1, it is generally stated that cameras are to be periodically checked (2-4 times annually), but there is not reporting on how frequently each remote camera was checked in Section 9.4.2 or in Table 9-2, making it difficult to assess the level of reasonable effort to minimize non-active days.</p> <p>QIA notes that these issues contribute to the integrity of Baffinland's overall program to monitor the potential effects of the project on caribou, including their avoidance of project components and calving areas. Until this, and other deficiencies related to the caribou monitoring program are addressed, QIA does not consider Baffinland to be in compliance with Term and Condition 53.</p>	<ul style="list-style-type: none">• using silica gel packs to prevent moisture build-up within cases• applying anti-fog products to camera lenses <p>If Baffinland is unable to implement any of the above measures, Baffinland must provide an explicit rationale for why each suggestion provided is not viable, based on an experimental period, or evidence that the proposed solution has not worked in the past in similar contexts.</p> <p>QIA also requests Baffinland report on the number of times (and date) when each remote camera was checked (on a per camera basis), whether servicing was required, and if so, what type (e.g. removal of obstruction, battery replacement, SD card collection, etc.).</p>		<ul style="list-style-type: none">• Viability of applying anti-fog products to camera lenses. <p>2. BIM will highlight any relevant outcomes in future reporting and as part of the TEWG forum.</p>
73	QIA 2023 NIRB TE #23.	<p>In response to the 2021 and 2022 TEAMR, QIA requested that Baffinland deploy remote cameras at all 24 HOL stations (vs. a sample of only 6), or if this was not possible, to select locations based on the best available IQ and western science. Since the purpose of the remote camera monitoring is to capture supplemental data on caribou movement in relation to the Project, locations should be selected based on maximizing the potential for detecting caribou. Baffinland</p>	<p>To respond to study design concerns regarding remote camera monitoring and improve compliance with PC Condition 53, Baffinland is requested to provide the following information:</p> <p>Baffinland to confirm whether or not MHTO was asked to comment on the use</p>	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1 – 2023 Final Terrestrial Environment Annual Monitoring Report</p>	<p>Baffinland would like to remind QIA that their comments/recommendations on the Wildlife Remote Camera program have been discussed at length (cf. Comments on 2022 TEAMR/NIRB report, QIA 2022 NIRB TE# 10). The current/ongoing remote camera program was also discussed at the 13-14 December 2023 TEWG meetings.</p> <p>1. The remote cameras were deployed at stations to address GN and QIA concerns that the duration of HOL surveys insufficiently covered the time that caribou are expected to be in the area. The Remote Camera program was</p>

Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
		<p>responded that it was not feasible to deploy cameras at all 24 HOL stations due to accessibility considerations, mainly with ongoing maintenance requirements in mind.</p> <p>In the 2023 TEAMR (Appendix E), Baffinland reasoned that that HOL stations 1, 3 ,4, 6,10 and 16 were selected “to provide a regular distribution along/at the Project,” claiming that “Methods/experimental design are appropriate for current regional low-density of caribou.” QIA continues to ask whether Baffinland explicitly verified these locations with MHTO prior to deploying cameras. In addition, are these six HOL stations the only ones that can be accessed as required for maintenance (per Baffinland, 2-4 times per year)? QIA notes that HOL stations 1 – 16 are generally accessed on foot (Section 9.3.1). Has Baffinland considered deploying remote cameras at HOL stations subject to access constraints in an effort to capture at least some data (e.g., during seasons when caribou are known to be calving or migrating)? QIA notes that all HOL stations are at least accessible during some portions of the year (i.e., when HOL monitoring typically occurs in June) and that remote cameras could be deployed at this time with the intention of collecting at least some data.</p> <p>QIA notes that these study design questions regarding remote camera locations contribute to QIA’s overarching concerns regarding the effectiveness of Baffinland’s overall program to monitor the potential effects of the project on caribou, including their avoidance of project components and calving areas. Until this, and other deficiencies related to the caribou monitoring program are addressed, QIA does not consider Baffinland to be in compliance with Term and Condition 53</p>	<p>of HOL stations 1, 3, 4, 6, 10, and 16 prior to remote camera program initiation.</p> <p>Baffinland to clarify whether HOL stations 1, 3, 4, 6, 10 and 16 are the only ones that can be accessed 2-4 times a year, as needed for remote camera maintenance.</p> <p>Baffinland is further requested to make additional effort to deploy remote cameras at as many HOL stations as possible, even if this means only collecting data for limited periods of the year (due to maintenance inaccessibility).</p>	<p>Section: Section 4.6.8; Project Certificate Term and Condition No. 53; Section 9.4</p> <p>Page: p. 205-210; 164-170</p>	<p>developed with input from the Terrestrial Environment Working Group (TEWG), inclusive of MHTO Membership. Pond Inlet elders are also instrumental in establishing the height of land program and by extension site selection.</p> <p>2. Sites 1, 3, 4, 6, 10 and 16 were selected to provide a regular distribution along/at the Project; this approach was deemed appropriate for current regional low- density of caribou. Considerations for logistics and safety were also considered.</p> <p>3. Based on monitoring outcomes to date, additional Camera deployment is not warranted. BIM will consider if/when caribou population numbers at the project were to increase.</p> <p>References:</p> <p>Environmental Dynamics Inc. (EDI), 2023. 2022 Final Mary River Project Terrestrial Environment Annual Monitoring Report - Prepared for Baffinland Iron Mines Corporation. April 28, 2023.</p>
74	QIA 2023 NIRB TE #24.	<p>As expressed in the past, QIA remains concerned that snow track surveys are insufficient for several reasons. This is a good example of a broader pattern where Baffinland has been dismissive of, or unwilling to implement, reasonable and relatively minor adjustments proposed by QIA. We reiterate the following concerns (and reasonable, minor</p>	<p>To address concerns regarding snow track survey deficiencies and improve compliance with Term and Condition 53, Baffinland is requested to commit to the following, in relation to snow track surveys for the next monitoring period (i.e., fall 2024):</p>	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1 – 2023 Final Terrestrial Environment Annual Monitoring Report</p>	<p>Snow track surveys are observational surveys intended to characterize wildlife presence/absence at the Project.</p> <ul style="list-style-type: none">It is not clear what the QIA are suggesting for ‘testing survey efficacy’. For example, searcher efficiency assessments typically refer to wildlife mortality surveys and carcass persistence assessments. This is not the intent of the snow track surveys.

Cmt. #	QIA Cmt. #	Reviewer's Detailed Comment	QIA Recommendations	Reference Section	Baffinland's Response
		<p>recommendations), which were not effectively addressed by Baffinland in response to the 2022 TEAMR.</p> <p>First, QIA remains concerned about the study design of snow track surveys. QIA previously requested that Baffinland test the efficacy of these surveys by completing two simultaneously and comparing the results. Baffinland's response to this related to the need to complete surveys around the deposit of fresh snow. However, from QIA's perspective, instructions can be provided to surveyors to ensure they do not disrupt snowfall to the point that tracks are not identifiable. QIA maintains that efficacy testing should be done to assuage concerns related to these results. There is no indication in Section 9.1 that Baffinland completed efficacy testing for snow track surveys.</p> <p>Second, QIA has requested that Baffinland determine species-specific thresholds at which deflections from roads can be considered significant for each species. Again, there is no consideration of significance in Section 9.1.2, which limits the usefulness of these findings.</p> <p>QIA notes that these deficiencies related to snow track surveys contribute to QIA's overarching concerns regarding the effectiveness of Baffinland's overall program to monitor the potential effects of the project on caribou, including their avoidance of project components and calving areas. Until this, and other deficiencies related to the caribou monitoring program are addressed, QIA does not consider Baffinland to be in compliance with Term and Condition 53.</p>	<ul style="list-style-type: none"> test the efficacy of snow track surveys by completing two simultaneously and comparing the results; and conduct research regarding wildlife road crossings and significance thresholds and analyze survey results relative to these to improve the usefulness of this survey. This emphasizes the need for a <p>These commitments were already proposed to Baffinland by QIA in 2022 and none were acknowledged in the 2023 report.</p>	<p>Section: Section 4.6.8; Project Certificate Term and Condition No. 53; Section 9.1</p> <p>Page: p. 205-210; 148-154</p>	<ul style="list-style-type: none"> Baffinland can review literature regarding wildlife crossing. However, as above, snow track surveys are observational surveys; QIA should clarify what is the purpose of 'efficacy testing' and associated thresholds. <p>Note: The QIA comment/recommendation appears to be incomplete or truncated</p>
75	QIA 2023 NIRB TE #25.	<p>QIA remains concerned about the absence of monitoring for potential effects of blasting on wildlife. In the 2023 report on compliance with PC Condition 60, Baffinland states that "no wildlife has been knowingly harmed or disturbed by blasting activities during construction". However, there is no information to substantiate this claim and nothing in the 2023 TEAMR to indicate that Baffinland makes an effort to monitor for potential effects of blasting on wildlife, including to caribou during sensitive timing windows (e.g., calving, post-calving). Baffinland states that personnel are required to scan for and report the presence of wildlife sightings, but no such log has been provided or summarized. This makes QIA concerned that it is possible these effects are occurring and Baffinland is simply unaware of it due to monitoring program constraints.</p>	<ol style="list-style-type: none"> Baffinland is requested to provide data logs to substantiate their claims that project personnel scan for and report wildlife presence (prior to blasting proceeding). Baffinland must also commit to undertaking targeted engagements with MHTO to evaluate concerns about the impacts of explosive use of caribou and identify periods when explosives may not be used. 	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1 – 2023 Final Terrestrial Environment Annual Monitoring Report</p> <p>Section: Section 4.6.8; Project Certificate Term and Condition No. 60</p> <p>Page: p. 235</p>	<ol style="list-style-type: none"> A Quarry Blasting Caribou Mitigation Hierarchy was developed to inform decision-making and procedures to minimize potential adverse effects on caribou related to quarry blasting. This includes a caribou observation form to be used to characterize caribou behavior/responses and applied mitigation measures. Baffinland welcomes engagement with the MHTO on blasting procedures/concerns should they request it. To date blasting has been discussed mostly with respect to dust through the Dust Audit Committee and Baffinland is implementing the recommendations received. Baffinland is also amenable to adding this to a future TEWG agenda and expects it to be a subject explored through the QIA's North Baffin Caribou Study. <p>Reference: EDI (2023). Internal Memo/Guidance.</p>

Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
		QIA has repeatedly requested Baffinland to provide evidence that wildlife are not harmed by blasting and to work with the MHTO and TEWG to evaluate concerns about the impacts of explosives on caribou and identify periods when explosive use is not permitted. Similarly to Baffinland’s responses to many other concerns raised by QIA, there’s no indication that Baffinland has made any targeted effort (e.g., outside of limited TEWG meetings that already have full agendas) to have these discussions in order to ensure compliance with Term and Condition 60.			
76	QIA 2023 NIRB TE #26.	<p>In 2023, QIA requested that Baffinland address item (h) in the annual report. Item (h) states that, among others, the Proponent must annually report the following information:</p> <p>“h. A discussion of any proposed changes to the monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program.”</p> <p>Reporting specific to condition (h) remains absent in the current 2023 NIRB report.</p>	Baffinland to report on proposed changes to terrestrial monitoring survey methodologies, statistical approaches or proposed adaptive management stemming from the results of the monitoring program.	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board</p> <p>Section: 4.6.8, Project Certificate Term and Condition No. 57</p> <p>Page: p. 217-220</p>	<p>This request has been addressed in the 2022 TEAMR (EDI, 2023), which describes methods, assumptions, and adaptive management approaches for multiple TEMMP components. Historical changes to and progression of assessment protocols are also outlined in opening subsections of most Terrestrial Environment monitoring components in the TEAMR. Per the 2023 TEAMR, examples include:</p> <ul style="list-style-type: none">• Section 5.1.1 (Helicopter Overflights) Monitoring History and Changes in Analytical Procedures (pg.19)• Section 7.1 History of Dustfall Monitoring at the Project (pg.42)• Section 7.2 Dustfall Suppression and Mitigation (pg.44)• 8.1.1.1 (Vegetation and Soil Base Metals Monitoring) Monitoring History and Changes in Sampling Procedures (pg. 121) <p>Methodological rationale and assumptions are also described in the TEAMR for each topic/discipline-specific methods section.</p> <p>References:</p> <p>Environmental Dynamics Inc. (EDI), 2024. 2023 Final Mary River Project Terrestrial Environment Annual Monitoring Report - Prepared for Baffinland Iron Mines Corporation.</p>
INUIT KNOWLWDGE, CULTURE, LAND AND RESOURCE USE & INUIT QUAJIMAJATUQANGIT					

