

FIGURE 15 DETECTIONS OF MUSKOX ON MOTION-TRIGGERED PHOTOS RECORDED BY REMOTE CAMERAS, DORIS AND MADRID AREAS, JUNE 2016 TO SEPTEMBER 2023

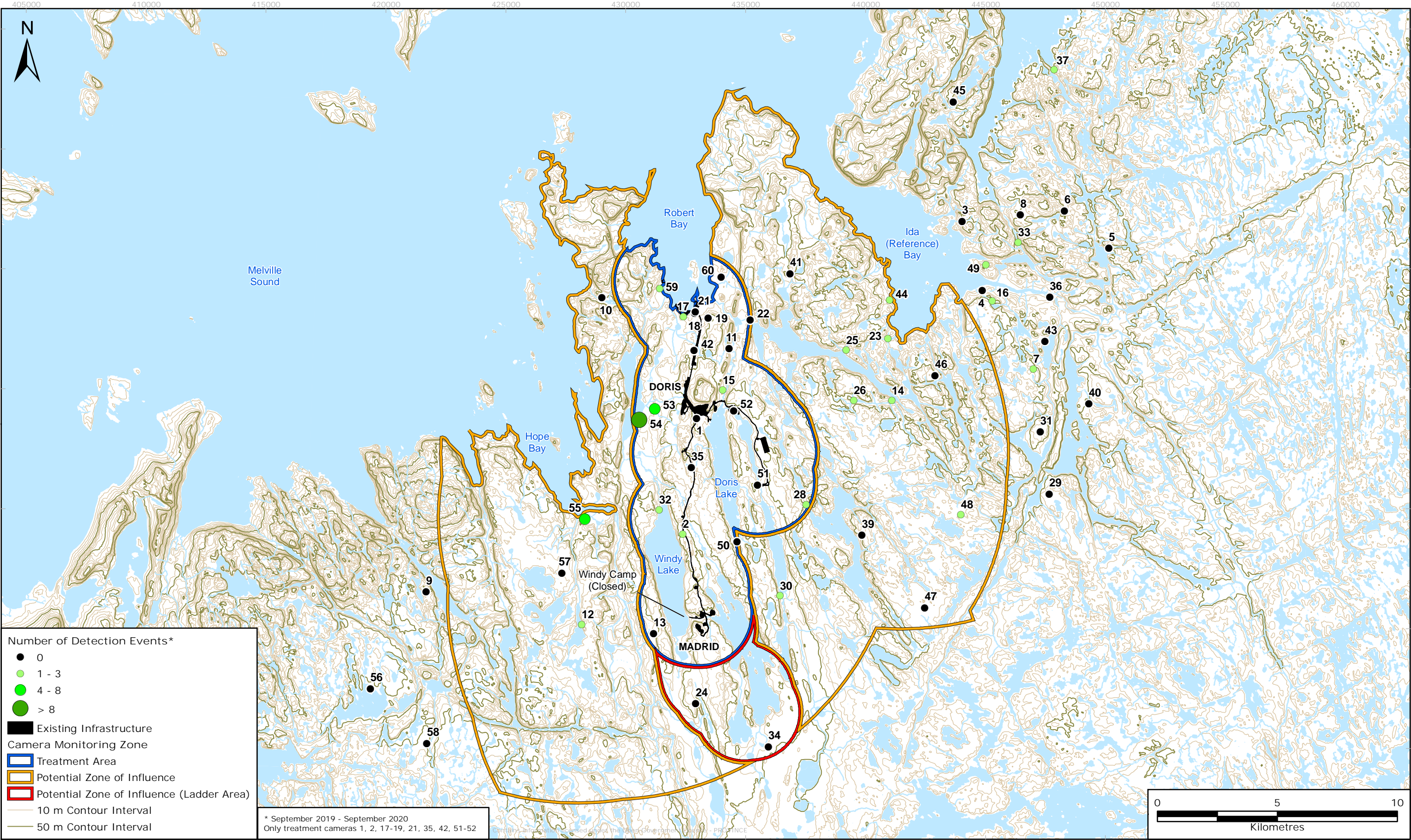




Photo 9 Muskox captured on ZOI zone camera 25. May 5, 2023.

3.5.3.3 WILDLIFE SIGHTINGS LOG AND INCIDENTAL OBSERVATIONS

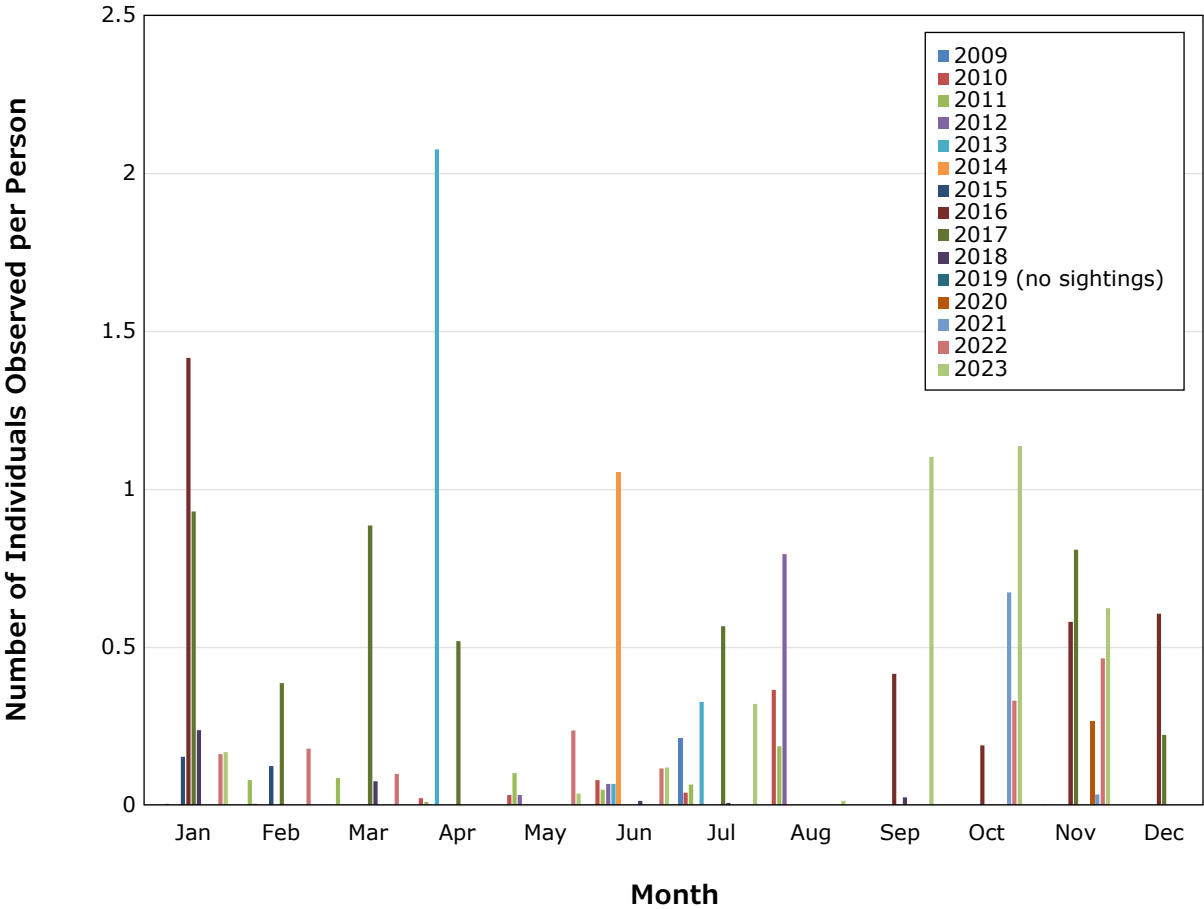
There were a total of 28 muskox sightings in 2023, though several sightings were likely repeats of the same group based on the date, location, and group size (Appendix H). A group of 10 muskox were noted over two days in July near Windy Lake (Appendix H). In late September and early October, a group of 17-22 muskox were repeatedly noted near Patch Lake and Windy Road km 3 to 7 (Appendix H). Herd sizes from all sightings ranged from five to 22 individuals with an average of 17 individuals. Solo individuals were sighted five times from July to August. Nearly all sightings of muskox occurred east or west of Windy Road, with 6 sightings in the TLR/TIA, and five sightings in the Doris area, north of camp (Table 21; Appendix H). The muskox sightings in the TLR/TIA had no observations recorded of the muskox interacting with the tailings.

TABLE 21 MUSKOX SIGHTINGS 2023

| General Location | Months | Total Sightings |
|--------------------|-----------------------------------|-----------------|
| Doris Area | July-September, November | 5 |
| Windy Road/ Madrid | January, July, September-November | 17 |
| TLR/TIA | June, August, September | 6 |

Muskox observations from the wildlife sightings log were corrected for the number of people on site each month from 2009 to 2023 (Figure 16). Across years, sightings are variable and have occurred in all months. In 2023, corrected muskox observations peaked at 1.1 observations per personnel (Figure 16). Peaks in muskox sightings typically represent sightings of larger herds, rather than more sightings of a few individuals (Figure 16).

FIGURE 16 NUMBER OF MUSKOX INDIVIDUALS RECORDED PER PERSONNEL PRESENT, HOPE BAY PROJECT, 2009 TO 2023



3.5.4 DISCUSSION

Detections of muskox by wildlife cameras are rare. A total of eight muskox events were recorded during the recent monitoring period from September 2022 to September 2023. Two events occurred in the Treatment zone, five events in the ZOI, and one in the control zone. This is an increase in detections of muskox compared to recent years, with only four camera detections of muskox in the most recent three monitoring years (2020-2022; ERM 2023). The small sample size across years prevented statistical analysis; however, the raw data indicate that muskox are least common in the Control zone in all years. This indicates that muskox are likely not avoiding the Project.