138	<p>QIA 2023 NIRB CRLU/IQ #5.</p>	<p>Baffinland has designed and is implementing terrestrial environment monitoring programs. For several years, QIA has requested that Baffinland describe if and how IQ has informed terrestrial environment monitoring design, analysis and interpretation of results, as well as conclusions.</p> <p>In Baffinland’s response to QIA comments respecting the 2021 Annual Monitoring Report, Baffinland identified that <i>“as part of the Phase 2 submission, Baffinland summarized how Inuit Qaujimagatuqangit has been incorporated throughout the project, including monitoring programs”</i> (Baffinland Response to Comments Received for the 2021 Annual Monitoring Report PDF p. 27). This response suggests that IQ has been incorporated into monitoring programs; however, the inclusion of IQ is not evident from the 2022 or 2023 Annual Monitoring Reports. Baffinland provided no response to QIA’s comments regarding the inclusion of IQ in 2023.</p> <p>In the 2023 Terrestrial Environment Annual Monitoring Report, Inuit Qaujimagatuqangit is mentioned only two times–</p> <ol style="list-style-type: none">1. “Work completed for the Terrestrial Environment Monitoring Program is guided by Inuit Qaujimagatuqangit and the Terrestrial Environment Mitigation and Monitoring Plan” (Appendix G.5.1, p. 1 of 201),2. “The HOL survey methods were developed in consultation with the TEWG... and incorporated Inuit Qaujimagatuqangit into strategies for detecting caribou” (Appendix G.5.1, p 160 of 201).	<p>As requested numerous times in the past, Baffinland is requested to include in its Annual Monitoring Report indication of which terrestrial, marine, and freshwater monitoring programs are designed with IQ, and which ones utilize IQ for analysis and interpretation of results. An explanation of how IQ shaped the monitoring program and supported interpretation of the results should be included in an overview section as a component of compliance with this requirement, which appears in numerous PCCs. Baffinland should also indicate how IQ is being used, confirm that it meets Inuit expectations re: Ownership, Control, Access and Possession (OCAP) and from where that IQ was obtained.</p>	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board</p> <p>Section: 4.6.8 Project Certificate Term and Condition No. 49 through 64</p> <p>Page: 190-243</p> <p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.1</p> <p>Section: Table 0; Section 0; Section 9.3</p> <p>Pages: xv – xix; p. 1.; p. 160</p>	<p>Baffinland has provided an adequate response to this request each year it has been issued, explaining in detail how various terrestrial, marine, freshwater, atmospheric and socio-economic programs have been developed in the past with consideration for IQ and community knowledge. This information is readily presented in the VC specific annual reports and in the associated management plans. If a reference is absent in a report and its analysis it is possible IQ or community knowledge was not provided to Baffinland in that year that it was applicable, or the information is not explicitly described as being Inuit Qaujimagatuqangit (IQ) and its simply labeled as community knowledge, Inuit input, Inuit feedback, etc. IQ is not the sole source of relevant information that can come from Inuit as it is generally referred to as what Inuit have always known, and may not capture more contemporary or every day information. Baffinland suggests path forward here may be through QIA’s review of Baffinlands IQ Framework, which has been publically available for review since May 2023. Many of the items raised by QIA that relate to IQ could be answered by that document in its current form, or through edits and additions could be addressed.</p>
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Cmt. #	QIA Cmt. #	Reviewer’s Detailed Comment	QIA Recommendations	Reference Section	Baffinland’s Response
		QIA recognizes that IQ has been used to develop and implement monitoring programs; however, this is repeatedly not reflected in Baffinland’s Annual Monitoring Reports. Most of Baffinland’s discussion is centered on western science integration into terrestrial, freshwater, and marine environment monitoring programs. Given that, as Baffinland states, IQ is a valuable component to the development of these programs, more information on how IQ has been incorporated into them should be included in Annual Monitoring Reports.			
139	QIA 2023 NIRB CRLU/IQ #6.	Terms and Conditions 39 and 40 relate to measures that Baffinland should take to develop progressive revegetation of disturbed areas that are no longer required for project operations (e.g., use of test plots, reseeded, replanting, erosion control considerations). While it is not an explicit requirement of PC Conditions 39 or 40, QIA has previously requested that Baffinland involve Inuit and use IQ to inform reclamation pilot research, including defining reclamation goals, end land uses, reclamation techniques, and criteria/measurements to determine success. However, in Baffinland’s reports on compliance with PC Conditions 39 and 40, there is no indication that they made any effort to involve Inuit or consider IQ in the 2023 revegetation surveying and reclamation pilot work. Appendix G.5.2. provides more detailed reporting on revegetation survey and preliminary reclamation trial activities completed in 2023, but again, does not include any indication that Inuit involvement or IQ was considered. Within the recommendations / lessons learned sections for these reports, there is no indication that Baffinland intends to do so in the future.	QIA requests Baffinland consider IQ and Inuit involvement in progressive and end of life reclamation planning activities. Baffinland is requested to identify whether and how Inuit will be involved in this work in subsequent years.	<p>Document Name: Baffinland Iron Mines 2023 Annual Report to the Nunavut Impact Review Board; Appendix G.5.2 (General)</p> <p>Section: Section 4.6.6 Project Certificate Term and Condition No. 39, 40</p> <p>Page: 164-170</p>	<p>Baffinland agrees that Inuit involvement and IQ are important considerations in closure planning for the Project. Baffinland is currently engaged in preparing a new revision of the Interim Closure and Reclamation Plan (ICRP) for the Project. Specific discussions have been held with QIA on plans for future engagements with Inuit regarding closure, and the next revision of the ICRP will include further details on the engagement strategy that Baffinland will implement to support closure planning.</p> <p>The Reclamation Pilot Study (EDI 2024) was intended to identify early successional patterns and biophysical constraints to reclamation in the Canadian High Arctic. Project-specific definition of end-land use objectives are not addressed in this Study.</p> <p>The Project has already committed to engagement/consultation with stakeholders/rights holders and integration of IQ in life of mine/end-land use planning. The revised/DRAFT Interim Closure and Reclamation Plan (ICRP) describes BIM’s approach to integrating IQ into the Project’s reclamation strategy.</p> <p>References:</p> <p>Environmental Dynamics Inc. (EDI), 2024. Mary River Project Reclamation Pilot Study: Revegetation Survey & Preliminary Reclamation Trial (2023 Project Update). EDI File # 22Y0273.</p>

Table A.2: Response to GN Comments on Baffinland’s 2023 Annual Report to the NIRB

Cmt. #	GN Cmt. #	Reviewer’s Detailed Comment	GN Recommendation	Reference Section	Baffinland’s Response
CARIBOU AERIAL SURVEY					
2	GN AR #02	<p>As described in Section 9.5 Aerial Caribou Survey of Appendix G.5.1 (Baffinland, 2024), the stated objective of the caribou aerial survey was to estimate the abundance and density of North Baffin caribou within the survey study area. However, the GN notes that this result is not reported. Additionally, the GN requests clarity on the Proponent’s modeling process, specifically, the stated assumption of independence of observations made by the primary and secondary observers.</p> <p>The objective of the aerial survey conducted by the Proponent and described in Section 9.4 of Appendix G.5.1 was:</p> <p><i>[to] estimate the abundance and density of North Baffin caribou in the northern (i.e., active Project area) and southern</i></p>	<p>The GN recommends the following regarding the above concerns:</p> <ol style="list-style-type: none">1. The Proponent should revise Appendix G.5.1 to include the results on caribou abundance and density.2. The Proponent should provide justification (or additional clarification) for the assumption of independence of observations made by the primary and secondary observers.	<p>53b, 54b, 58b (Project Certificate No. 005, Amendment No. 004)</p> <p>Baffinland Iron Mines Corporation. Appendix G.23 –Mary River Project 2021 Annual Report, Caribou Monitoring Triggers and Recommendations Report. (March 2022)</p> <p>Baffinland Iron Mines Corporation. Appendix G.5.1 – Mary River Project Terrestrial Environment 2023 Annual Monitoring Report. (March 2024)</p>	<p>1. Regrettably, Section 9.5 Aerial Caribou Survey of Appendix G.5.1 was missing results on abundance and density estimates. The 2023 TEAMR has been revised to include this missing information and reissued to the NIRB public record.</p> <p>Note: A stand-alone version of the Aerial Caribou Survey summary report (with complete results) was circulated to the QIA for preliminary review in June 2023.</p> <p>Reference:</p> <p><i>EDI 2023. Mary River Project: 2023 Late-Winter Aerial Caribou Survey. EDI File # 23C0111, June 2023, Prepared for Baffinland Iron Mines Corp. Pg.28.</i></p> <p>2. Baffinland re-iterates that the methods followed for the aerial survey were the same as those used by the GN – including those for the primary and secondary observers.</p>

Cmt. #	GN Cmt. #	Reviewer’s Detailed Comment	GN Recommendation	Reference Section	Baffinland’s Response
		<p><i>(i.e. planned/future Project area) subregions of the wildlife RSA (EDI Environmental Dynamics Inc. 2022b). (Page 171; Baffinland, 2024)</i></p> <p>However, Appendix G.5.1 appears to lack a subsection discussing the estimated abundance and density of caribou resulting from this aerial survey. The GN notes that the last subsection presented on this topic in Appendix G.5.1 is section 9.5.2.2 Modelling Outcomes. While this omission may be an editorial oversight, the GN emphasizes that providing complete information in annual reports is essential for a thorough review and promotes transparency for all stakeholders. Additionally, the GN wishes to highlight the relevancy of these results with respect to Baffinland’s 2022 Caribou Monitoring Triggers and Recommendations Report which states:</p> <p><i>... a sample of 35 collared caribou per year is most likely required for a study informing potential Project impacts on caribou. The collaring program and analyses require at least 350 caribou, or 35 groups, to be present within the study area(s) (Baffinland, 2022).</i></p> <p>In section 9.5.1.3 of Appendix G.5.1, the Proponent states “An MRDS model was developed with the following assumptions: (1) independence of observation made by the primary and secondary observers and (2) point independence” (Page 176; Baffinland, 2024). The GN requests justification for this approach as the detections made by one observer may influence the detections of the other observer in double-observer studies through various modalities like body language.</p>			<p>To the degree possible, primary and secondary observers made independent observations of caribou. Specific caribou observations were not discussed during surveys. We acknowledge that there is potential for error in this process, as the GN suggests. There are two common options to deal with the double-observer protocol in mark-recapture distance sampling (MRDS): (1) primary and secondary observers search with complete independence, and (2) a trial configuration whereby the secondary observer generates ‘trials’ for the primary observer (Burt et al. 2014). It is likely that survey protocols fell somewhere in between these two options. For future aerial surveys, Baffinland is open to discussing the pros/cons of the ‘independent observer’ versus ‘trial configuration’ protocols to develop MRDS functions and estimate abundance/density of caribou.</p>
PASSIVE DUSTFALL MONITORING					

4	GN AR #4.	<p>Appendix G.5.1 presents results of the Project’s passive dustfall sampling in 2023. Results indicate that annual dustfall exceeded predictions at most monitoring sites. However, these exceedances and their causes are not discussed in the Appendix G.5.1.</p> <p>Table 7-4. Annual dustfall accumulation for sites sampled throughout 2023 of Appendix G.5.1 shows that annual dustfall exceeded dustfall modelling predictions at 24 of 43 (56%) of monitoring sites in 2023 (Pages 72-73; Baffinland, 2024). The frequency of these exceedances suggests significant deficiencies in the dustfall modeling for the Project, resulting in inaccurate predictions.</p> <p>Additionally, discussion of the above exceedances is concerning absent from text presented elsewhere in</p> <p>Appendix G.5.1. For example, Table 0. Summary of environmental effects monitoring and research activities at the Mary River Project in 2023 in Appendix G.5.1. does not cite the exceedances at monitoring sites. Instead, Table 0 concludes that “2023 dustfall results were consistent with predictions that the highest dustfall would be within the PDA” (Page xvi; Baffinland, 2024).</p>	<p>The GN recommends the following regarding the above concerns:</p> <ol style="list-style-type: none">1. That the Proponent provide an explanation as to what deficiencies or invalid assumptions in the Project’s dustfall modelling could have resulted in the exceedances presented in Table 7-2.2. That the Proponent provide an explanation as to how future dustfall modelling FOR THE Project will be modified to account for the current inaccuracy that exists.	<p>36, 50, 54d, 58c, 187, and 188 (Project Certificate No. 005, Amendment No. 004).</p> <ul style="list-style-type: none">• Baffinland Iron Mines Corporation. Appendix G.5.1 – Mary River Project Terrestrial Environment 2023 Annual Monitoring Report. (March 2024)	<p>In general, it is difficult to make comparisons between air dispersion modelling results, especially from 2013, and dustfall monitoring results of an active mine site from 10 years later in 2023. Updated air dispersion model results for dustfall are available in the Mary River Project – Sustaining Operations Proposal Air Quality Assessment (Nunami Stantec Limited 2023). Nunami Stantec Limited 2023 includes comparisons between the air dispersion model predictions for dustfall and measured annual dustfall between 2018 and 2021. Air dispersion models are based on a number of assumptions and are typically expected to agree with actual ambient air quality measurements within a factor of two (US EPA 1992). In addition, the U.S. EPA and other regulatory agencies have conducted extensive testing of the CALPUFF model, including evaluating uncertainties in input values, limitations of model physics, and representation of the random nature of the atmosphere by a model, leading to the accepted use of the CALPUFF in regulatory decisions. For assessments that cannot complete a model performance evaluation, the US EPA (2005) recommends decision makers use modelling as a ‘best estimate’ of effects based on understanding that the assessment follows a sound modelling methodology and used representative inputs for the Project.</p> <p>References</p> <p>United States Environmental Protection Agency (US EPA). 1992. Protocol for Determining the Best Performing Model. United States Environmental Protection Agency (US EPA). Office of Air Quality, Planning and Standards. Research Triangle Park, NC 27711. EPA-454/R-92-025. December 1992.</p> <p>US EPA. 2005. 40 CFR (Code of Federal Regulations) Part 51 Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions; Final Rule. Available at: https://www.epa.gov/sites/default/files/2020-09/documents/appw_17.pdf. Accessed February 2024.</p>
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Cmt. #	GN Cmt. #	Reviewer’s Detailed Comment	GN Recommendation	Reference Section	Baffinland’s Response
DUSTFALL IMAGERY ANALYSIS					
5	GN AR #5.	<p>As detailed in section 7.4 Dustfall Imagery Analysis of Appendix G.5.1, the Project’s dust fall monitoring program includes conducting studies which examine dust fall extent in the vicinity of the Project through satellite imagery. The use of imagery is being developed by calibrating the satellite-derived Snow Darkening Index (SDI) against two methods of direct ‘on-the-ground’ dust fall measurement; (a) dust fall (g/m2) from passive collection canisters, and (b) Total Suspended Solids (TSS) (mg/L) from snow samples. In reviewing the Project’s annual report regarding dust fall monitoring, the GN notes the following:</p> <p><u>Interannual Trends</u></p> <p>Figure 7-23 presents satellite-derived dustfall extents from 2004; 2013-2023 which illustrates a spike in 2019 (Baffinland, 2024, figure 7-23). However, Appendix G.5.1 does not discuss or investigate potential factors that may have contributed to this peak in 2019. Information that contributed to this spike in 2019 could inform future dust monitoring and mitigation and should be presented.</p>	<p>The GN recommends the following regarding the above concerns:</p> <ol style="list-style-type: none">That the Proponent provide discussion, further investigation, and supporting evidence regarding factors which may have contributed to the sharp peak in dustfall extent detected in 2019 by satellite imagery.That the Proponent continue the snow sampling pilot study in 2024. In 2024, more samples should be collected during a broader sampling period. Additionally, the GN recommends that snow sampling should target days with minimal cloud cover.	<p>36, 50, 54d, 58c, 187, and 188 (Project Certificate No. 005, Amendment No. 004).</p> <p>Baffinland Iron Mines Corporation. Appendix G.5.1 – Mary River Project Terrestrial Environment 2023 Annual Monitoring Report (March 2024).</p> <p>Government of Nunavut. Government of Nunavut Comments on the Mary River Project 2022 Annual Report (July 2022).</p>	<ol style="list-style-type: none">Several 2019 satellite images had extensive dust in classes <4.5 g/m² (as extracted by the Snow Darkening Index and converted to g/m²). A visual review of these images showed less snow cover than (a) images in the same year with less extensive dust and (b) images in 2020 on or within a day of the same date. Less snow cover could result in more exposed ground, a possible source of dust, and potential misclassification of ground as dust. There were no peaks in total annual ore hauled or Tote Road traffic in 2019 compared to 2018 and 2020. Further investigation and discussion will be provided in the 2024 TEAMR.The snow sampling pilot study was continued in the Spring of 2024. Samples were collected between May 18 and 22. Image footprints and corresponding image acquisition dates up to the end of May were provided to the sampling field crew to better align sampling and imagery. Samples were collected on days with minimal cloud cover. Baffinland will take the GN’s recommendation into consideration for the 2025 sampling program.

Cmt. #	GN Cmt. #	Reviewer’s Detailed Comment	GN Recommendation	Reference Section	Baffinland’s Response
		<p><u>Snow Sampling Pilot Study</u></p> <p>An update on the pilot study exploring at the relationship between the satellite image-derived SDI and measurements of TSS in snow samples is provided in 7.4.4 Snow Samling Pilot Study of Appendix G.5.1 (Baffinland, 2024). A significant relationship between these two metrics was not detected, despite pooling data from 2022 and 2023 (Page 117; Baffinland, 2024). The GN notes, that the sample size used in this study to date has been limited by the total number of snow samples collected, the availability of satellite images corresponding to the dates of snow sampling and cloud cover on sampling days (Page 117; Baffinland, 2024). Additionally, the GN notes that, as demonstrated in Figure 7-25, sampling in the higher portion of the range of TSS measured to date (i.e., > 200 mg/L) has been limited to only two data points (Page 117; Baffinland, 2024).</p> <p>Furthermore, Section 7.4.4 of the report states that:</p> <p>Continuation of the pilot study is being evaluated in relation to the need for and viability of improvements to experimental design, including increased data/image capture and improved geolocation of snow sampling in relation to available satellite imagery. (Page 117; Baffinland, 2024)</p> <p>The GN maintains its position, as noted in comments on Baffinland’s 2022 Annual Report (GN-AR-03; GN, 2023), that this pilot should continue, and that increasing sample size is a viable means to improve the study design. Additional sampling is needed to increase sample size and provide more data points in the higher part of TSS range. The GN believes this could be achieved by increasing the overall number of snow samples collected, broadening the sampling window to spread sampling over a range of dates greater than in 2022 (May 1 to 9) and 2023 (May 6 to May 15), as well as focusing sampling on days with minimal cloud cover.</p>			
HELICOPTER TRAFFIC					
6	GN AR #6.	Section 5 Helicopter Overflights of Appendix G.5.1 summarizes helicopter traffic supporting Project operations	The GN recommends the following regarding the above concerns:	59, 71 and 72 (Project Certificate No. 005, Amendment No. 004)	1. The meaning of the terms “unreasonable” and “impractical” are at the discretion of the pilot as described in Table5-6. List of rationale was discussed January 5, 2023 with the GN and presented and discussed at the February 14,

Cmt. #	GN Cmt. #	Reviewer’s Detailed Comment	GN Recommendation	Reference Section	Baffinland’s Response
		<p>in 2023. After reviewing this section, the GN has three key comments regarding this material. These concerns include:</p> <p>1) the number of low-level flights;</p> <p>2) the definition used to justify short distance flights; and,</p> <p>3) the need for a review of helicopter flight corridors to incorporate areas that may be of significance for caribou.</p> <p>1) Low-level Flights</p> <p>In 2023, between May and September, 1,799 helicopter flights (totalling 1,041 hours of flying) were made to support Project-related activities (Tables 5-2 and 5-3; Baffinland 2024). Table 5-5 illustrates that of these flights, 72.53% were below the minimum altitudes set by Project terms and conditions for reducing disturbance of migratory birds and other wildlife (e.g., Term and Conditions 71) and established in the TEMMP (Baffinland, 2016) and draft TEMMP (Baffinland, 2023) to avoid disturbance of other wildlife. However, ~68% of these low-level flights had a rationale for flying below minimum altitude thresholds. Consequently, the Proponent deemed these flights to be compliant with Project terms and conditions. Nevertheless, low-level helicopter flights are a potential source of disturbance to wildlife such as caribou (e.g., Wilson and Wilmhurst, 2019; Wolfe et al., 2000).</p> <p>With respect to helicopter traffic reported in 2023, the GN notes several comments as follows.</p> <p>2) Short Distance Flights</p> <p>In Appendix G.5.1, the Proponent provides a summary of the various rationales provided by pilots to justify flying below the minimum altitude thresholds. As per Table 5-7, the second most common justification provided was the short distance of a flight; this justification accounted for ~19% of total flight hours in 2023 (Page 33; Baffinland, 2024). In Table 5-6, the Proponent provides pilot rationales for low-level</p>	<p>1. The Proponent should provide additional details on what is meant by “unreasonable” and “impractical” in the justifications for low-level flights in Table 5-6 of the Appendix G.5.1.</p> <p>2. In this, and future annual reports, the Proponent should ensure that the category for short distance flights is subdivided to distinguish between flights where low-level flying is: (a) Itself a specific regulatory requirement of the activity being undertaken; (b) Necessary for safety; (c) Necessary to collect the samples, themselves, during a monitoring activity; (d) Being justified solely on the preference to save time, fuel or other factors.</p> <p>3. In this and future annual reports, the Proponent should provide data summarizing the distance of low-level flights that are classified as short distance according to the subdivisions specified in the above recommendation. Pursuant to this recommendation, the Proponent should provide the mean, maximum and minimum distances of low-level flights.</p> <p>4. In collaboration with the TEWG, the Proponent should undertake an evaluation of the Project’s helicopter flight corridors in relation to the distribution and movements of caribou. Using Inuit Qaujimatugangit and Inuit Qaujimaningit and recent scientific data (collected via aerial surveys and satellite collaring) the TEWG should determine whether</p>	<p>Baffinland Iron Mines Corporation. Appendix G.5.1 – Mary River Project Terrestrial Environment 2023 Annual Monitoring Report (March 2024).</p> <p>Baffinland Iron Mines Corporation. Terrestrial Environment Mitigation and Monitoring Plan, BAFPH-830-P16-0027 (March 2016).</p> <p>Baffinland Iron Mines Corporation. Draft Terrestrial Environment Mitigation and Monitoring Plan, BAFPH-830-P16-0027 (March 2023).</p> <p>Wolfe, S.A., Griffith, B. & Wolfe, C.A.G. (2000). Response of reindeer and caribou to human activities. Polar Research,19, 63–13. https://doi.org/10.1111/j.1751-8369.2000.tb00329.x</p> <p>Wilson, S. F., & Wilmshurst, J. F. (2019). Behavioural responses of southern mountain caribou to helicopter and skiing activities. Rangifer, 39(1), 27–42. https://doi.org/10.7557/2.39.1.4586</p>	<p>2023 TEWG meeting (Meeting ID T-16022023). Item (Action ID T-28042022-2) was designated as complete at the December 13-14, 2023 meeting (Meeting ID T-13122023).</p> <p>2. At the request of the GN, the pilot rationale table was reviewed in 2023, and the action item completed as detailed in 1. This request for further detail is unreasonable and unlikely to lead to improvements to overflight mitigation.</p> <p>3. The pilot rationale table was reviewed in 2023, and the action item completed as detailed in 1.</p> <p>4. Baffinland will consider this request.</p>

Cmt. #	GN Cmt. #	Reviewer’s Detailed Comment	GN Recommendation	Reference Section	Baffinland’s Response
		<p>flights. In this table, the description for short distance flights is as follows:</p> <p><i>At the discretion of the pilot who is operating the aircraft during the flight, by considering the distance travelled during a flight as well as other contributing factors, it is determined that gaining an altitude of 650 magl is unreasonable, unsafe, or impractical. These types of trips are generally associated with specific monitoring programs that are MANDATORY and there are no other practical ways of completing them (e.g., water sampling locations not accessible by foot or boat, dustfall sampling, wildlife observations, noise sampling, prospecting) (Page 32; Baffinland, 2024).</i></p> <p>The GN notes that the description of this category of low-level flights appears to combine activities where low-level flying is either a safety or regulatory requirement with those where it is preferred by the Proponent for time and cost savings. Consequently, this category should be subdivided into flights where low-level flying is specifically required for safety, regulatory purposes, or to complete an aerial-based monitoring activity, versus those where it is done solely for efficiency.</p> <p>For instance, it is the GN’s understanding that activities listed in Table 5-6, such as dustfall sampling, water sampling, and noise sampling, do not typically require low-level flying, as the sampling itself is not conducted while airborne. In contrast, some aerial-based wildlife monitoring (e.g., aerial surveys) specifically requires low-level flying to maintain detection probabilities. Distinguishing between low-level flights that are necessary, versus those that are preferred by the Proponent, is essential for reviewers and the NIRB to fully understand the trade-offs being made by the Proponent in terms of operational efficiency versus wildlife disturbance.</p> <p><u>Flight Corridors</u></p> <p>Term and condition 59 of the Project Certificate states that:</p> <p><i>The Proponent shall ensure that aircraft maintain, whenever possible (except for specified operational purposes such as drill moves, take offs and landings), and subject to pilot</i></p>	<p>areas of significant wildlife importance can be delineated and avoided.</p>		

Cmt. #	GN Cmt. #	Reviewer’s Detailed Comment	GN Recommendation	Reference Section	Baffinland’s Response
		<p><i>discretion regarding aircraft and human safety, a cruising altitude of at least 610 metres during point-to-point travel when in areas likely to have migratory birds, and 1,000 metres vertical and 1,500 metres horizontal distance from observed concentrations of migratory birds (or as otherwise prescribed by the Terrestrial Environment Working Group) and use flight corridors to avoid areas of significant wildlife importance...</i></p> <p>With respect to the flight corridors for avoiding areas of significant wildlife importance, section 5.2.1 of the report states that:</p> <p><i>Only the key moulting area for Snow Geese was identified for helicopter avoidance in 2023. No locations or boundaries of areas prescribed explicitly by the TEWG or areas of observed concentrations of other migratory birds were identified in 2023 (Baffinland, 2024).</i></p> <p>The Project has accumulated 9 years of helicopter flight corridor data. Given the ongoing concerns about the status of North Baffin caribou combined with the availability of current data on caribou distribution and movements provided by the Proponent’s recent aerial survey (e.g., 9.5 Aerial Survey; Baffinland, 2024) and the GN’s collaring program, flight corridors currently used by the project should be evaluated to ensure they are avoiding areas of highest caribou use. This evaluation should be undertaken by the Proponent in collaboration with the Terrestrial Environment Working Group (TEWG).</p>			