No muskox have been recorded on cameras located at the TIA. This result suggests that muskox do not make use of the area near the TIA. Muskox are also typically not observed near the TIA based on information collected through the wildlife sightings log. However, incidental sightings of muskox increased in 2023 and there were a total of six incidental sightings near the TIA. The muskox sightings in the TLR/TIA had no observations recorded of the muskox interacting with the tailings. There were four observations of muskox near in the TLR/TIA that occurred within 10 days of each other at the end of September, it is likely that they were multiple sightings of the same group.

Twenty-eight incidental sightings of muskox occurred in 2023, with several sightings of a group of ten muskox in July 2023, and a group of 17-22 in September and October 2023. The number of individuals recorded in the wildlife sightings log should not be interpreted as observations of unique individuals (e.g., a population estimate) as it is likely that the same individuals are counted across time by different observers. No other interactions, incidents, mortalities, or incidental sightings of muskox were reported in 2023.

The Madrid-Boston FEIS predicted a not significant residual effect of disturbance at a geographic extent of the RSA and a low magnitude residual effect for disruption of movement at the extent of the PDA. Camera monitoring in the current program has occurred since 2016 and in this time muskox events have been rare. Due to the low number of events modelling of muskox events or occupancy is not possible and it is predicted that muskox will continue to be data deficient indefinitely.

3.6 GRIZZLY BEAR

Grizzly bears are considered a species of Special Concern by the COSEWIC and on Schedule 1 of the SARA (COSEWIC 2002, 2012; Government of Canada 2021b). Additionally, in Nunavut grizzly bears are territorially listed as vulnerable (S3) suggesting they are at moderate risk of extirpation (CESCC 2020). Barren ground grizzly bears are at the most northern and eastern limits of the continental grizzly bear range. Consequently, grizzly bears in the central Arctic have the largest annual home ranges and likely have the lowest densities of any grizzly bear population studied in North America (McLoughlin et al. 1999).

The distribution and abundance of grizzly bears has increased in the region since the 1970s (Banci and Spicker 2016). Grizzly bears have been associated with major river systems, their associated watersheds, and the coast, and are most often seen in the spring and fall during fish-spawning periods and following migrating caribou.

3.6.1 FEIS PREDICTIONS

The Madrid-Boston FEIS predictions included not significant and low magnitude residual effects of disruption of movement and attraction at a geographic extent of the PDA for grizzly bear (TMAC Resources Inc. 2017).

3.6.2 METHODS

The potential effects of Project-related activities on grizzly bear are monitored through the wildlife camera monitoring program as well as through the Wildlife Sightings/Reporting program, results of which are presented as wildlife interactions, incidents, and mortalities and incidental sightings in Sections 3.6.3.2 and 3.6.3.3.

Camera data from June 2016 to September 2023 were summarized and compiled for the purposes of conducting a statistical analysis to investigate whether there were differences between the number of grizzly bear events at cameras located in the Treatment zone (< 2 km from existing infrastructure) and in the Control zone (> 10 km from existing infrastructure). There were a sufficient number of events per month to permit statistical analyses of the predicted number of events recorded rather than predicted occupancy (probability of at least one event per month). A secondary analysis was completed to investigate a potential ZOI should a significant difference in the predicted number of events be detected. The models accounted for spatiotemporal variation in detections by including smoothed terms for northing and easting as well as month, and random variables for camera number and year where these terms improved model fit to the data.

Cameras 18, 21, and 22 monitor areas of possible bear attractants; cameras 18 and 21 monitor the Roberts Bay Waste Management Facility and camera 22 monitors an area at the Roberts Lake Outflow and fish fence (though the fish fence was not active in all camera monitoring years). Bears may be attracted to these areas—despite mitigations to reduce the attractiveness—resulting in these cameras recording more events than other areas near the Project (where avoidance is anticipated).

Further details on methodology for this monitoring program can be found in Appendix A and in Methods Section 3.2. Datasets of 2022 camera effort and detection events are presented in Appendices D to F. Compiled datasets of grizzly bear detection events from June 2016 to September 2023 are presented in Appendix P.

3.6.3 RESULTS

3.6.3.1 CAMERA MONITORING

Across all years of the camera monitoring program from June 2016 to September 2023, cameras were active and recording for a total of approximately 69,140 camera days (Camera effort within monitoring zones for the most recent year is summarized by month in Table 22; effort summaries per camera are provided in Appendix D). A brief summary of the grizzly bear events recorded across all cameras during the current monitoring period is provided below. Data from facility monitoring cameras 18, 21, and 22 are also included in the summary below (see Section 3.2.1).

TABLE 22 GRIZZLY BEAR EVENTS RECORDED BY MONTH AT TREATMENT, ZOI, AND CONTROL CAMERAS, SEPTEMBER 2022 TO 2023

| Year | Month | Treatment Cameras | | | | ZOI Cameras | | | | Control Cameras | | | |
|--------------------------|-------|----------------------------|-------------------------|-------------------------|--------------|----------------------------|-------------------------|-------------------------|--------------|----------------------------|-------------------------|-------------------------|-------------|
| | | Camera Effort ¹ | No. Cameras with Events | No. Events ² | | Camera Effort ¹ | No. Cameras with Events | No. Events ² | | Camera Effort ¹ | No. Cameras with Events | No. Events ² | |
| | | | | Raw | Corrected | | | Raw | Corrected | | | Raw | Corrected |
| 2022 | Sept. | 505 (20) | 3 | 4 | 4.56 | 410 (16) | 8 | 10 | 11.4 | 321 (18) | 3 | 3 | 3.42 |
| | Oct. | 489 (18) | 1 | 1 | 1.19 | 451 (17) | 2 | 2 | 2.38 | 259 (13) | 2 | 2 | 2.38 |
| 2023 | Mar. | 373 (15) | - | - | - | 372 (13) | - | - | - | 144 (7) | - | - | - |
| | April | 375 (13) | 1 | 1 | 1.1 | 416 (15) | - | - | - | 265 (12) | - | - | - |
| | May | 401 (16) | 1 | 1 | 1.04 | 372 (16) | - | - | - | 345 (18) | 2 | 2 | 2.08 |
| | June | 420 (18) | 4 | 7 | 7 | 372 (16) | 1 | 1 | 1 | 434 (18) | 2 | 2 | 2 |
| | July | 349 (16) | 2 | 2 | 2.06 | 321 (15) | 8 | 9 | 9.27 | 376 (17) | 2 | 2 | 2.06 |
| | Aug. | 381 (16) | 4 | 11 | 11.99 | 300 (13) | 6 | 10 | 10.9 | 344 (17) | 10 | 14 | 15.26 |
| | Sept. | - | - | - | - | - | - | - | - | 19 (1) | - | - | - |
| Total³ | | - | 16 | 27 | 28.94 | - | 25 | 32 | 34.95 | - | 21 | 25 | 27.2 |

¹ Camera effort is presented as the total number of camera days by month; number of cameras with at least one camera day (i.e., unobscured) presented in parenthesis.

² Events are presented as the number recorded by cameras (raw) as well as the number of events corrected for the monthly darkness factor (corrected).

³ Total number of cameras with events represents the number of unique cameras with events across the monitoring period. Total number of events is the cumulative total across the monitoring period.



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Page 67

From the recent monitoring periods (September 2022 – September 2023), 84 grizzly bear events were recorded (Table 22). Temporally, grizzly bear were recorded starting in April and continuing through October (Photo 10), with no events between November and March (when grizzly bear are in hibernation; Table 22). Grizzly bear events were recorded in all zones in June through August (Table 22). Events occurred relatively evenly across zones, however, events occurred more frequently in the in the ZOI zone ($n = 32$) compared to the Treatment or Control zones ($n = 27$ and 25 respectively; Figure 17) in recent monitoring years (Table 22; Appendix P).