Table A.3: Response to ECCC Comments on Baffinland’s 2022 Annual Report to the NIRB

Cmt. #	ECCC Cmt. #	Reviewer’s Detailed Comment	ECCC Recommendations	Reference Section	Baffinland’s Response
NON-COMPLIANT FLIGHTS OVER SNOW GEESE MOULTING AREA					
1	ECCC #2.	<p>The Proponent reported a 72% compliance rate with flight heights in snow goose areas during the moulting season (July-August). While ECCC understands that compliance is not always possible subject to pilot discretion, to verify the reported rates of compliance, reviewers need to know the acceptable and approved operational purposes which constitutes rationale for categorizing an otherwise non-compliant flight as complaint. A list of these rationale is provided in Table 4.18 of the 2023 Annual Report Main Document.</p> <p>Further, rationale for flights within a horizontal distance of <1500m from Snow Goose Moulting Area have not been included in Table 4.18. Rationale is provided in the 2023 Terrestrial Environment Annual Monitoring Report (TEAMR) (Footnote 8, pg. 23):</p> <p><i>“...this 1,500 m horizontal buffer is not always practical as it results in longer flight times and prolongs potential disturbance. Alternatively, pilots occasionally fly over the eastern edge of the Snow Geese area to reduce flight time and minimize potential disturbance.”</i></p> <p>It is not clear whether the rationale to reduce flight time by flying over the Snow Goose Moulting Area has been approved by the Terrestrial Environment Working Group (TEWG) and the NIRB, and where this approval has been recorded. It is not clear whether flights over the Snow Goose Moulting Area were classified as compliant with rationale, non-compliant, or compliant.</p>	<ol style="list-style-type: none">ECCC recommends that the Proponent clarify how flights over the Snow Goose Moulting Area were classified, and how this is represented in reported rates of compliance.ECCC recommends that the Proponent confirm whether the list of rationale for low level flights in Table 4.18, and the rationale for close vertical flights in the TEAMR, have been accepted by the TEWG and the NIRB.ECCC recommends that the Proponent record all flight non-compliance rationale in the next version of the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP), which is currently under revision, and share that plan with reviewers.	<ul style="list-style-type: none">2023 Annual Report to the NIRB Main Document (Baffinland; May 3, 2024)<ul style="list-style-type: none">Table 4.18: Descriptions of Pilot Rationales Given for Low-Level FlightsNIRB Appendix G.5.1: 2023 Terrestrial Environment Annual Monitoring Report (Environmental Dynamics Inc.; March 2024)	<ol style="list-style-type: none">Flights over the Snow Goose area include the 1,500 m horizontal buffer in July and August (moulting season) when the Snow Goose area applies (2023 TEAMR, section 5.1.2 pg 20-21 and 2023 NIRB Section 4 pg 230). These flights are broken down into compliant, compliant with rational and non-compliant as described in Table 5-1 (2023 TEAMR pg 22) and Table 4.19 (2023 NIRB pg 230). The compliance results for the Snow Goose area are presented in Section 5.2 of the 2023 TEAMR and in tables 5-3, and 5-12 under the ≥1,100 magl Cruising Altitude Requirement heading and a breakdown of the compliant with rationale flights in table 5-7 (also under ≥1,100 magl heading), A subset is presented in Section 4 of the 2023 NIRB and Table 4.20 (rationale breakdown under the ≥1,100 magl heading) and Figure 4.12.The list of rationale was discussed Jan 5, 2023 with the GN and presented and discussed at the February 14, 2023 TEWG meeting (Meeting ID T-16022023). Item (Action ID T-28042022-2) was designated as complete at the December 13-14, 2023 meeting (Meeting ID T-13122023).The table of non-compliance rationale will be considered for inclusion in the next version of the TEMMP.
EIDER SPECIES AND MORTALITIES					
2	ECCC #3.	<p>The 2023 TEAMR states that 13 King Eider mortalities were documented in 2023, all individual mortalities.</p> <p>Canadian Wildlife Service (CWS)-ECCC received an email notification from Todd Swenson of Baffinland on November 2, 2023 (with a follow up on January 25, 2024), which reported 13 Common Eider mortalities occurred during a</p>	<ol style="list-style-type: none">ECCC recommends that the Proponent add the mortalities of the 13 Common Eiders.ECCC recommends that the Proponent summarize, in future annual reports, any corrective	<ul style="list-style-type: none">NIRB Appendix G.5.1: 2023 Terrestrial Environment Annual Monitoring Report (Environmental Dynamics Inc.; March 2024)Re: Mary River Project - Bird Mortality Notification. (Email from	<ol style="list-style-type: none">In fact, the 13 King (not Common) Eider mortalities were documented in section 11.1 (Wildlife Interactions and Mortalities) of the 2023 TEAMR. Regrettably, ‘common eider’ was incorrectly listed in the notification to ECCC (Nov 2023).A description of corrective measures following wildlife mortalities can be included in future monitoring.

		<p>single incidence with the same cause of death for all individuals (ship loading infrastructure collision following winterization and reduced lighting). This mortality event has not been captured in the 2023 TEAMR.</p> <p>More information about corrective measures taken following multiple mortalities can help to inform the effectiveness of corrective measures.</p>	<p>measures taken following wildlife mortalities, and whether any further mitigations are being proposed, considered, or implemented to reduce further mortality events.</p>	<p>Todd Swenson <todd.swenson@baffinland.com> to CWS North (ECCC) <cwsnorth-scfnord@ec.gc.ca>; January 25, 2024)</p>	
PROGRAM FOR REGIONAL AND INTERNATIONAL SHOREBIRD MONITORING					
4	ECCC #5	<p>THE Proponent’s TEMP identified songbirds and shorebirds as a Key Indicator (KI) for follow-up monitoring. Section 2.2 Birds states (pg. 42 of 128): <i>“Baffinland will assist in regional-level monitoring by the Canadian Wildlife Service (CWS) looking at regional diversities of songbirds and shorebirds.”</i></p> <p>Section 4.4 Birds Monitoring further states (pg. 65 of 128) that Baffinland has <i>“... committed to assisting the CWS in regional baseline research and monitoring of these species. The monitoring program involves 20 PRISM plots conducted within the RSA every five years (Table 4-7).”</i> This is part of Term and Condition #73 and #74.</p> <p>The 2023 Annual Report states that the previous Program for Regional and International Shorebird Monitoring (PRISM) survey was held more than 5 years ago, in 2018, and it consisted of 14 plots. While Covid-19 restrictions have been a challenge for maintaining monitoring programs, the collection of baseline data is still valuable and should be reinitiated.</p>	<p>ECCC recommends that the Proponent re-initiate PRISM surveys to monitor shorebirds and provide an update on when the next PRISM surveys are planned.</p>	<ul style="list-style-type: none">○ Terrestrial Environment Mitigation and Monitoring Plan (Baffinland; 2016)	<p>Baffinland can discuss PRISM plot surveys with ECCC-CWS at their convenience. The intent was to support ECCC’s ongoing PRISM monitoring programme.</p>

DUST MANAGEMENT AND MONITORING

1	<p>CIRNAC #1</p> <p>In the last three Mary River Annual Reports (2020 to 2022), CIRNAC recommended that Baffinland consider including the following measures to increase the quality of monitoring activities:</p> <p>a) Testing the chemical composition of soil base sites for bioavailable metal loadings from the dust, resulting from contact with surface water/soil moisture (for example, acidity, leachable metals, sulphate, nitrate).</p> <p>CIRNAC acknowledges that Baffinland will include leachability studies as a response option if soil metal concentrations are higher than baseline or Canadian Council of Ministers of the Environment (CCME) guideline values over two consecutive years. This measure would address ongoing concerns regarding the generation of dust by Project components and the potential effects of dustfall on aquatic receiving environments, which are reiterated in the Dust Audit Committee Report (2023).</p> <p>CIRNAC recognizes that seasonal dustfall rates are provided in the 2023 TEAMR; however, dust analytical data is absent in the reporting. The vegetation and soil base metals sampling program was not carried out in the 2023 season. The data would support the assessment of the impacts of dust on surface water and sediment quality.</p> <p>CIRNAC reiterates its 2022 Annual Review comment that, while bulk chemistry (including metals) soil sampling is a good measure of the spatial extent of dustfall related to the Project Development Area (PDA), it is not an indicator of contaminant mobility within aquatic receiving environments. Baffinland should determine if dustfall rates correlate with direct or indirect contaminant loading into aquatic environments based on geochemical testing of dust-impacted soil and sediment.</p> <p>To characterize contaminant mobility and potential impacts on aquatic environments, CIRNAC suggests pairing bulk metal soil sampling with leachability sampling to better understand the soluble constituents in the dustfall. Characterizing the leachability would help Baffinland understand the indirect transport pathways of dissolved soluble constituents to aquatic receptors, as dissolved soluble constituents are</p>	<p>CIRNAC recommends that Baffinland consider improvements to the quality of monitoring activities, which could include the following measures:</p> <p>a) Develop a dustfall impact CSM to summarize and evaluate the sources and extent of contamination and transportation pathways while considering meteorological variables, and where impacts to receptors may be occurring within the PDA.</p> <p>b) Indicate how dustfall rates correlate with direct or indirect contaminant loading into aquatic environments based on geochemical testing of dust- impacted soil and sediment.</p> <p>Implement leachability studies in the Terrestrial Environment Mitigation and Monitoring Plans adaptive management action toolkit if soil metal concentrations are higher than baseline or CCME guideline values over two (2) consecutive years.</p>	<ul style="list-style-type: none"> Project Certificate No. 005 (Amendment 05) (November 17, 2023) Terms and Conditions #10, 21 Baffinland Iron Mines Corporation (Baffinland) 2023 Annual Report to the Nunavut Impact Review Board (NIRB) (May 03, 2024): <ul style="list-style-type: none"> Section 4.6.2 Air Quality Section 4.6.5 Groundwater & Surface Water Section 4.6.6 Vegetation Baffinland. 2024. The NIRB's 2022-2023 Annual Monitoring Report for the Mary River Project – Updates to Parties Comments on the 2022-2023 Annual Report (NIRB File No. 08MN053) EDI Environmental Dynamics Inc. (EDI) 2024. Mary River Project Terrestrial Environment 2023 Annual Monitoring Report (TEAMR) (March 2024) Nunami Stantec Limited (Nunami). 2023 Annual Air Quality, Dustfall and Meteorology Report. (April 30, 2024) Nunami Stantec Limited and Independent Dust Audit Committee Members (Dust Audit Committee). 2023. Baffinland Dust Audit Final Recommendations Report. (February 8, 2023) 	<p>a. Dustfall impacts and mitigations are already being overseen by the Dustfall Audit Committee. Further, dust deposition at the Project is already evaluated via dust isopleth modelling (revised/updated in 2023). Potential effects to the Terrestrial Environment are evaluated and interpreted in relation to trends from passive dustfall monitoring. It is not clear how a supplementary Conceptual Site Model (CSM) would further inform dust modelling at the Project beyond existing studies and monitoring programs.</p> <p>b. Evaluation of increasing trends in parameter concentrations in water and sediment into aquatic environments are considered, which would reflect potential effects from dustfall</p> <p>c. This CIRNAC Comment/Recommendation reiterates CIRNAC Comment #9 on the 2022 TEAMR, bullets (c) and (d).</p> <p>Baffinland already monitors and investigates potential trends in increased dustfall generation with soil contamination in the various mine site areas. A long-term vegetation and soil base metals monitoring program was initiated in 2012, as described in the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP) (Baffinland, 2016). The objectives of the vegetation and soil base metals monitoring program are to monitor metal concentrations in vegetation and soil, particularly caribou forage (i.e., lichen), and verify that metal concentrations are within the acceptable range for established soil quality guidelines and relevant vegetation indicator values.</p> <p>The most recent soil-metal concentration data, collected in 2022 at the Project, predominantly indicated no significant change, or concentrations were significantly lower relative to baseline values. Concentrations were below or within an acceptable range for soil-metal concentrations. Further, it was noted that there was a significant negative relationship between metal concentrations in dustfall and metal concentrations in soil for all CoPCs except cadmium; for all CoPCs, this appeared to be mediated by a significant positive relationship with soil pH. No unifying trend has been drawn from the analysis (EDI, 2023).</p> <p>Undertaking leachability and geochemical testing is not presently warranted given that soil sampling data collected in 2022 predominantly indicated concentrations were below or within an acceptable range for soil-metal concentrations. The TEMMP/Trigger-Action Response Plan would guide future adaptive management response "If monitoring indicates increasing concentrations of metals over time".</p> <p>References:</p> <p>Baffinland Iron Mines Corporation (Baffinland), 2023. Terrestrial Environment Mitigation and Monitoring Plan. Ref. No. BAF-PH1-830-P16-0027, DRAFT. May 15, 2023.</p>
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		<p>generally more bioavailable to aquatic receptors.</p> <p>To visualize and evaluate the sources and extent of metal contamination within the PDA, Baffinland should consider developing a dustfall impact Conceptual Site Model (CSM). The CSM should be a living document that is used to continually evaluate the sources of contamination, and direct and indirect dustfall transport pathways and identify where impacts to aquatic receptors may be occurring throughout the PDA. This CSM could be included in Appendix G.5.3: Program for Identifying Conditions with High Risk for Dust Dispersion.</p>			<p>EDI Environmental Dynamics Inc. (EDI). 2023. Mary River Project: 2022 Terrestrial Environment Annual Monitoring Report. Prepared for Baffinland Iron Mines Corporation, Oakville, Ontario, Canada. 426 pp.</p>
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Table A.4: Response to CIRNAC Comments on Baffinland’s 2023 Annual Report to the NIRB

	CIRNAC Cmt. #	Reviewer’s Detailed Comment	CIRNAC Recommendation	Reference Section	Baffinland’s Response

Cmt. #					
DUST MANAGEMENT AND MONITORING					

1	CIRNAC #1	<p>In the last three Mary River Annual Reports (2020 to 2022), CIRNAC recommended that Baffinland consider including the following measures to increase the quality of monitoring activities:</p> <p>a) Testing the chemical composition of soil base sites for bioavailable metal loadings from the dust, resulting from contact with surface water/soil moisture (for example, acidity, leachable metals, sulphate, nitrate).</p> <p>CIRNAC acknowledges that Baffinland will include leachability studies as a response option if soil metal concentrations are higher than baseline or Canadian Council of Ministers of the Environment (CCME) guideline values over two consecutive years. This measure would address ongoing concerns regarding the generation of dust by Project components and the potential effects of dustfall on aquatic receiving environments, which are reiterated in the Dust Audit Committee Report (2023).</p> <p>CIRNAC recognizes that seasonal dustfall rates are provided in the 2023 TEAMR; however, dust analytical data is absent in the reporting. The vegetation and soil base metals sampling program was not carried out in the 2023 season. The data would support the assessment of the impacts of dust on surface water and sediment quality.</p> <p>CIRNAC reiterates its 2022 Annual Review comment that, while bulk chemistry (including metals) soil sampling is a good measure of the spatial extent of dustfall related to the Project Development Area (PDA), it is not an indicator of contaminant mobility within aquatic receiving environments. Baffinland should determine if dustfall rates correlate with direct or indirect contaminant loading into aquatic environments based on geochemical testing of dust-impacted soil and sediment.</p>	<p>CIRNAC recommends that Baffinland consider improvements to the quality of monitoring activities, which could include the following measures:</p> <p>c) Develop a dustfall impact CSM to summarize and evaluate the sources and extent of contamination and transportation pathways while considering meteorological variables, and where impacts to receptors may be occurring within the PDA.</p> <p>d) Indicate how dustfall rates correlate with direct or indirect contaminant loading into aquatic environments based on geochemical testing of dust-impacted soil and sediment.</p> <p>e) Implement leachability studies in the Terrestrial Environment Mitigation and Monitoring Plans adaptive management action toolkit if soil metal concentrations are higher than baseline or CCME guideline values over two (2) consecutive years.</p>	<ul style="list-style-type: none"> Project Certificate No. 005 (Amendment 05) (November 17, 2023) Terms and Conditions #10, 21 Baffinland Iron Mines Corporation (Baffinland) 2023 Annual Report to the Nunavut Impact Review Board (NIRB) (May 03, 2024): <ul style="list-style-type: none"> Section 4.6.2 Air Quality Section 4.6.5 Groundwater & Surface Water Section 4.6.6 Vegetation Baffinland. 2024. The NIRB's 2022-2023 Annual Monitoring Report for the Mary River Project – Updates to Parties Comments on the 2022-2023 Annual Report (NIRB File No. 08MN053) EDI Environmental Dynamics Inc. (EDI). 2024. Mary River Project Terrestrial Environment 2023 Annual Monitoring Report (TEAMR) (March 2024) Nunami Stantec Limited (Nunami). 2023 Annual Air Quality, Dustfall and Meteorology Report. (April 30, 2024) Nunami Stantec Limited and Independent Dust Audit Committee Members (Dust Audit Committee). 2023. Baffinland Dust Audit Final Recommendations Report. (February 8, 2023) 	<p>d. Dustfall impacts and mitigations are already being overseen by the Dustfall Audit Committee. Further, dust deposition at the Project is already evaluated via dust isopleth modelling (revised/updated in 2023). Potential effects to the Terrestrial Environment are evaluated and interpreted in relation to trends from passive dustfall monitoring. It is not clear how a supplementary Conceptual Site Model (CSM) would further inform dust modelling at the Project beyond existing studies and monitoring programs.</p> <p>e. Evaluation of increasing trends in parameter concentrations in water and sediment into aquatic environments are considered, which would reflect potential effects from dustfall</p> <p>f. This CIRNAC Comment/Recommendation reiterates CIRNAC Comment #9 on the 2022 TEAMR, bullets (c) and (d).</p> <p>Baffinland already monitors and investigates potential trends in increased dustfall generation with soil contamination in the various mine site areas. A long-term vegetation and soil base metals monitoring program was initiated in 2012, as described in the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP) (Baffinland, 2016). The objectives of the vegetation and soil base metals monitoring program are to monitor metal concentrations in vegetation and soil, particularly caribou forage (i.e., lichen), and verify that metal concentrations are within the acceptable range for established soil quality guidelines and relevant vegetation indicator values.</p> <p>The most recent soil-metal concentration data, collected in 2022 at the Project, predominantly indicated no significant change, or concentrations were significantly lower relative to baseline values. Concentrations were below or within an acceptable range for soil-metal concentrations. Further, it was noted that there was a significant negative relationship between metal concentrations in dustfall and metal concentrations in soil for all CoPCs except cadmium; for all CoPCs, this appeared to be mediated by a significant positive relationship with soil pH. No unifying trend has been drawn from the analysis (EDI, 2023).</p> <p>Undertaking leachability and geochemical testing is not presently warranted given that soil sampling data collected in 2022 predominantly indicated concentrations were below or within an acceptable range for soil-metal concentrations. The TEMMP/Trigger-Action Response Plan would guide</p>
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Cmt. #	CIRNAC Cmt. #	Reviewer’s Detailed Comment	CIRNAC Recommendation	Reference Section	Baffinland’s Response
		<p><u>To characterize contaminant mobility and potential impacts on aquatic environments, CIRNAC suggests pairing bulk metal soil sampling with leachability sampling to better understand the soluble constituents in the dustfall. Characterizing the leachability would help Baffinland understand the indirect transport pathways of dissolved soluble constituents to aquatic receptors, as dissolved soluble constituents are generally more bioavailable to aquatic receptors.</u></p> <p><u>To visualize and evaluate the sources and extent of metal contamination within the PDA, Baffinland should consider developing a dustfall impact Conceptual Site Model (CSM). The CSM should be a living document that is used to continually evaluate the sources of contamination, and direct and indirect dustfall transport pathways and identify where impacts to aquatic receptors may be occurring throughout the PDA. This CSM could be included in Appendix G.5.3: Program for Identifying Conditions with High Risk for Dust Dispersion.</u></p>			<p><u>future adaptive management response “If monitoring indicates increasing concentrations of metals over time”.</u></p> <p>References:</p> <p><u>Baffinland Iron Mines Corporation (Baffinland), 2023. Terrestrial Environment Mitigation and Monitoring Plan. Ref. No. BAF-PH1-830-P16-0027, DRAFT. May 15, 2023.</u></p> <p><u>EDI Environmental Dynamics Inc. (EDI). 2023. Mary River Project: 2022 Terrestrial Environment Annual Monitoring Report. Prepared for Baffinland Iron Mines Corporation, Oakville, Ontario, Canada. 426 pp.</u></p>



APPENDIX B TEWG WRITTEN REQUESTS AND BAFFINLAND RESPONSES

August 16, 2024

EDI Project No: 24C0140

Baffinland Iron Mine Corporation (Baffinland)
2275 Upper Middle Road East, Suite 300
Oakville, ON, L6H 0C3

Attention: Cortney Oliver, Jesse Manufor

RE: MARY RIVER PROJECT | Revisiting the Definition of ‘Deflection’

During the review of the Sustained Operations Proposal and as identified in the Nunavut Impact Review Board’s reconsideration report (Nunavut Impact Review Board 2023), the Qikiqtani Inuit Association (QIA) requested that Baffinland work with the Terrestrial Environment Working Group (TEWG) to redefine caribou deflections. This commitment is stated in Technical Comment QIA TE-2(1). Further discussion in the body of the report was not given to place the request in context. Presently, the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP) defines ‘deflection’ as “...(any) caribou that fail to cross the North Railway or Tote Road after approaching it” (Baffinland Iron Mines Corporation 2023).

Commitment/ Intervenor		Sustained Operations Proposal Technical Comment(s)	Commitment
3	QIA	QIA TE-2 (1)	Baffinland commits to work with the TEWG to redefine deflections to include repeated caribou balking in the Project area by November 30, 2024, to ensure that a new definition of deflections is included in an updated Terrestrial Environment Mitigation and Monitoring Plan filed with the 2024 Annual Report to NIRB.

From Appendix D, List of Commitments in Respect of the Sustained Operations Proposal, Nunavut Impact Review Board. 2023. Reconsideration Report and Recommendations for Baffinland’s Sustaining Operations Proposal. [NIRB Public Registry No. 347145](#). Cambridge Bay, Nunavut, Canada. 164 pp.

During the 31st Terrestrial Environment Working Group (TEWG) meeting on May 22, 2024, Baffinland requested that the QIA lead the discussion on their request. However, further discussion on this topic did not occur. Instead, the QIA requested that Baffinland review the definitions used in different projects and provide a summary report of those definitions to the TEWG. This memo summarizes the proposed definitions.

Please do not hesitate to contact the undersigned should you have any questions or commentary.

Justine Benjamin, PBIOL,
Wildlife Specialist

MS/PA



REVIEW

A review of relevant literature about the interaction between caribou and industrial developments such as mining, oil and gas infrastructure, and transportation corridors in northern or Arctic settings was conducted to evaluate what “deflection” implies regarding caribou response. For context, Merriam-Webster Dictionary (2024) defines **deflection** as “*a turning aside or off course*”, and avoidance is defined as “*an action of emptying, vacating, or clearing away*”. Several scientific literature sources apply ‘avoidance’ when describing caribou behaviour to industrial infrastructure (Wilson et al. 2014, Russell and Gunn 2017, Boulanger et al. 2021, Prichard et al. 2022, Severson et al. 2023). ‘Deflection’ is also applied, but no further specification is provided. Project-specific applications of terminology and related specifications and/or limitations when defining caribou response behaviours are provided from the following mining Projects.

Red Dog Mine, Alaska

The Red Dog Mine in northwest Alaska is within the range of the western Arctic caribou herd. Portions of the herd migrate through the project area (US Environmental Protection Agency and US Department of the Interior 1984, Garry et al. 2018). A specific definition or investigation of deflections related to the mine from follow-up monitoring could not be found. A study on the effects of roads on caribou movement at the Red Dog Mine in Alaska classified slow and normal crossers using spatial analysis techniques and collared caribou data (Wilson et al. 2016). The study noted the issues of scale to which deflections occur and did not provide further definition of the term.

Diavik Diamond Mine, Northwest Territories

The Diavik Diamond Mine in the Northwest Territories is within the range of the Bathurst Caribou herd, and the facilities interact with migration to and from their calving grounds (Diavik Diamond Mines Inc. 2012). Although deflection of caribou was predicted, no further definition of this term was provided. East versus west deflections were monitored and reported at the Diavik Diamond Mine in 2020. As part of their wildlife monitoring, they reported the number of deflections to the east or the west concerning caribou migration to and from calving grounds (Management and Solutions in Environmental Sciences 2021). It was determined that monitoring west versus east deflections yielded low explanatory information and had little value for continuing “deflection” monitoring.

Ekati Diamond Mine, Northwest Territories

The Ekati Diamond Mine in the Northwest Territories interacts with seasonal migration of the Bathurst, and to a lesser extent the Beverly/Ahiak caribou herds. Deflection for that project is described as caribou “...*hesitating or changing path of motion at road*” (Arctic Canadian Diamond Company 2022). For a remote camera program at the Ekati Diamond Mine, caribou response to roads was broken down as crossing or deflecting, with deflected behaviour described as changes in the path of motion and not fully crossing the road or hesitating (Arctic Canadian Diamond Company 2022). Poole et al. (2021) define the deflection of collared caribou at the Ekati Diamond Mine as collared caribou changing direction by at least 60° between two steps, where steps refer to the plotting of individual movement paths from pairs of telemetry locations separated by a specific time interval (i.e., 1hr, 8hr, 24hr).