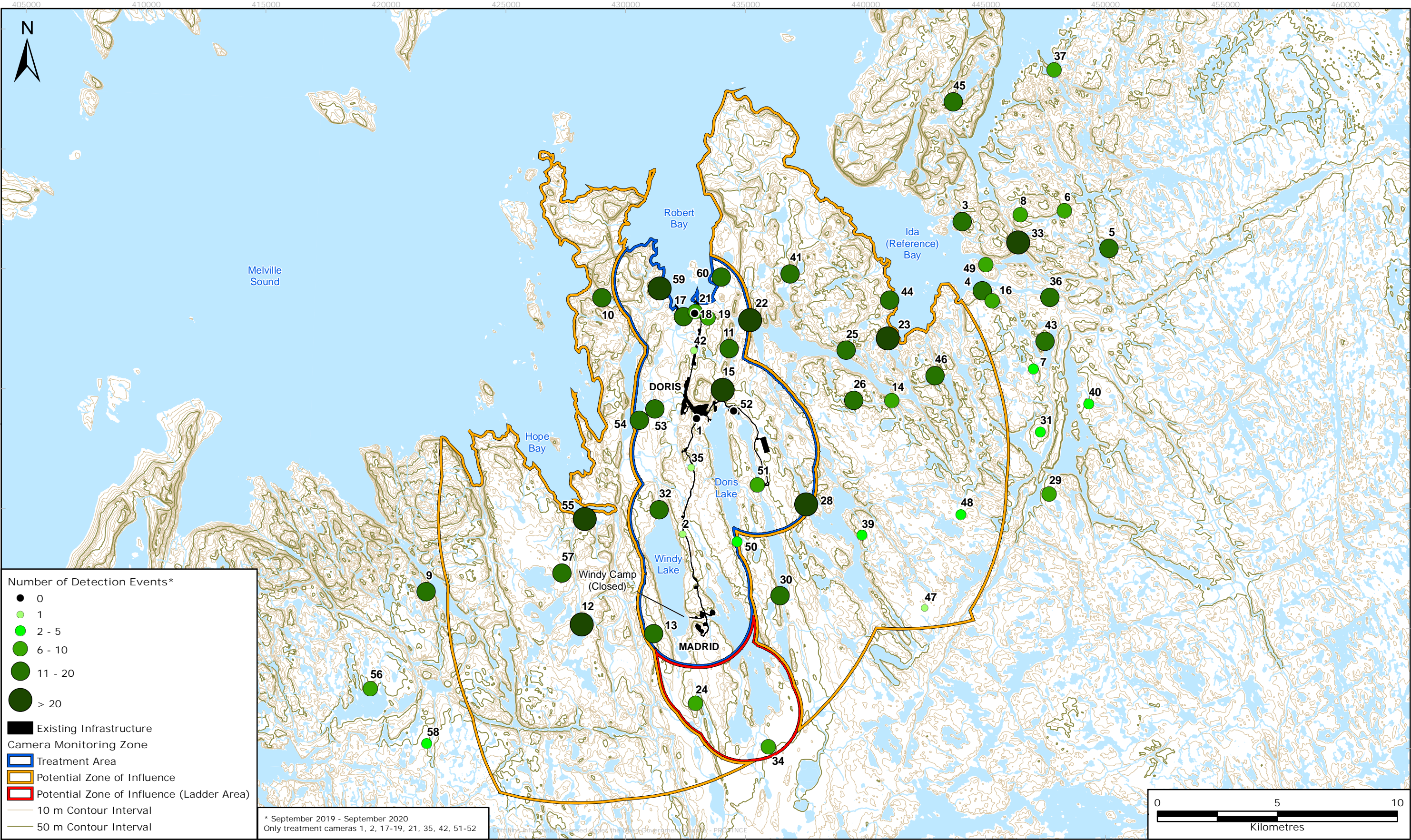
Photo 10 Grizzly bear captured on Control zone camera 33 on August 18, 2023.

Facilities Camera Monitoring

Under the current camera design, there are five cameras that have site specific monitoring objectives for grizzly bear: cameras 18 and 21 at the Roberts Bay Waste Management Facility, camera 22 at the Roberts Lake Outflow/Fish Fence, and cameras 51 and 52 at the north and south end of the TIA.

The Roberts Bay Waste Management Facility changed locations in 2022 and the camera which was responsible for monitoring the Waste Management Facility subsequently moved. The new location is outside of the composter and in the general entrance pathway for the Waste Management Facility. In the most recent monitoring period (September 2022 – September 2023) no grizzly bears were captured on camera in proximity to the Waste Management Facility.

FIGURE 17 DETECTIONS OF GRIZZLY BEAR ON MOTION-TRIGGERED PHOTOS RECORDED BY REMOTE CAMERAS, DORIS AND MADRID AREAS, JUNE 2016 TO SEPTEMBER 2023



During the monitoring period from September 2022 - September 2023, ten grizzly bear events were recorded at these cameras. One grizzly bear event was recorded on camera 51 at the north end of the TIA in June 2023. The event included a sow with a cub walking across the TIA (Photo 11). It appears that the pair are moving across the frame without stopping or interacting directly with the ground. The other nine events were recorded by camera 22 between June 30 and August 15 2023. Five of these events took place between August 12 and August 15 and included a single adult. Therefore, it is possible these events are capturing the same individuals using the area, however, events in this time period appear to be of multiple individuals based on size and colouration. Two events including sows with cubs were captured on camera 22 including a sow with a lone cub on June 30th 2023 and a sow with two cubs on August 8th 2023.



Photo 11 grizzly bear sow and cub walking across tia captured on Treatment camera 51. June 22, 2023.

Statistical Analysis

A spatiotemporal analysis was conducted on grizzly bear event data from 55 cameras; cameras 18, 21, and 22 were excluded from the analyses (see Methods Section 3.6.2). Effort and event data for the 55 cameras were included for cameras and months with effort ≥ 7 days. A total of six events occurred on cameras with less than seven days of effort and were subsequently removed from the analysis. This included one event from the Treatment zone and five events from the Control zone.

In the main analysis predicting grizzly bear events by camera zone, the best fit model included smooth functions for month and northing as well as random variables for camera number and year. There was no significant difference in the predicted number of grizzly bear events between

Treatment and Control cameras ($p = 0.83$; Table 23). Differences between ZOI and Control were also nonsignificant with ($p = 0.11$; Table 24). Month and northing were each included as a smooth function in the regression analysis as they provided better model fit to the data, though only the effect of northing was significant ($p < 0.05$; Table 23).

TABLE 23 SUMMARY OF TREATMENT VS. CONTROL MODEL COEFFICIENTS AND SIGNIFICANCE LEVEL FOR GRIZZLY BEAR CAMERA EVENT DATA

| Coefficient | β Value | Standard Error (se) | t-Value | p-Value |
|----------------------|---------------|---------------------|---------|---------|
| Camera Type, ZOI | 0.46 | 0.22 | 1.59 | 0.11 |
| Camera Type, Control | 0.07 | 0.29 | 0.21 | 0.83 |
| Smooth (Northing) | 0.30 | 0.31 | 2.37 | 0.02 |
| Smooth (Month) | 0.58 | 0.88 | 0.66 | 0.51 |

There were a modest number of cameras that recorded grizzly bear events in each of the three zones; the percentage of Camera*Months in the main analysis (effort ≥ 7 days per month) that had at least one event was similar between zones in 2023 (Table 24). A total of 27 events were recorded on Treatment cameras, 32 on ZOI cameras, and 26 on Control cameras (Table 19 and 24). Statistical analyses were carried out on the number of events (rather than occupancy, as for wolverine). These numbers suggest that there were robust sample sizes to draw predictions in both the Treatment and Control zones. Grizzly bear occupancy was calculated on the number of camera months in which one or more events occurred. This was lowest in the Treatment zone and highest in the ZOI zone across all monitoring years (Table 24). This suggests that grizzly bear may be concentrated within the Treatment zone to certain cameras or habitats and not occurring uniformly across the zone.

TABLE 24 SUMMARY OF CAMERAS WITH MONTHS ≥ 7 DAYS EFFORT AND TOTAL GRIZZLY BEAR EVENTS RECORDED

| Occupancy ¹ | | Treatment | ZOI | Control |
|-----------------------------|--------------------------------|-----------|------|---------|
| Unoccupied (no events) | No. Camera*Months ² | 599 | 370 | 420 |
| | Percentage (%; of Total) | 79.4 | 71.2 | 73.8 |
| Occupied (1 or more events) | No. Camera*Months ² | 155 | 157 | 149 |
| | Percentage (%; of Total) | 20.5 | 29.8 | 27.2 |
| Total Events | | 295 | 280 | 217 |

¹ Table summaries does not include event or effort data collected from Cameras 18, 21, and 22 from June 2016 to September 2023. These data are included in Table 22 and therefore event summaries will be different.

² Represents individual camera and month combinations. For example, for a single camera that had over a week of camera effort for the monitoring period from June 2016 to September 2023 (except hibernation months November-February, i.e., 51 months) and did not record a bear event, this camera would have a total of 51 unoccupied camera*months. If the same camera were to have recorded bear events in four months, the camera would have a total of four occupied camera*months and 39 unoccupied camera*months.

Given that there were no differences in the predicted number of grizzly bear events between Treatment and Control cameras, a secondary analysis for a potential ZOI was not necessary. The secondary analysis is performed when a statistical difference is obtained between Treatment and Control zones to determine at what distance the effect may be occurring. The analysis which uses six years of monitoring data suggests that grizzly bears are neither avoiding nor attracted to the Project. Modelling of all of camera monitoring data since June 2016 has shown that grizzly bear are not avoiding or attracted to the Project and therefore, 2023 is proposed to be the last year of conducting the camera ZOI analysis for grizzly bear. The camera monitoring program will continue, and results of grizzly bear detections will be summarized in the annual WMMP Report.

3.6.3.2 INTERACTIONS, INCIDENTS, AND MORTALITIES

Six grizzly bear interactions were recorded in 2023. On May 29, 2023, a grizzly bear entered the waste sorting area in Robert's Bay throughout the night and tore apart the waste receptacles. Upon inspection of the waste, it was found that food and hygiene waste was disposed of within the general debris instead of the appropriate waste to be incinerated. On-site, reemphasis was communicated with respect to proper waste segregation to reduce animal attraction. General waste is contained within seacans. There were no further incidents at this waste sorting area in 2023.

An interaction involved a single adult grizzly bear deterred by a drone into the tundra on May 28, 2023. Four of the interactions involved a single adult female grizzly bear with one or more cubs, in all cases requiring deterrence from the camp or active site areas. June 5, 2023, an adult female and cub were moved using a drone from the area around the airport and towards Doris Mountain. On June 16, 2023, one adult female and one cub were deterred for six minutes away from the site footprint using a helicopter. One adult female and three cubs were deterred towards Madrid using a drone on June 26, 2023. In July 2023, one adult female and one cub were deterred with a helicopter two times, they continued on towards the Doris Bridge on the TLR.