Meliadine Mine, Nunavut

The Meliadine Mine near Rankin Inlet, Nunavut, interacts with migrating mainland barren ground caribou. Monitoring identifies caribou behaviour to infrastructure as either ‘deflection’ or ‘paralleling’. Deflection was defined as observations of caribou movements parallel to the road or adjusting their route away (at any angle) from the road (WSP Canada Inc. 2023a). A more detailed definition for Integrated Step Selection Analysis included “...a turning angle $\geq 60^\circ$ between the heading of the step and the average heading of the individual caribou’s movement.” “Paralleling” was defined as any steps a caribou took to avoid getting closer to the Mine and infrastructure, such as when caribou are seen walking alongside or parallel to the infrastructure. (WSP Canada Inc. 2023b).

PROPOSED DEFINITIONS

The review of available sources and definitions show that a tiered/graded system of classifying caribou movement (e.g., 2 or 3 categories) in relation to Project infrastructure is commonly used. Categories may include:

- **Unimpeded crossing.** No noticeable response; caribou unaffected and continue on their way.
- **Delayed crossing.** Caribou may hesitate, travel parallel, or even deflect before crossing.
- **No crossing.** Caribou may hesitate, travel parallel or deflect, but ultimately no crossing occurs.

The proposed terms and descriptors for caribou behavioural responses to infrastructure at the Mary River Project are summarized in Table 1. Considerations for defining caribou ‘deflection’ versus ‘delay’ should include caribou persistence or the number of steps taken (e.g., using estimates from collar data analysis) before returning in the original direction.

Table 1. Proposed Terms and Descriptors | Caribou Behavioural Response to Infrastructure.

Term	Behavioural Response	Descriptor/Definition
Deflect	No Crossing	Caribou approaches Project infrastructure (i.e., rail line or Tote Road) but does not continue on its path (i.e., no crossing) while showing a distinct mechanism-related behavioural response (e.g., step change associated with a disturbance measure such as traffic pass, snowbank height).
Delay	Delayed Crossing	Caribou approaches Project infrastructure but does not immediately continue its path (i.e., no immediate crossing). Behaviour includes briefly stopping or slowing down (relative to previous travel time), travelling parallel to the feature, circling, and turning around before crossing at the original location or an alternate location.
Cross	Unimpeded Crossing	Caribou approaches Project infrastructure and crosses with no noticeable behavioural response.



CLOSURE

The QIA requested that Baffinland commit to working with the TEWG to redefine deflections. Baffinland opened the discussion at the May 22, 2024 TEWG meeting. At that meeting, the QIA directed Baffinland to provide this summary report on how deflections are defined at other mining sites. The definitions were found to align with the intentions of the Terrestrial Environment Mitigation and Monitoring Plan (TEMMP), and the revised descriptors described in this memo will be applied to the Project when characterizing caribou behavioural responses to infrastructure.

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August 16, 2024

EDI Project No: 24C0140

Baffinland Iron Mine Corporation (Baffinland)
2275 Upper Middle Road East, Suite 300
Oakville, ON, L6H 0C3

Attention: Cortney Oliver, Jesse Manufor

RE: MARY RIVER PROJECT
Considerations for Pellet-Based DNA Mark-Recapture for Caribou Abundance

During the Qikiqtani Inuit Association's (QIA's) review of the Sustained Operations Proposal, and as identified in the Nunavut Impact Review Board's reconsideration report (Nunavut Impact Review Board 2023), the QIA requested that Baffinland work with the Terrestrial Environment Working Group (TEWG) to explore whether mark-recapture using pellets could be used to estimate caribou population abundance across the regional study area (RSA). This commitment is stated in Technical Comment QIA TE-2(2):

Commitment/ Intervenor		Sustained Operations Proposal Technical Comment(s)	Commitment
4	QIA	QIA TE-2 (2)	Baffinland commits to working with the TEWG to explore whether marked-recapture using pellets is an approach that could be used to estimate caribou abundance across the regional study area, including whether this method would be acceptable to Inuit, and provide a report with recommendations to TEWG by November 30, 2024 on potential use of this method. Whether this program is a viable alternative will be considered if 1) the information is required, 2) the information provided would not be duplicative of another program that is running, and 3) the potential impact of additional flights is acceptable.

From Appendix D, List of Commitments in Respect of the Sustained Operations Proposal, Nunavut Impact Review Board. 2023. Reconsideration Report and Recommendations for Baffinland's Sustaining Operations Proposal. [NIRB Public Registry No. 347145](#). Cambridge Bay, NU, Canada. pp.164

During the 31st TEWG meeting on May 22, 2024, Baffinland suggested that the QIA lead the discussion and provide rationale on their request. However, further discussion on this request did not occur. Although pellet counts have been used to estimate relative abundance of ungulate populations, pellet counts alone can be imprecise and unreliable (Smart et. al. 2003, as cited in Brinkman et. al. 2011). To meet this Project commitment, this memo provides a review of mark-recapture using DNA techniques and considers the viability of a pellet-based DNA mark-recapture program as an alternative method to estimate the abundance of barren ground caribou (*Rangifer tarandus groenlandicus*) in the RSA.

Please do not hesitate to contact the undersigned with any questions or comments.

Jay Brogan, MSc, RPBio, Senior Biologist

MS/PA



MARK-RECAPTURE USING DNA

The mark-recapture technique is a method used to estimate the size of a population where it is impractical to count every individual. The mark-recapture population estimation (Krebs 2014) is based on the following:

- (1) Capturing and marking a subset of individuals.
- (2) Releasing these individuals into the population.
- (3) Capturing a subsequent subset of individuals to determine the proportion of marked individuals.
- (4) Applying assumptions to estimate the broader population.

This technique assumes that all of the individuals are equally likely to be captured (i.e., a mark does not increase or reduce the likelihood of being recaptured); the population is closed (i.e., no recruitment or immigration, and no loss of marked individuals or emigration); there is sufficient time between the first and second capture events to permit individuals to mix randomly within the population; and, marked individuals are not lost (Pollock 1981, Krebs 2014).

Pellet-based DNA sampling is suggested because it provides a non-intrusive population estimate for some species and Project settings. The method follows the same principles defined above for the marked-recapture technique, although fecal pellets are used to identify the individuals (Kohn and Wayne 1997). Before pellet-based DNA sampling can occur, a reconnaissance flight of the RSA is required to locate caribou and caribou tracks (Poole et al. 2011, Hettinga et al. 2012). These locations are then sent to a second/independent team tasked with surveying each area in search of fresh pellets (Hettinga et al. 2012). The surveying and collection of pellets would then be repeated to obtain a subset of pellets for determining the proportion of marked to unmarked individuals. All pellet samples would be carefully handled/prepared and sent to a laboratory for microsatellite genotyping (i.e., DNA sequencing) which is used as markers to identify individuals.

Applying DNA Mark-Recapture to Estimate Caribou in the Regional Study Area

“...considered if 1) the information is required, and 2) the information provided would not be duplicative of another program that is running.”

1) Distribution information of caribou in the Project RSA is required (but not necessarily the number of caribou).

2) Yes, the method is duplicative of other programs.

Using aerial surveys is the standard approach for estimating the abundance and distribution of barren ground caribou on Baffin Island. An aerial survey of Baffin Island was conducted by the Government of Nunavut in 2014, and an aerial survey of the Project RSA was conducted by Baffinland in March 2023. These surveys used the aerial distance sampling method preferred by the Government of Nunavut (Campbell et al. 2015). This method is also a standard approach in other jurisdictions such as Alberta and British Columbia, and is deemed to provide reliable and comparable estimates.



Following Baffinland's 2023 aerial survey of the Project RSA, a caribou population estimate was calculated, as reported in *2023 Mary River Project Terrestrial Environment Annual Monitoring Report*, (Baffinland Iron Mines Corporation 2023). Based on aerial survey transects of the southern subregion which includes the planned Project area, and the northern subregion which includes the current Project area, the 2023 study estimated 613 caribou (95% CI = 314–1,198; 38.94 caribou/1,000 km²) in the southern subregion and 44 caribou (95% CI = 11–182; 3.74 caribou/1,000 km²) in the northern subregion of the RSA.

For Consideration:

The aerial distance sampling methods and pellet-based DNA mark-recapture programs have strengths and weakness for estimating wildlife populations:

- Aerial distance sampling is considered a cost-effective option for population estimates of ungulates (Grignolio et al. 2020). Aerial distance sampling is more effective in homogeneous habitats. It is less effective for aggregating and/or low-density populations and species with few detection events (e.g., sheep and goats) (Found and Patterson 2020).
- Pellet-based DNA sampling is costly. Accounting for personnel, field effort/logistic and analytical procedures, it is estimated to cost six times more than aerial surveys (Poole et al. 2011). DNA mark-recapture is better applied to closed populations (or those in discrete blocks, such as peninsula-based populations), small populations, and/or habitats that are easily accessible or have low sightability (Poole et al. 2011, Found and Patterson 2020). Pellet DNA mark-recapture is not preferred for low-density populations, large survey areas, and/or densely aggregating species (Found and Patterson 2020).

“...considered if... 3) the potential impact of additional flights is acceptable.”

3) Baffinland is committed to minimizing its impact on the landscape, and therefore does not support additional flight disturbance (unless warranted).

As described above, a reconnaissance flight of the RSA is required before mark-recapture pellet-based DNA sampling can occur, followed by two rounds of surveying in search of fresh pellets. These activities will require increasing helicopter flights and the proportion of low-level flying in the study area, which will increase anthropogenic presence on the landscape.

CONCLUSION

At the 31st TEWG meeting (May 22, 2024) Baffinland opened discussion on the viability of using pellet-based DNA mark-recapture methods to estimate the caribou population in the RSA. Upon review of available literature and considerations for the Project setting and other related survey programs, the pellet-based DNA mark-recapture method is unlikely to be a viable method for abundance estimation given the large area and moving population. This approach would duplicate estimates of caribou populations in relation to the Project that were obtained from aerial distance sampling completed in 2023. This approach would also increase anthropogenic presence on the landscape while incurring significant costs.



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September 27, 2024

EDI Project No: 24C0140

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2275 Upper Middle Road East, Suite 300
Oakville, ON L6H 0C3

Attention: Cortney Oliver, Jesse Manufor

RE: Southern Rail Caribou Baseline Data Collection

Background

The Qikiqtani Inuit Association (QIA) submitted a draft recommendation to the Terrestrial Environment Working Group on February 6, 2024, for caribou baseline data collection in the Southern Rail Regional Study Area (RSA) (QIA 2024). The Southern Rail RSA corresponds to the ‘Southern Transport Corridor’ study area identified in the technical report *Caribou Monitoring | Triggers and Recommendations* (EDI Environmental Dynamics Inc. 2022).

The QIA recommended that Baffinland Iron Mines Corp. (Baffinland) implement one or more monitoring programs to assess (a) caribou presence and movement before construction and (b) a zone of influence (ZOI) and movement deflections during construction and operation. Camera traps were suggested as the least invasive method, minimizing disturbance to caribou compared to alternatives like GPS collaring and ground- or aerial-based surveys. Though the QIA supports GPS collaring to assess caribou movement and ZOIs, they suggest that Baffinland implement alternative programs if the Hunters and Trappers Organizations (HTOs) do not support collaring.

EDI Environmental Dynamics Inc. (EDI) evaluated the efficacy of baseline data collection methods to address the monitoring objectives highlighted by the QIA while considering the potential impacts on caribou, data resolution and quality, logistics and effort, and financial cost. This evaluation is consistent with Term and Condition No. 50 of Project Certificate No. 005 (Nunavut Impact Review Board 2012), which requires Project-specific monitoring that is continuously refined to aid in adaptive management responses.



Method Evaluation

The Mary River Project has three key objectives and associated metrics for monitoring caribou: (1) predict the potential for interaction with the Project using regional caribou abundance/density and distribution; (2) assess whether Project infrastructure poses a barrier to caribou movement based on crossings and deflections (see EDI Environmental Dynamics Inc. 2024a for a discussion on these movement-related terminologies); and (3) assess the presence and magnitude of a Project ZOI based on altered caribou space use and habitat selection. These objectives pose different questions about Project-related effects and may require different study designs.

Estimates of abundance and density in the Project area require a survey with broad spatial coverage, independent counts of caribou, and analytical techniques that account for imperfect detection; e.g., see Section 9.5 *Aerial Caribou Survey* in *Mary River Project Terrestrial Environment 2023 Annual Monitoring Report* (EDI Environmental Dynamics Inc 2024). Estimating changes to space use from a ZOI also requires a broad study extent to assess how the Southern Rail might be altering habitat selection near it compared to locations farther away; e.g., see *Caribou Monitoring | Triggers and Recommendations* (EDI Environmental Dynamics Inc. 2022). Understanding movement and caribou responses to the Southern Rail requires fine-resolution spatial and temporal data. Data collection should occur locally (near the proposed footprint) and frequently (multiple times per day) to capture caribou responses to the Southern Rail before, during, and after construction.

Overall, three methods were considered to address monitoring objectives: (1) camera traps, (2) GPS collaring, and (3) aerial surveys. These methods vary in their potential effects on caribou behaviour, data resolution, and associated analytical techniques. Each method is discussed in detail (below) to inform the selection of the right approach(s) for each monitoring objective. Other methods exist to answer caribou-related monitoring questions but are not discussed here, e.g., the QIA's suggested consideration of a pellet-based DNA mark-recapture, which was evaluated in EDI Environmental Dynamics Inc. (2024).