3.6.3.3 WILDLIFE SIGHTINGS LOG AND INCIDENTAL OBSERVATIONS

A total of 77 grizzly bears were incidentally observed in 2023 in 37 separate sightings (Table 25; Appendix H). Sightings occurred between May and September, with the majority of events in June ($n = 11$) and September ($n = 11$). The latest sighting occurred on September 27, 2023. Most of the sightings ($n = 22$) were of more than one bear. Five sightings were recorded near the TIA and TLR access road, however no bears were noted in the TIA footprint or interacting with the tailings.

TABLE 25 GRIZZLY BEAR SIGHTINGS AND INCIDENTAL OBSERVATIONS 2022

| General Location | Months | Total Sightings | Total Individuals |
|--------------------|-------------------------|-----------------|-------------------|
| Doris Area | June-September, | 9 | 22 |
| Windy Road/ Madrid | May-July, September | 22 | 45 |
| Airstrip | August | 1 | 2 |
| TLR/TIA | May, June, July, August | 5 | 8 |

The number of grizzly bears observed per on-site personnel each month were calculated (Figure 18; Appendix K). Across years, grizzly bear sightings peak in July and August. However, in 2023 grizzly bear sightings peaked in September with the highest proportion of grizzly bears per on-site personnel since data collection began in 2009 (0.31 sightings per personnel; Figure 18). This may be in part a reflection of the low number of personnel on site due to care and maintenance, rather than an increase in the number of bears.

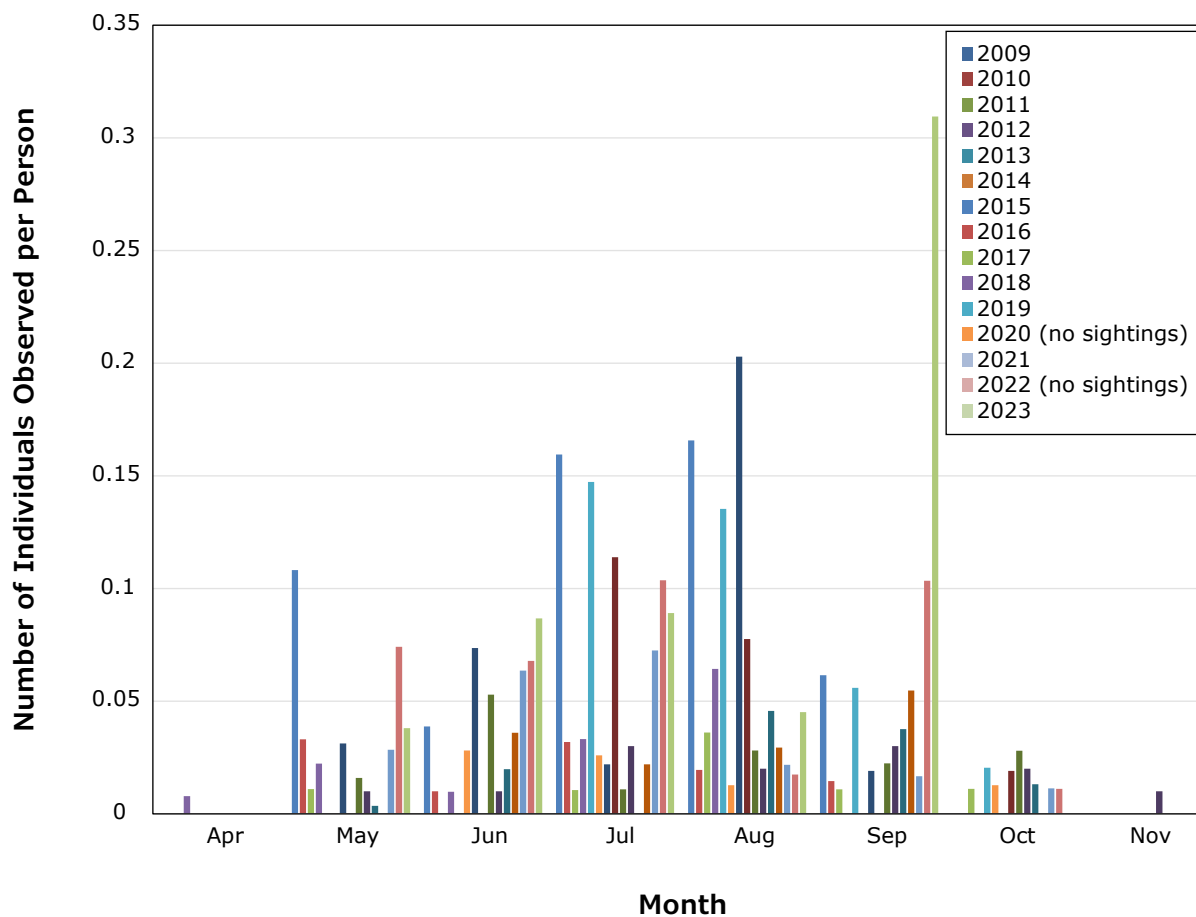
3.6.4 DISCUSSION

Grizzly bears were recorded in 84 camera events across all camera zones during the most recent data collection periods in September 2022 – September 2023. Grizzly bear events were commonly recorded in June through September. In the most recent period, camera events in the ZOI zone occurred at a higher frequency compared to the Treatment or Control zones, although events were relatively evenly distributed between zones. This is similar to monitoring trends in earlier years of the monitoring program.

Grizzly bear occurrences recorded on remote cameras from June 2016 to September 2023 were compiled and analysed to assess Project related effects on bear occurrence between the Treatment zone (< 2 km from infrastructure) and the Control Zone (> 10 km from infrastructure). Statistical analyses indicated that the chance of detecting a grizzly bear at Treatment cameras was not significantly different than at Control cameras, suggesting that the Project is not influencing the distribution of grizzly bears by either attraction to or by avoidance of the Project. Current management practices, such as waste management practices and responses to grizzly bear interactions and incidents, appear to be effective at reducing potential Project effects to grizzly bears. The statistical analysis of camera data will be concluded in 2024, with this analysis representing the final modelling for grizzly bear events. Monitoring has occurred from June 2016 to present and event modelling of these results have suggested that grizzly bears have not been attracted to nor avoiding the Project. In future years camera information for grizzly bears will be classified and summarized without statistical analysis.

One event consisting of a sow and cub was captured in the TIA on camera 51 in June of 2023. It appears that the pair were walking through the TIA without stopping and there was no evidence that they were directly interacting with the ground while moving through the TIA. This was the lone grizzly bear event captured by cameras on the TIA suggesting that grizzly bears may not use the TIA with regularity. An additional nine events including two of sows with a cub were captured on camera 22 which is located at the ERM fish fence. The fish fence was not used in 2023 and instead the grizzly bears were likely there to utilize the stream to catch fish which is supported by 66% of these events occurring in the late summer (August). The Roberts Bay Waste Management Facility changed locations in 2022 and no grizzly bears were captured on camera in proximity to the new location between September 2022 and September 2023. The lack of grizzly bear events indicate that grizzly bears are not being attracted to the Waste Management Facility and waste is being sufficiently handled.

FIGURE 18 NUMBER OF GRIZZLY BEAR INDIVIDUALS RECORDED PER PERSONNEL PRESENT, HOPE BAY PROJECT, 2009 TO 2023



The Madrid-Boston FEIS predicted a not significant and low magnitude residual effect of disruption of movement and attraction at a geographic extent of the PDA for grizzly bear. Camera monitoring in the current program has occurred since 2016 and modelling to analyze a potential ZOI has occurred since 2017. The complete dataset across six years does not indicate that grizzly bears are attracted to or avoiding the Project. At this time Agnico Eagle considered the grizzly bear ZOI analysis sufficient to confirm that the effects of the Project on grizzly bears are within predicted levels of potential attraction. Therefore, 2023 is proposed to be the last year of conducting the camera ZOI analysis for grizzly bear. The camera monitoring program will continue and results of grizzly bear detections will be summarized in the annual WMMP Report. If patterns in grizzly bear occurrence change (as evidenced by increased or decreased detections by camera zone or season), the ZOI analysis may be conducted again for further assessment of grizzly bear occurrence patterns. This update in the WMMP program will be included in an updated 2024 WMMP Plan, and discussed at the first IEAC meeting in 2024 prior to changes being implemented.

Grizzly bears were reported in the wildlife sightings log and as part of the interactions, incidents, and mortalities program. In 2023, there were five interactions in which grizzly bears required helicopter or drone deterrence from the site and one interaction involving a grizzly bear accessing a waste sorting facility in Robert's Bay. After the event waste sorting practices were discussed to prevent the situation from occurring again.

There were 37 incidental sightings of grizzly bears reported. Five sightings were recorded near the TIA and TLR access road, however no bears were noted in the TIA footprint or interacting with the tailings. TIA camera 51 also recorded one adult female grizzly bear and single young of last year cub in early June 2023. This number is similar to the number of grizzly bears incidentally reported in other years. The lack of repeated attraction to site facilities indicates that effective mitigation practices are in place. The number of individuals recorded in the wildlife sightings log should not be interpreted as observations of unique individuals (e.g., a population estimate) as it is likely that the same individuals can be counted across time by different observers.

3.7 WOLVERINE

Wolverine have large home ranges and populations are generally low in the central Arctic (Mulders 2000). This species is an important cultural and economic resource for people in Nunavut and the Northwest Territories. The Canada population of wolverine, including Nunavut, is considered a species of Special Concern by COSEWIC (2014) and under Schedule 1 of the SARA (Government of Canada 2021b). Additionally, in Nunavut wolverines are territorially listed as vulnerable (S3) suggesting they are at moderate risk of extirpation (CESCC 2020). Due to the reliance of wolverine on caribou as their main food source, the distribution and abundance of wolverine is affected by the trends in caribou populations (Banci and Spicker 2016). For example, the abundance of wolverine on Victoria Island was low after caribou abundance decreased in the early 20th century. However, with the increasing abundance of caribou on Victoria Island in the 1990s, the wolverine abundance also increased.

3.7.1 FEIS PREDICTIONS

The Madrid-Boston predictions included not significant and low magnitude residual effects of disruption of movement and attraction at a geographic extent of the PDA for wolverine (TMAC Resources Inc. 2017).

3.7.2 METHODS

The potential effects of Project-related activities on wolverine are monitored through the wildlife camera monitoring program as well as through the Wildlife Sightings/Reporting program, results of which are presented as wildlife interactions, incidents, and mortalities and incidental sightings in Sections 3.7.3.2 and 3.7.3.3. General methods for these programs are described in Section 3.2 and Appendix A.

Camera data from June 2016 to September 2023 were summarized and compiled for the purposes of conducting a statistical analysis to investigate whether there were differences between wolverine occupancy at cameras located in the Treatment zone (< 2 km from existing infrastructure) and in the Control zone (> 10 km from existing infrastructure). Wolverine occupancy at a camera was defined as one or more wolverine events at a camera in a month. Therefore, occupancy was modelled as a binomial distribution between cameras with no observations in a given month and cameras with at least one wolverine event at a camera in a given month. A secondary analysis was completed to assess a potential ZOI should a significant difference in the predicted occupancy between Treatment zone and Control zone cameras be detected. The models accounted for spatiotemporal variation in detections by including smoothed terms for northing and easting as well as month, and random variables for camera number and year where these terms improved model fit to the data.

Datasets of 2023 camera effort and detection events are presented in Appendices D to F. Compiled datasets of detection events from June 2016 to September 2023 are presented in Appendix R.

3.7.3 RESULTS

3.7.3.1 CAMERA MONITORING

Across the period from June 2016 to September 2023, cameras were active and recording for a total of approximately 69,140 camera days (Appendix D). Camera effort within monitoring zones by month is summarized in Table 12; effort summaries per camera are provided in Appendix D. A brief summary of the wolverine events recorded across all cameras during the current monitoring period is provided below. Data from cameras 18, 21, and 22 with specific monitoring objectives are also included in the summary below (see Methods Section 3.2.1).

From the recent monitoring period from September 2022 and September 2023, 11 wolverine were recorded (Figure 19; Table 26). Temporally, wolverine events were recorded from March to August, (Table 26; Photo 12; Appendix F). Events were most common in the Control zone ($n = 7$), followed by the ZOI ($n = 3$) and Treatment zone ($n = 1$; Table 27). In previous years, wolverine events occurred at similar rates and in similar proportions across the camera zones (i.e., lowest in the Treatment zone). Wolverine are almost always recorded as single individuals (Photo 13).

TABLE 26 WOLVERINE EVENTS RECORDED BY MONTH AT TREATMENT, ZOI, AND CONTROL CAMERAS, JANUARY 2020 TO SEPTEMBER 2023

| Year | Month | Treatment Cameras | | | | ZOI Cameras | | | | Control Cameras | | | |
|--------------------|-------|----------------------------|-------------------------|-------------------------|-----------|----------------------------|-------------------------|-------------------------|-----------|----------------------------|-------------------------|-------------------------|-----------|
| | | Camera Effort ¹ | No. Cameras with Events | No. Events ² | | Camera Effort ¹ | No. Cameras with Events | No. Events ² | | Camera Effort ¹ | No. Cameras with Events | No. Events ² | |
| | | | | Raw | Corrected | | | Raw | Corrected | | | Raw | Corrected |
| 2022 | Sept. | 505 (20) | - | - | - | 410 (16) | 1 | 1 | 1.14 | 321 (18) | - | - | - |
| | Oct. | 489 (18) | - | - | - | 451 (17) | - | - | - | 259 (13) | - | - | - |
| | Nov. | 390 (18) | - | - | - | 339 (16) | - | - | - | 132 (6) | - | - | - |
| | Dec. | 55 (9) | - | - | - | 44 (5) | - | - | - | 27 (2) | - | - | - |
| 2023 | Jan. | 105 (11) | - | - | - | 66 (8) | - | - | - | 20 (3) | - | - | - |
| | Feb. | 94 (8) | - | - | - | 102 (7) | - | - | - | 43 (3) | - | - | - |
| | Mar. | 373 (15) | - | - | - | 372 (13) | 1 | 1 | 1.15 | 144 (7) | 1 | 1 | 1.15 |
| | Apr. | 375 (13) | - | - | - | 416 (15) | 1 | 1 | 1.1 | 265 (12) | 1 | 2 | 2.2 |
| | May | 401 (16) | - | - | - | 372 (16) | - | - | - | 345 (18) | 3 | 3 | 3.12 |
| | Jun. | 420 (18) | 1 | 1 | 1 | 372 (16) | - | - | - | 434 (18) | - | - | - |
| | Jul. | 349 (16) | - | - | - | 321 (15) | - | - | - | 376 (17) | - | - | - |
| | Aug. | 381 (18) | - | - | - | 300 (13) | - | - | - | 344 (17) | 1 | 1 | 1.09 |
| | Sep. | - | - | - | - | - | - | - | - | 19 (1) | - | - | - |
| Total ³ | | - | 1 | 1 | 1 | - | 3 | 3 | 3.39 | - | 6 | 7 | 7.56 |

Notes:

¹ Camera effort is presented as the total number of camera days by month; number of cameras with at least one camera day (i.e., unobscured) presented in parenthesis.

² Events are presented as the number recorded by cameras (raw) as well as the number of events corrected for the monthly darkness factor (corrected).

³ Total number of cameras with events represents the number of unique cameras with events across the monitoring period. Total number of events is the cumulative total across the monitoring period.



FIGURE 19 DETECTIONS OF WOLVERINE ON MOTION-TRIGGERED PHOTOS RECORDED BY REMOTE CAMERAS, DORIS AND MADRID AREAS, JUNE 2016 TO SEPTEMBER 2023

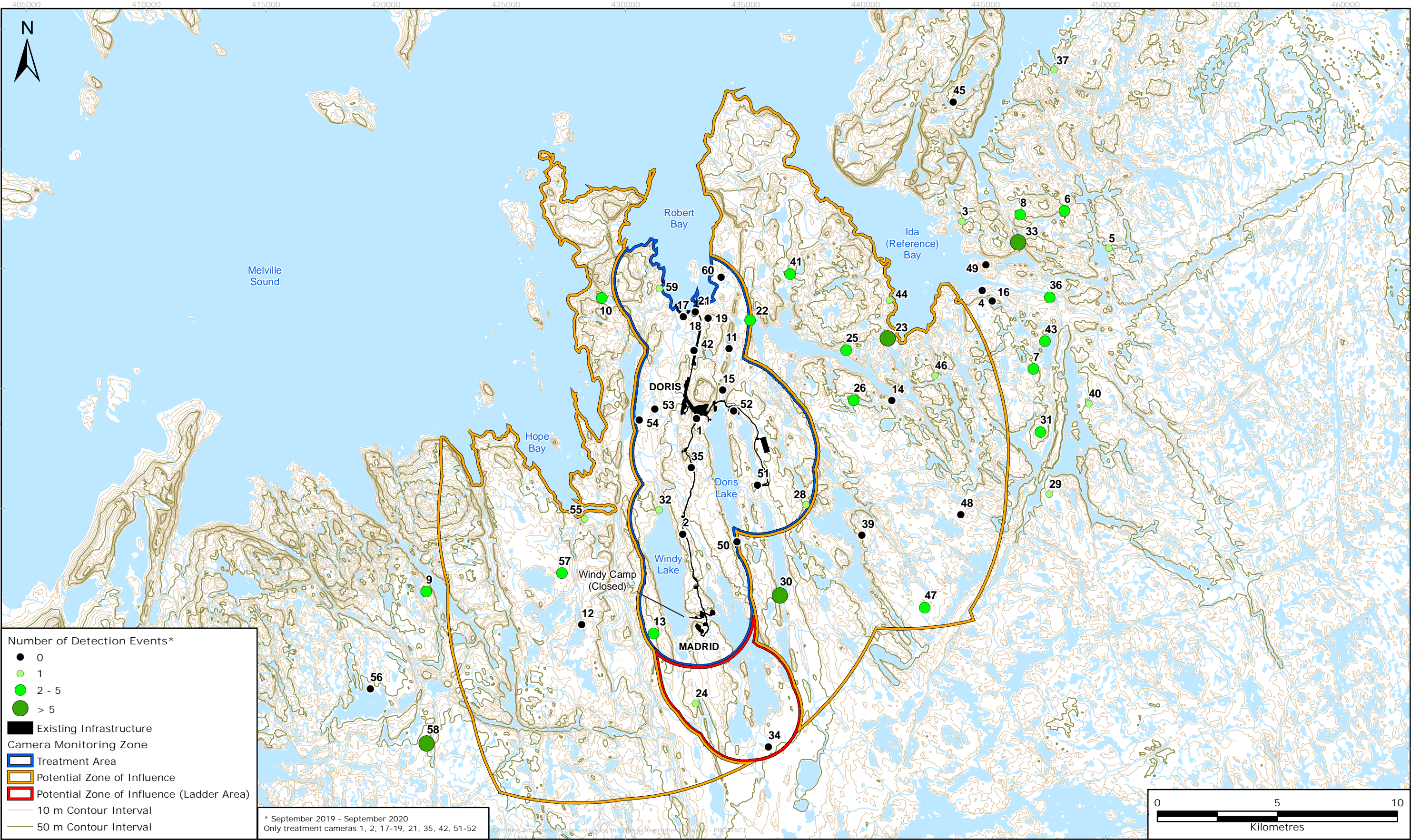




Photo 12 Wolverine captured on Control zone camera 43. May 19, 2023.