Camera Traps

Camera traps are a non-intrusive method for documenting wildlife presence and movement patterns. They can capture location information at broad (distribution) and fine (interaction) scales, assuming animals use areas the cameras sampled. Cameras can also collect data at a fine temporal resolution as they can be set to trigger at pre-defined intervals or by motion. However, many cameras are needed to cover large study areas and detect broad spatial trends. For example, the number of cameras required to estimate a ZOI would be cost-prohibitive and could disturb wildlife from the many helicopter flights required to deploy, service, and retrieve data. Yet camera programs have been used for ZOI-related studies. A camera program was employed by Agnico Eagle at the Hope Bay (formerly Madrid-Boston) Gold Mine in Nunavut to verify the 2–10 km ZOI predicted in the Final Environmental Impact Statement. Sixty (60) cameras were placed broadly across three distance zones from the Project (<2 km, 2–10 km, and >10 km) to assess how frequently caribou were photographed in each zone (ERM Consultants Canada Ltd. 2024). This study design was sufficient to *verify* a ZOI. Still, it would not capture the resolution needed to *estimate* a precise ZOI, which requires many more cameras at equally spaced distance intervals around mining infrastructure.



Camera traps are ideal for collecting fine-scale spatiotemporal data to assess caribou-infrastructure interactions. Camera traps were effectively used at Agnico Eagle's Meadowbank Complex (Nunavut) to capture interactions between caribou and project roads to assess crossing events, road permeability for caribou, and movement/behavioural responses to road physical parameters (Agnico Eagle Mines Limited 2024). Furthermore, camera traps at Agnico Eagle's Meliadine Mine (Nunavut) could detect 350% more crossings than GPS collar data alone (ERM Consultants Canada Ltd. 2021). Camera studies also facilitate systematic placement of cameras that are better suited to detect the presence and absence of caribou and can be used to test the affect of specific road features (ERM Consultants Canada Ltd. 2021).

GPS Collaring

GPS collaring is a standard method for caribou monitoring because it provides location information at broad (distribution) and fine (interaction) scales and typically at a fine temporal resolution (2- to 4-hour fix rates based on modern technology). Data gathered from GPS-collared caribou have been used extensively to address questions related to movement (Wilson et al. 2016, Prichard et al. 2020, Fullman et al. 2021, Severson et al. 2023, Boulanger et al. 2024) and ZOIs (Polfus et al. 2011, Johnson and Russell 2014, Johnson et al. 2020, Boulanger et al. 2021). GPS collars and ground-based observations tend to be correlated (e.g., Meliadine Mine; WSP Canada Inc. 2023). However, there are still hazards and limitations to this method. Collaring is invasive and can lead to caribou injury and mortality (e.g., Government of Nunavut 2021). Collared caribou may comprise only a small proportion of a targeted herd and may not always be a representative sample of on-the-ground conditions, including project interactions. For example, GPS collars could not capture caribou presence in the Meliadine Narrows (July 3, 2020), while ground observations confirmed their presence (Agnico Eagle Mines Limited 2023). If GPS-collared caribou are limited in their interaction with mining infrastructure, any effects estimates will be imprecise (e.g., All-Weather Access Road; WSP Canada Inc. 2023). In such cases, monitoring would need to be supplemented with location-specific observations.

Aerial Surveys

Aerial surveys are an effective method for evaluating caribou abundance/density and space use. Baffinland has already used this method to determine whether caribou interact with the Project (EDI Environmental Dynamics Inc 2024). Fixed-wing and helicopter-based aerial surveys have also been used at the Meliadine Mine to document seasonal distribution, habitat associations, and abundance of caribou (Agnico Eagle Mines Ltd. and Golder Associates Ltd. 2014). With the appropriate study design, aerial surveys can help estimate ZOIs. Boulanger et al. (2021) used aerial survey data (4- to 8-km transects) to estimate ZOIs at the Ekati-Diavik Complex and found that caribou presence was required in at least 140/7,865 (1.8%) 1-km cells in their study area; more presence improved the precision of ZOI estimates. Intensive surveys with closer-spaced transects (e.g., 1–2 km) could yield higher resolution data and more precise ZOI estimates. Autonomous drones (e.g., Superwake — <https://www.superwake.ca>) can complete such surveys while causing less disturbance to wildlife due to their smaller size (5.5 m by 3 m) and limited auditory disturbance compared to fixed-wing or helicopter aircrafts. However, even with higher resolution data from drones, aerial surveys only provide a snapshot of ecological conditions and would not be ideal for continuously assessing caribou interaction with infrastructure.



Recommendation

GPS collaring is the most frequently used method to assess caribou movement and ZOIs. However, due to HTO concerns (presumed to be related to possible invasiveness and harm caused by GPS collaring), the QIA suggested that Baffinland seek alternative monitoring programs. In lieu of GPS collaring occurring, EDI recommends the two alternative monitoring programs for the Southern Rail baseline data collection.

1. Intensive aerial surveys using either long-range autonomous drones or fixed-wing aircraft to (a) estimate abundance/density and (b) assess changes to space use and habitat selection due to a ZOI from the Southern Rail. These intensive surveys can simultaneously answer (a) and (b) using the same survey protocols.
2. Camera traps to evaluate caribou interaction with the Southern Rail, including behaviour, crossings, and deflections. Camera arrays would be deployed along caribou migration routes and trails that intersect the Southern Rail corridor, as identified by Inuit Qaujimagatuqangit knowledge and surveys during the Project's baseline studies (EDI Environmental Dynamics Inc. 2012).

Both programs could be implemented in 2025 and might occur before, during, and after the construction of the Southern Rail. If GPS collaring is supported by the Terrestrial Environment Working Group, and research permits are approved, then intensive aerial surveys would not be required. Instead, GPS collar data would be used to answer questions related to movement and ZOIs, and traditional fixed-wing aerial surveys would be conducted at pre-determined intervals (based on caribou density and variability) to assess caribou abundance/density and distribution broadly.

Yours truly,

EDI Environmental Dynamics Inc.

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APPENDIX C CLIMATE DATA



Appendix Table C-1. Mine Site climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2005	Jun	–	5.0	13.9
2005	Jul	8.4	4.4	112.5
2005	Aug	8.6	4.2	37.1
2005	Sep	-0.2	5.0	5.1
2005	Oct	–	2.7	–
Gap in Data				
2006	Jun	3.5	4.8	22.1
2006	Jul	9.7	4.2	94.8
2006	Aug	9.1	4.1	74.5
2006	Sep	2.4	3.3	25.4
2006	Oct	-4.8	4.0	4.2
2006	Nov	-19.8	2.8	0.0
2006	Dec	-29.7	2.5	0.0
2007	Jan	-32.3	1.4	0.0
2007	Feb	-26.2	2.6	0.0
2007	Mar	-31.0	2.5	0.0
2007	Apr	-20.0	1.9	0.0
2007	May	-11.7	3.6	0.1
2007	Jun	3.6	4.2	0.9
2007	Jul	13.2	4.3	37.8
2007	Aug	9.6	3.3	57.4
2007	Sep	-0.9	2.9	9.3
2007	Oct	-12.4	3.3	0.1
2007	Nov	-21.5	4.3	0.0
2007	Dec	-30.6	1.6	0.1
2008	Jan	-29.6	4.1	0.0
2008	Feb	-35.3	2.1	0.0
2008	Mar	-27.8	4.5	0.0
2008	Apr	-15.2	4.7	0.0
2008	May	-0.8	3.2	23.8
2008	Jun	–	6.5	0.0
2008	Jul	–	5.0	11.4
2008	Aug	–	3.2	30.4
2008	Sep	–	4.9	8.8
2008	Oct	-11.8	4.5	0.1
2008	Nov	-22.4	3.4	0.0
2008	Dec	-29.9	2.5	0.0
2009	Jan	-27.8	2.6	0.0



Appendix Table C-1. Mine Site climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2009	Feb	-31.3	1.4	0.0
2009	Mar	-27.8	3.1	0.0
2009	Apr	-17.8	2.7	3.1
2009	May	-6.4	2.6	3.1
2009	Jun	4.3	5.1	35.2
2009	Jul	12.5	3.2	28.4
2009	Aug	8.6	3.3	36.2
2009	Sep	–	4.7	26.6
2009	Oct	–	4.4	0.1
2009	Nov	–	2.6	0.0
2009	Dec	–	5.4	0.0
2010	Jan	-32.1	3.9	0.0
2010	Feb	–	4.5	0.0
2010	Mar	–	3.5	0.0
2010	Apr	–	3.0	1.0
2010	May	–	4.8	8.4
2010	Jun	–	4.6	8.2
2010	Jul	–	2.2	1.9
Gap in Data				
2013	Aug	2.0	2.8	0.4
2013	Sep	-1.8	4.8	4.0
2013	Oct	-8.4	4.8	1.1
2013	Nov	-27.2	2.1	0.0
2013	Dec	-31.2	2.0	0.0
2014	Jan	-28.5	2.5	0.0
2014	Feb	-31.7	1.5	0.0
2014	Mar	-29.0	1.8	0.0
2014	Apr	-18.2	4.2	0.1
2014	May	-7.8	2.9	7.5
2014	Jun	2.7	4.8	43.8
2014	Jul	11.5	2.8	36.1
2014	Aug	6.0	4.0	67.8
2014	Sep	-2.1	3.2	3.1
2014	Oct	-10.6	3.8	0.4
2014	Nov	-20.9	2.5	0.0
2014	Dec	-29.9	2.1	0.0
2015	Jan	-35.4	1.3	0.0



Appendix Table C-1. Mine Site climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2015	Feb	-37.0	1.2	0.0
2015	Mar	-30.3	1.8	0.2
2015	Apr	-22.6	1.8	0.0
2015	May	-6.1	4.5	3.2
2015	Jun	4.3	4.1	18.2
2015	Jul	12.2	4.2	34.6
2015	Aug	7.1	4.2	41.8
2015	Sep	0.2	4.9	48.5
2015	Oct	-10.3	3.9	5.0
2015	Nov	-23.5	2.8	0.0
2015	Dec	-32.0	3.4	0.0
2016	Jan	-25.9	2.5	0.0
2016	Feb	-31.6	2.3	0.0
2016	Mar	-29.4	0.5	0.0
2016	Apr	-15.4	4.1	2.8
2016	May	-4.2	5.2	6.0
2016	Jun	5.8	3.3	17.4
2016	Jul	11.8	4.1	31.8
2016	Aug	10.6	3.6	59.9
2016	Sep	-1.9	4.8	51.5
2016	Oct	-11.2	5.0	0.2
2016	Nov	-16.8	3.6	0.0
2016	Dec	-29.4	2.0	0.0
2017	Jan	-26.4	3.5	0.0
2017	Feb	-31.2	1.6	0.0
2017	Mar	-30.6	2.8	0.0
2017	Apr	-15.4	4.4	1.0
2017	May	-5.6	3.9	1.4
2017	Jun	4.2	4.2	21.9
2017	Jul	7.2	5.4	67.8
2017	Aug	8.6	3.4	56.7
2017	Sep	-0.3	4.1	1.6
2018	Jan	-32.2	0.6	0.0
2018	Feb	-34.6	2.0	0.0
2018	Mar	-25.3	3.4	0.0
2018	Apr	-17.6	3.2	1.7
2018	May	-8.5	3.2	0.6



Appendix Table C-1. Mine Site climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2018	Jun	4.8	4.3	26.0
2018	Jul	7.5	4.4	51.3
2018	Aug	6.4	4.0	2.0
2018	Sep	-2.1	4.7	25.1
2018	Oct	-14.2	3.3	0.0
2018	Nov	-25.4	2.0	0.0
2018	Dec	-26.5	2.9	0.0
2019	Jan	-31.4	3.0	0.0
2019	Feb	-33.6	0.8	0.0
2019	Mar	-27.8	2.9	0.0
2019	Apr	-20.6	3.3	0.1
2019	May	-0.1	4.1	7.1
2019	Jun	6.4	4.4	45.2
2019	Jul	11.0	4.0	54.4
2019	Aug	11.2	4.0	22.6
2019	Sep	2.4	4.4	20.6
2019	Oct	3.0	4.8	2.4
2019	Nov	-8.9	3.1	0.1
2019	Dec	-14.9	3.7	0.0
2020	Jan	-33.1	1.0	0.0
2020	Feb	-32.4	0.6	0.0
2020	Mar	-25.9	2.3	0.0
2020	Apr	-13.9	1.5	0.0
2020	May	-6.1	2.9	0.1
2020	Jun	5.8	1.8	0.2
2020	Jul	14.1	2.2	0.4
2020	Aug	8.5	2.2	0.9
2020	Sep	5.3	2.5	0.0
2020	Dec	-19.6	4.8	0.0
2021	Jan	-21.9	3.6	0.0
2021	Feb	-26.2	4.0	0.0
2021	Mar	-29.9	3.3	0.0
2021	Apr	-13.9	5.6	0.0
2021	May	-4.9	3.9	0.1
2021	Jun	6.2	4.5	1.5
2021	Jul	7.0	4.5	2.2
2021	Aug	6.6	5.3	11.8



Appendix Table C-1. Mine Site climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2021	Sep	-1.6	3.8	13.0
2021	Oct	-2.5	5.9	22.6
2021	Nov	-20.0	2.3	0.0
2021	Dec	-21.6	3.4	0.0
2022	Jan	-29.0	2.1	0.0
2022	Feb	-33.7	2.1	0.0
2022	Mar	-25.0	2.4	0.0
2022	Apr	-17.8	4.5	0.0
2022	May	-8.7	3.6	1.6
2022	Jun	3.4	4.1	33.2
2022	Jul	13.4	3.4	7.4
2022	Aug	8.0	3.8	32.0
2022	Sep	1.1	5.5	35.8
2022	Oct	-10.6	5.2	10.8
2022	Nov	-26.9	2.4	0.0
2022	Dec	-23.3	5.0	0.0
2023	Jan	-34.8	2.4	0.0
2023	Feb	-40.1	1.3	0.0
2023	Mar	-23.6	2.1	0.0
2023	Apr	-16.0	2.4	0.0
2023	May	-7.0	4.9	0.0
2023	Jun	1.5	5.0	28.2
2023	Jul	10.3	3.9	27.6
2023	Aug	8.9	5.0	84.6
2023	Sep	0.9	5.3	43.6
2023	Oct	-9.0	4.1	3.2
2023	Nov	-12.9	6.4	0.0
2023	Dec	-22.9	4.0	0.0
2024	Jan	-25.9	2.8	0.0
2024	Feb	-29.6	2.6	0.0
2024	Mar	-24.2	3.0	0.0
2024	Apr	-14.0	4.7	0.0
2024	May	-7.6	3.4	0.2
2024	Jun	4.3	3.5	14.0
2024	Jul	9.2	4.7	84.0
2024	Aug	7.2	4.5	62.4
2024	Sep	3.9	5.2	155.2



Appendix Table C-1. Mine Site climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2024	Oct	-3.0	6.2	22.6
2024	Nov	-16.4	3.8	0.0
2024	Dec	-29.1	1.8	0.0

Italicized grey text indicates precipitation data were recorded during time periods with a potentially blocked rain gauge.

Appendix Table C-2. Milne Inlet climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2006	Jun	—	5.6	1.5
2006	Jul	8.6	5.5	76.5
2006	Aug	8.1	6.4	35.8
2006	Sep	1.6	5.0	52.3
2006	Oct	-4.8	5.0	0.3
2006	Nov	-19.1	4.9	0.0
2006	Dec	-28.2	3.7	0.0
2007	Jan	-30.6	2.4	0.0
2007	Feb	-25.3	4.7	0.0
2007	Mar	-30.9	4.0	0.0
2007	Apr	-18.6	4.2	0.0
2007	May	-10.7	2.8	0.0
2007	Jun	2.8	5.0	0.0
2007	Jul	9.9	5.4	16.1
2007	Aug	7.8	5.1	24.7
2007	Sep	-1.0	5.0	7.2
2007	Oct	-10.5	5.3	0.0
2007	Nov	-22.9	5.2	0.0
2007	Dec	-29.7	3.5	0.0
2008	Jan	-28.0	4.4	0.0
2008	Feb	-34.2	3.0	0.0
2008	Mar	-29.9	4.8	0.0
2008	Apr	-17.3	5.3	0.0
2008	May	-4.6	4.9	0.0
2008	Jun	—	5.1	14.4
2008	Jul	9.9	5.5	82.2
2008	Aug	—	3.7	3.9
2008	Sep	—	5.3	0.0
2008	Oct	-11.3	5.3	0.0
2008	Nov	-21.9	3.5	0.0



Appendix Table C-2. Milne Inlet climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2008	Dec	-28.8	5.2	0.0
2009	Jan	-27.7	4.5	0.0
2009	Feb	-31.0	2.6	0.0
2009	Mar	-27.9	4.6	0.0
2009	Apr	-17.9	3.2	0.0
2009	May	-7.5	3.8	0.0
2009	Jun	3.5	5.7	0.0
2009	Jul	11.5	5.8	0.0
2009	Aug	—	6.3	0.0
2009	Sep	—	4.5	0.0
2009	Oct	—	4.5	0.0
2009	Nov	—	4.5	0.0
2009	Dec	—	4.5	0.0
2010	Jan	—	—	—
2010	Feb	—	—	—
2010	Mar	—	13.9	26.2
Gap In Data				
2013	Aug	2.1	5.2	37.4
2013	Sep	-1.8	6.2	0.6
2013	Oct	-7.9	5.1	1.4
2013	Nov	-25.7	3.1	0.0
2013	Dec	-30.2	2.8	0.0
2014	Jan	-29.2	4.2	0.0
2014	Feb	-31.2	3.8	0.0
2014	Mar	-29.0	2.4	0.0
2014	Apr	-19.4	4.8	1.0
2014	May	-7.5	4.3	1.8
2014	Jun	1.8	5.0	13.9
2014	Jul	10.5	4.0	8.9
2014	Aug	5.4	5.7	10.3
2014	Sep	-2.3	4.0	3.0
2014	Oct	-10.6	3.6	0.2
2014	Nov	-21.3	2.1	0.0
2014	Dec	-29.2	4.3	0.0
2015	Jan	-33.8	2.6	0.0
2015	Feb	-35.3	2.5	0.0
2015	Mar	-29.5	3.0	0.0



Appendix Table C-2. Milne Inlet climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2015	Apr	-23.7	3.6	0.0
2015	May	-8.3	5.2	1.1
2015	Jun	2.5	4.9	10.1
2015	Jul	10.0	4.8	8.0
2015	Aug	6.0	5.5	7.7
2015	Sep	-0.1	5.9	10.1
2015	Oct	-9.5	5.8	6.5
2015	Nov	-21.6	4.5	0.0
2015	Dec	-30.5	6.8	0.0
2016	Jan	-25.3	4.9	0.0
2016	Feb	-31.6	3.3	0.2
2016	Mar	-29.3	2.5	0.0
2016	Apr	-16.8	5.7	1.2
2016	May	-5.8	5.8	5.3
2016	Jun	4.0	4.0	8.8
2016	Jul	9.9	5.4	22.7
2016	Aug	8.7	5.3	39.8
2016	Sep	-1.6	6.2	18.5
2016	Oct	-10.6	5.5	0.1
2016	Nov	-16.8	5.1	0.0
2016	Dec	-27.0	3.2	0.0
2017	Jan	-25.7	4.9	0.0
2017	Feb	-30.7	3.4	0.0
2017	Mar	-30.4	4.0	0.0
2017	Apr	-16.7	5.3	0.0
2017	May	-6.9	4.4	0.0
2017	Jun	3.1	5.0	0.0
2017	Jul	6.9	6.2	34.1
2017	Aug	7.0	4.9	10.8
2017	Sep	-0.7	6.5	8.9
2018	Jan	-31.0	21.5	0.0
2018	Feb	-35.1	16.7	0.0
2018	Mar	-26.9	5.4	0.0
2018	Apr	-19.4	6.9	0.1
2018	May	-9.8	4.8	0.0
2018	Jun	3.3	5.6	19.3
2018	Jul	6.7	6.3	74.8



Appendix Table C-2. Milne Inlet climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2018	Aug	4.9	5.9	52.5
2018	Sep	-11.8	6.0	18.1
2018	Oct	-23.4	6.8	0.0
2018	Nov	-35.3	2.5	0.0
2018	Dec	-34.2	14.4	0.0
2019	Jan	-40.9	11.5	0.0
2019	Feb	-41.1	30.5	0.0
2019	Mar	-36.2	5.0	0.0
2019	Apr	-31.3	6.0	0.5
2019	May	-12.0	6.0	2.8
2019	Jun	-4.4	5.5	30.5
2019	Jul	-0.3	6.3	50.1
2019	Aug	0.3	5.7	30.4
2019	Sep	-8.1	2.9	41.3
2019	Oct	-8.2	—	1.0
2019	Nov	-19.1	—	0.0
2019	Dec	-25.1	—	0.0
2020	Jan	-35.3	—	0.0
2020	Feb	-34.7	—	0.0
2020	Mar	-29.3	—	0.0
2020	Apr	-17.9	—	0.0
2020	May	-7.9	—	0.2
2020	Jun	4.4	0.0	31.0
2020	Jul	11.5	0.0	20.9
2020	Aug	6.6	0.1	0.0
2020	Sep	-1.4	2.5	0.3
2020	Oct	-6.8	4.6	0.0
2020	Nov	-22.1	5.6	0.0
2020	Dec	-22.4	5.5	0.0
2021	Jan	-22.5	4.8	0.0
2021	Feb	-28.1	5.1	0.0
2021	Mar	-29.2	5.3	0.0
2021	Apr	-15.3	5.4	0.0
2021	May	-6.1	4.7	0.0
2021	Jun	4.3	5.5	0.4
2021	Jul	5.9	6.2	0.4
2021	Aug	5.2	6.6	9.2



Appendix Table C-2. Milne Inlet climate data.

Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2021	Sep	-1.3	5.2	10.6
2021	Oct	-2.4	8.6	15.2
2021	Nov	-18.9	3.3	0.0
2021	Dec	-22.2	5.3	0.0
2022	Jan	-29.4	3.4	0.0
2022	Feb	-33.4	3.1	0.0
2022	Mar	-25.8	4.1	0.0
2022	Apr	-18.7	6.3	0.0
2022	May	-9.3	5.5	0.4
2022	Jun	2.4	5.3	6.8
2022	Jul	11.3	4.7	2.4
2022	Aug	6.9	5.7	13.6
2022	Sep	0.7	6.5	39.0
2022	Oct	-10.3	6.0	0.2
2022	Nov	-24.8	3.7	0.0
2022	Dec	-23.7	6.2	0.0
2023	Jan	-33.5	3.7	0.0
2023	Feb	-37.5	4.3	0.0
2023	Mar	-25.7	3.2	0.0
2023	Apr	-18.9	2.3	0.0
2023	May	-7.3	6.4	0.0
2023	Jun	0.9	6.2	12.8
2023	Jul	8.4	4.7	10.4
2023	Aug	7.9	6.8	58.6
2023	Sep	0.6	6.3	37.6
2023	Oct	-8.2	4.7	0.4
2023	Nov	-13.6	6.2	0.0
2023	Dec	-22.9	5.2	0.0
2024	Jan	-26.6	4.4	0.0
2024	Feb	-27.5	4.3	0.0
2024	Mar	-25.0	5.2	0.0
2024	Apr	-14.9	6.7	0.0
2024	May	-8.0	5.8	5.2
2024	Jun	2.8	4.1	4.2
2024	Jul	7.7	6.2	61.4
2024	Aug	6.4	6.3	61.4
2024	Sep	3.7	7.9	54.8



Appendix Table C-2. Milne Inlet climate data.



Year	Month	Average Air Temperature (°C)	Average Wind Speed (m/s)	Total Precipitation (mm)
2024	Oct	-2.9	7.1	13.4
2024	Nov	-16.1	4.6	0.0
2024	Dec	-27.3	3.3	0.0

Italicized grey text indicates precipitation data were recorded during time periods with a potentially blocked rain gauge.





APPENDIX D REMOTE CAMERA LOCATIONS



Site Name	Camera Name	Location	Latitude Longitude	/	Access	Site Photo
HOL 6	Baffin-1	KM 57	71.4832, -80.213		Helicopter, vehicle, foot	
HOL 16	Baffin-2	KM 95	71.3321, -79.4779		Helicopter, vehicle, foot	



Site Name	Camera Name	Location	Latitude Longitude	/	Access	Site Photo
HOL 1	Baffin-3	KM 4	71.8710, -80.8828		Helicopter, vehicle, foot	
HOL 1	Baffin-4	KM 4	71.8710, -80.8828		Helicopter, vehicle, foot	





Site Name	Camera Name	Location	Latitude Longitude	/	Access	Site Photo
HOL 6	Baffin-5	KM 57	71.4832, -80.213		Helicopter, vehicle, foot	
HOL 16	Baffin-6	KM 95	71.3321, -79.4779		Helicopter, vehicle, foot	




Site Name	Camera Name	Location	Latitude Longitude	/	Access	Site Photo
HOL 3	Baffin-7	KM 27	71.7297, -80.4418		Helicopter, vehicle, foot	
HOL 4	Baffin-8	KM 42	71.6073, -80.347		Helicopter, vehicle, foot	



Site Name	Camera Name	Location	Latitude Longitude	/	Access	Site Photo
HOL 10	Baffin-9	KM 85.5	71.3732, -79.6859		Helicopter, vehicle, foot	
HOL 4	Baffin-10	KM 42	71.6073, -80.347		Helicopter, vehicle, foot	



Site Name	Camera Name	Location	Latitude Longitude	/	Access	Site Photo
HOL 10	Baffin-11	KM 85.5	71.3732, -79.6859		Helicopter, vehicle, foot	
HOL 3	Baffin-12	KM 27	71.7297, -80.4418		Helicopter, vehicle, foot	