Photo 13 Wolverine captured on ZOI zone camera 23. Sept 25, 2022.

Facilities Camera Monitoring

Under the current camera design, five cameras have a site-specific monitoring objective for wolverine (the same cameras with site specific monitoring objectives for grizzly bear): camera 18 and camera 21 at the Roberts Bay Waste Management Facility, camera 22 at the Roberts Lake Outflow and Fish Fence, and cameras 51 and 52 at the north and south end of the TIA. In 2022 the Roberts Bay Waste Management Facility moved locations, and the camera associated with the facility subsequently moved with it. No wolverine events were recorded on facility cameras between September 2022 and September 2023.

Statistical Analysis

A statistical analysis was conducted to determine whether wolverine occupancy (probability of at least one wolverine event at a camera in a month) was different between the Treatment zone and Control zone using 55 cameras. Model selection included variables controlling for spatial and temporal correlation, with a smooth function for location (northing and easting) and month, in addition to the main effect variable for camera zone.

There was a significant difference in predicted wolverine occupancy between the Control and Treatment zones ($p < 0.01$), and between the Treatment zone and potential ZOI ($p < 0.01$; Table 27). The best fitting model did not include the smooth functions for easting, northing, or month, indicating that these variables are not impacting the probability of wolverine occurrence. The significant difference between the Treatment and ZOI camera zones in the main analysis indicates a potential ZOI is occurring within 2 km of infrastructure.

TABLE 27 SUMMARY OF TREATMENT VS. CONTROL MODEL COEFFICIENTS AND SIGNIFICANCE LEVEL FOR WOLVERINE CAMERA OCCUPANCY DATA

| Coefficient | β Value | Standard Error (se) | t-Value | p-Value |
|----------------------|---------------|---------------------|---------|---------|
| Camera Type, ZOI | 2.15 | 0.60 | 3.57 | <0.01* |
| Camera Type, Control | 2.45 | 0.59 | 4.14 | <0.01* |

* Indicates significant difference in wolverine occupancy compared to Treatment zone.

A secondary regression analysis was conducted to investigate for a potential ZOI for wolverine. The best fit model was similar to the categorical model, with only the distance from infrastructure variable providing optimal model fit. The significant effect of distance to infrastructure in the follow up regression ($p < 0.001$; Table 28) suggests that a ZOI is occurring for wolverine around the Study Area, and wolverines may be avoiding Project infrastructure. However, the model did not indicate a clear point at which predicted occupancy leveled with distance from infrastructure, and therefore does not provide a conclusive ZOI for wolverine. The probability of wolverine occupancy at wildlife cameras, visualized with a linear model in Figure 20, indicates generally low wolverine occupancy across the Study Area. The probability of occupancy increases from approximately 0.03 to 0.10 (i.e., 3 to 10% probability) between 0 km and 17.5 km from infrastructure. The predicted probability of occupancy values vary across distances, showing variation in wolverine occupancy among both closer distances to infrastructure (< 5 km) and

farther distances (> 10 km; indicated by the predicted values plotted along with the model lines). This variation suggests that wolverines are not altogether avoiding the Project area, but are more likely to occur at greater distances from infrastructure.

TABLE 28 SUMMARY OF SMOOTHED TERM OUTPUTS AND SIGNIFICANCE LEVEL FOR THE POTENTIAL ZOI MODEL FOR WOLVERINE CAMERA OCCUPANCY DATA

| Term/Coefficient | β Value | Standard Error (se) | t-Value | p-Value |
|----------------------------|---------------|---------------------|---------|---------|
| Distance to Infrastructure | 0.76 | 0.22 | 3.52 | <0.001* |

Note: model terms are smoothed with non-linear splines.

* Indicates significant difference in wolverine occupancy compared to Treatment zone.

These results should be interpreted with caution because wolverine events remain extremely low compared to the number of active camera months. Less than 1% Camera*Months (effort \geq 7 days per month) had at least one wolverine event in the Treatment zone, while the ZOI had 5% and the Control zone had 6% Camera*Months with at least one event (Table 29). The statistical analysis of camera data will be concluded in 2024, with this analysis representing the proposed final modelling for wolverine occurrence. Wolverine occurrence remains low and the modelling results in recent years have been consistent in suggesting that wolverine occupancy is lower in proximity to the Project. Modelling of all of camera monitoring data since June 2016 has shown that wolverines are not avoiding the Project and therefore, 2023 is proposed to be the last year of conducting the camera ZOI analysis for wolverine. The camera monitoring program will continue, and results of wolverine detections will be summarized in the annual WMMP Report.

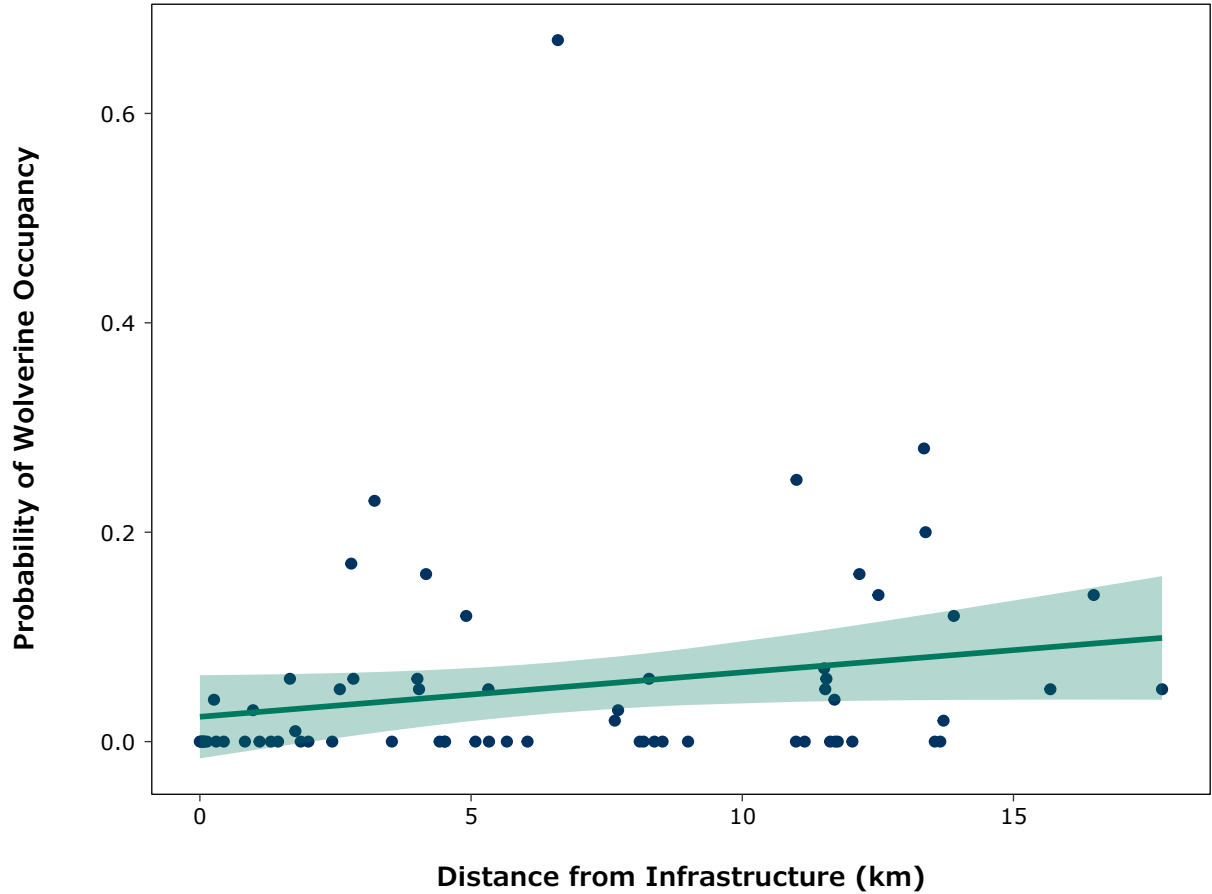
TABLE 29 SUMMARY OF CAMERAS WITH EFFORT \geq 7 DAYS IN A MONTH AND WOLVERINE OCCUPANCY

| Occupancy ¹ | | Treatment | ZOI | Control |
|--------------------------------|--------------------------------|-----------|-----------|-----------|
| Unoccupied (no events) | No. Camera*Months ² | 865 | 558 | 562 |
| | Percentage (%; of Total) | 99.3 | 94.9 | 93.6 |
| Occupied (1 or more events) | No. Camera*Months ² | 6 | 30 | 38 |
| | Percentage (%; of Total) | 0.7 | 5.1 | 6.3 |
| Total Events | | 7 | 39 | 53 |

¹ Table summaries does not include event or effort data collected from Cameras 18, 21, and 22 from June 2016 to September 2023. Effort data for these three cameras are included in Table 26.

² Represents individual camera and month combinations. For example, for a single camera that had over a week of camera effort for the monitoring period from June 2016 to September 2023 (except December and January, i.e., 64 months) and did not record a wolverine event, this camera would have a total of 64 unoccupied camera*months. If the same camera were to have recorded wolverine events in four months, the camera would have a total of four occupied camera*months and 60 unoccupied camera*months.

FIGURE 20 PROBABILITY OF WOLVERINE OCCUPANCY AT WILDLIFE CAMERAS BY DISTANCE FROM INFRASTRUCTURE



Notes: Shaded area indicates 95% Confidence Intervals

3.7.3.2 INTERACTIONS, INCIDENTS, AND MORTALITIES

A single wolverine mortality was recorded in 2023 (Appendix G). On May 20, 2023 the remains of a single wolverine were located 750 m east of Windy Road. This mortality was deemed to be due to natural causes given that the carcass was located far away from infrastructure.

No wolverine interactions or incidents were reported during 2023 (Appendix G).

3.7.3.3 WILDLIFE SIGHTINGS LOG AND INCIDENTAL OBSERVATIONS

One wolverine was observed in 2023 (Appendix H). On March 27, 2023 a solo wolverine was observed at kilometer five on Windy Road, bounding west.

Wolverines have been recorded variably across years, with sightings most commonly occurring in winter and spring (January to May; Figure 21). Very few individual wolverines are typically seen in a given year compared to other large mammal VECs (see Sections 3.4 to 3.6).

3.7.4 DISCUSSION

Wolverine were recorded in low numbers across all camera zones, with 11 wolverine events recorded during the recent monitoring period September 2022-2023. Almost all wolverine cameras events recorded are of one individual.

Wolverine occupancy (cameras with at least one wolverine event in a month) was compiled from wildlife cameras using data from June 2016 to September 2023. Analysis was conducted to assess Project related effects on wolverine occupancy between the Treatment zone (< 2 km to infrastructure) and the Control zone (> 10 km from infrastructure). The analysis accounted for spatiotemporal variation in the data by including smooth functions for month and location (northing and easting) and random variables for camera number and year.

Consistent with results from 2022, the analyses indicated that wolverine occupancy differed in the Treatment zone compared both the Control zone and the potential ZOI (2 to 10 km from infrastructure). A secondary analysis was conducted using continuous distance from infrastructure as a variable, with visualization showing that the probability of wolverine occupancy at wildlife cameras is very low overall but gradually increases from 3% to 10% as the distance from infrastructure increases to 20 km. The significant difference between the Treatment and ZOI camera zones in the main analysis indicates a potential ZOI is occurring within 2 km of Infrastructure. Results should be interpreted with caution because wolverine detections through the camera program remain rare.

The Madrid-Boston predictions included not significant and low magnitude residual effects of disruption of movement and attraction at a geographic extent of the PDA for wolverine (TMAC Resources Inc. 2017). Current analyses indicate that wolverine may be exhibiting avoidance of Project infrastructure at greater distances, potentially within around 2 km of infrastructure. This result is contrary to the FEIS prediction that wolverine may be attracted to the Project. Using the criteria for residual effects ratings from the FEIS, the current effect would be categorized as a low magnitude, medium duration, and reversible not significant effect (TMAC Resources 2017). At this time Agnico Eagle considered the wolverine ZOI analysis sufficient to confirm that the effects of the Project are not attracting wolverines. Therefore, 2023 is proposed to be the last year of conducting the camera ZOI analysis for wolverine. The camera monitoring program will continue

and results of wolverine detections will be summarized in the annual WMMP Report. If patterns in wolverine occurrence change (as evidenced by increased or decreased detections by camera zone or season), the ZOI analysis may be conducted again for further assessment of wolverine occurrence patterns. This update in the WMMP program will be included in an updated 2024 WMMP Plan, and discussed at the first IEAC meeting in 2024 prior to changes being implemented.

Wolverine have very large home ranges compared to the Project area, and potential avoidance is unlikely to impact a significant portion of any individual's territory. Home ranges of wolverines vary by sex, ranging from 100 km² for an adult female to over 600 km² for an adult male (Copeland and Whitman 2003). Low densities of wolverine in this area have been confirmed through other studies. A two-year wolverine DNA study in the northern portion of the Project Study Area in 2010 and 2011 estimated a relative density of 5.4 to 6.4 wolverine per 1,000 km² (Rescan 2011). Population densities of wolverine in other areas of the Canadian tundra are approximately 1.25 to 25 individuals per 1,000 km², depending on habitat and the availability of prey (Persson, Wedholm, and Segerstrom 2010; Inman et al. 2012).

Wolverine occupancy may also vary in the Project area due to natural differences in habitat and prey availability. For example, in winter caribou have been noted to be more common through the rocky areas surrounding the Project, rather than the low lying Green Belt where the mine site is situated. Wolverine may follow similar patterns, tracking caribou as their main form of prey. Because the camera program was implemented in its current design in 2016 after Project construction had commenced, there is no way to distinguish between natural environmental variation in species occurrence compared to distribution changes due to the presence of the Project.

Wolverine were not recorded on any specific facility monitoring cameras that monitor areas which may be attractants, or in the vicinity of the TIA in 2023. In 2022 the Roberts Bay Waste Management Facility moved locations, and the camera associated with the facility subsequently moved with it. No wolverine events were observed at the new location, nor had they been recorded at the previous location in recent years. The FEIS predicted a low magnitude residual effect for attraction to the Project for wolverine, but monitoring to date does not indicate any attraction of wolverine to the Project.

3.8 NEST PREDATORS

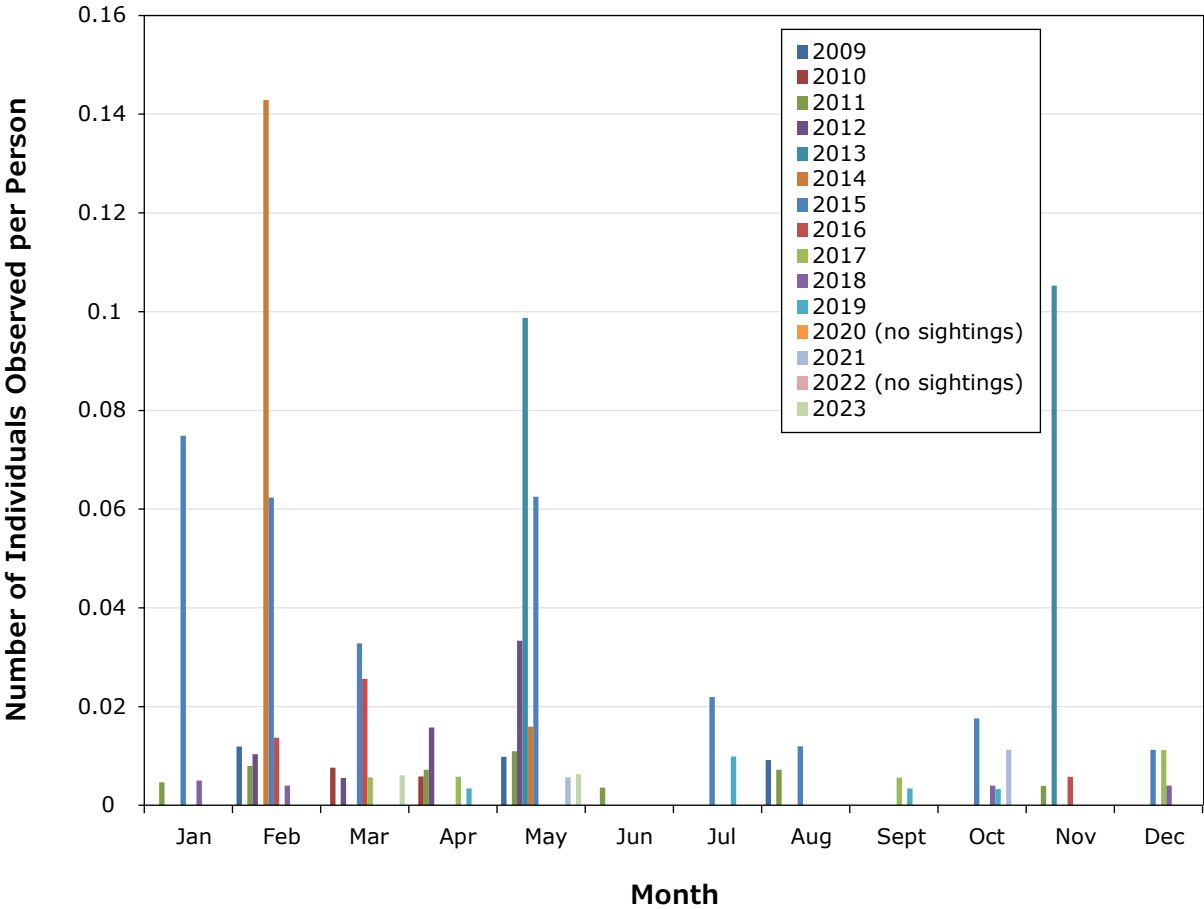
Nest predators include omnivorous or carnivorous species that frequently depredate bird nests. In the Project area, this includes common ravens (*Corvus corax*), Arctic fox (*Vulpes lagopus*), red fox (*Vulpes vulpes*), grey wolf (*Canis lupus*), gulls (*Laridae sp.*), and small-bodied mammals such as weasels (*Mustilidae sp.*).

3.8.1 FEIS PREDICTIONS

The attraction of nest predators to Project infrastructure, which could cause indirect mortality of nesting upland breeding birds and waterbirds, was not predicted to be a residual effect (TMAC Resources Inc. 2017).



FIGURE 21 NUMBER OF WOLVERINE INDIVIDUALS RECORDED PER PERSONNEL PRESENT, HOPE BAY PROJECT, 2009 TO 2023



3.8.2 METHODS

Nest predators are monitored through the wildlife camera monitoring program as well as through the Wildlife Sightings/Reporting program. General methods for these programs are described in Section 3.2.

For nest predators detected at cameras, small-bodied mammals such as weasels are excluded from analysis because of very low detections of these species by wildlife cameras.

3.8.3 RESULTS

3.8.3.1 CAMERA MONITORING

The following section presents the results of detections of potential nest predators from May 15 to August 15, in 2023 (i.e., during the bird nesting period in the Arctic). Across this period from May to August, available cameras were active and recording for a total of 11,996 camera days (Table 30).

From May 15 to August 15, 2023, there were a total of 18 unique events recorded that contained potential nest predators (Table 30; Figure 22; Appendix F). Events were generally consistent across months but were more common in the ZOI ($n = 9$) than the Treatment or Control zones ($n = 5$ and 4 respectively; Table 30). Recorded nest predators in the 2023 bird nesting period included red fox ($n = 8$; Photo 14), unspecified fox ($n = 9$), common raven ($n = 1$). Nest predator events typically consist of one individual and in the most recent monitoring period all events included only a single individual. The observed number of individuals does not represent the total number of unique individuals that were present due to the possibility of double-counting the same individuals both temporally and spatially.



Photo 14 Red fox captured on ZOI zone camera 25. April 5, 2023.

TABLE 30 NEST PREDATOR EVENTS RECORDED BY MONTH AT TREATMENT, ZOI, AND CONTROL CAMERAS, MAY 15 TO AUGUST 15, 2023

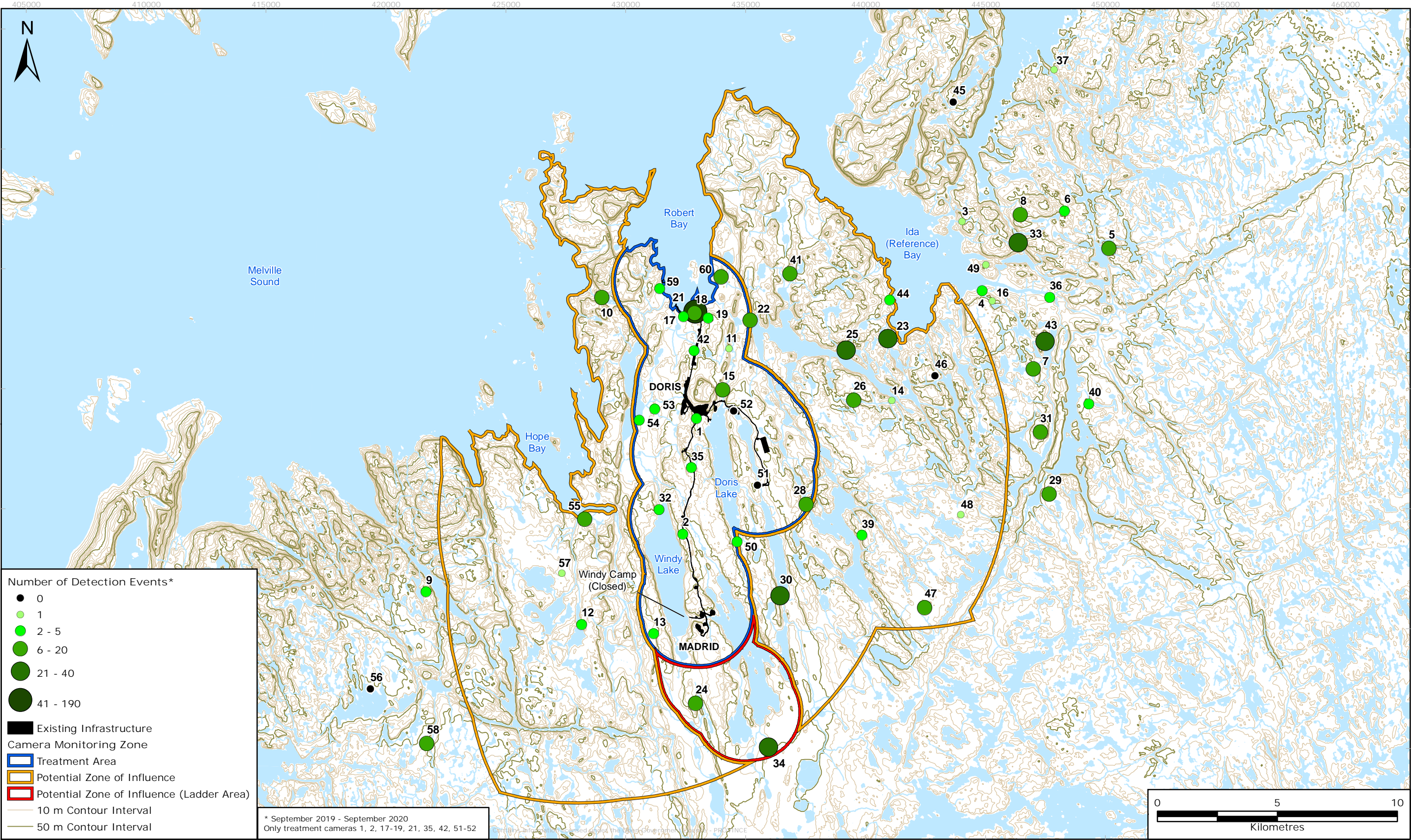
| Year | Month | Treatment Cameras | | | | ZOI Cameras | | | | Control Cameras | | | |
|--------------------------|-------|----------------------------|-------------------------|-------------------------|-------------|----------------------------|-------------------------|-------------------------|--------------|----------------------------|-------------------------|-------------------------|-------------|
| | | Camera Effort ¹ | No. Cameras with Events | No. Events ² | | Camera Effort ¹ | No. Cameras with Events | No. Events ² | | Camera Effort ¹ | No. Cameras with Events | No. Events ² | |
| | | | | Raw | Corrected | | | Raw | Corrected | | | Raw | Corrected |
| 2023 | May | 401 (16) | - | - | - | 372 (16) | 3 | 3 | 4.16 | 345 (18) | - | - | - |
| | June | 420 (18) | - | - | - | 372 (16) | 2 | 2 | 2 | 434 (18) | 1 | 2 | 2 |
| | July | 349 (16) | 3 | 4 | 4.12 | 321 (15) | 3 | 3 | 3.09 | 376 (17) | 1 | 2 | 2.06 |
| | Aug. | 381 (18) | 1 | 1 | 1.09 | 300 (13) | 1 | 2 | 2.18 | 344 (17) | - | - | - |
| Total³ | | - | 4 | 5 | 5.21 | - | 9 | 10 | 11.43 | - | 2 | 4 | 4.06 |

¹ Camera effort is presented as the total number of camera days by month; number of cameras with at least one camera day (i.e., upright) presented in parenthesis.

² Events are presented as the number recorded by cameras (raw) as well as the number of events corrected for the monthly darkness factor (corrected).

³ Total number of cameras with events represents the number of unique cameras with events across the entire monitoring period. Total number of events is the cumulative total across the entire monitoring period

FIGURE 22 DETECTIONS OF NEST PREDATORS ON MOTION-TRIGGERED PHOTOS RECORDED BY REMOTE CAMERAS, DORIS AND MADRID AREAS, JUNE 2016 TO SEPTEMBER 2023



Facilities Camera Monitoring

Under the current camera design, there are five cameras that have site specific monitoring objectives for nest predators (the same cameras with site specific monitoring objectives for grizzly bear): cameras 18 and 21 at the Roberts Bay Waste Management Facility, camera 22 at the Roberts Lake Outflow/Fish Fence, and cameras 51 and 52 at the north and south end of the TIA. Individual camera effort information is in Appendix D.

Only two nest predator events were captured on facility cameras during the breeding bird period from May 15 to August 15, 2023. These consisted of two red foxes recorded on camera 51 at the North end of the TIA. These events represent the first nest predators captured on the TIA cameras, which suggests that the areas around the TIA are infrequently used by nest predators. The presence of nest predators such as foxes and wolves in this area may also be noted through the Wildlife Sightings/Reporting process, as discussed below.

3.8.3.2 INTERACTIONS, INCIDENTS AND MORTALITIES

One mortality involving nest predators was recorded in 2023 (Appendix G). A dead red fox was seen being carried by another red fox on November 25, 2023. The red fox was believed to have died of natural causes.

No nest predator interactions or incidents were reported during 2023 (Appendix G).

3.8.3.3 WILDLIFE SIGHTINGS LOG AND INCIDENTAL OBSERVATIONS

Fifty-six incidental sightings of potential nest predators were recorded in 2023, primarily red foxes ($n = 31$ sightings; Appendix H). Additional records include eleven raven sightings, five wolf sightings, four arctic fox sightings, ten unidentified fox sightings, two gull sightings, and one ermine sighting (Appendix H). All red fox sightings were of single individuals, except for pairs observed in March and July and one other sighting of an individual fox carrying another deceased fox in November. Sightings generally occurred in the Doris area ($n = 35$) and Windy Road/ Madrid area ($n = 15$; Table 31). All five sightings near the TIA and TLR access road were of red foxes and did not include any records of animals on the footprint of the TIA or interacting with tailings.

TABLE 31 NEST PREDATOR SIGHTINGS LOG AND INCIDENTAL OBSERVATIONS 2023

| General Location | Months | Total Sightings | Total Individuals |
|--------------------|---|-----------------|-------------------|
| Doris Area | All months | 35 | 47 |
| Windy Road/ Madrid | February-April, June-August, October-December | 15 | 16 |
| TLR/TIA | February, June, August, November | 5 | 5 |
| Boston | September | 1 | 1 |

Observations of nest predators standardized by the number of personnel on site between May and August across years are illustrated in Figure 23. Observations typically peak in May and decrease through the summer, with the highest proportion of nest predators per on site personnel from 2013-2014 (Figure 23).

3.8.3.4 SPECIES OF CONSERVATION CONCERN

None of the nest predator species known to occur in the Study Area are listed as species of conservation concern federally or in Nunavut.

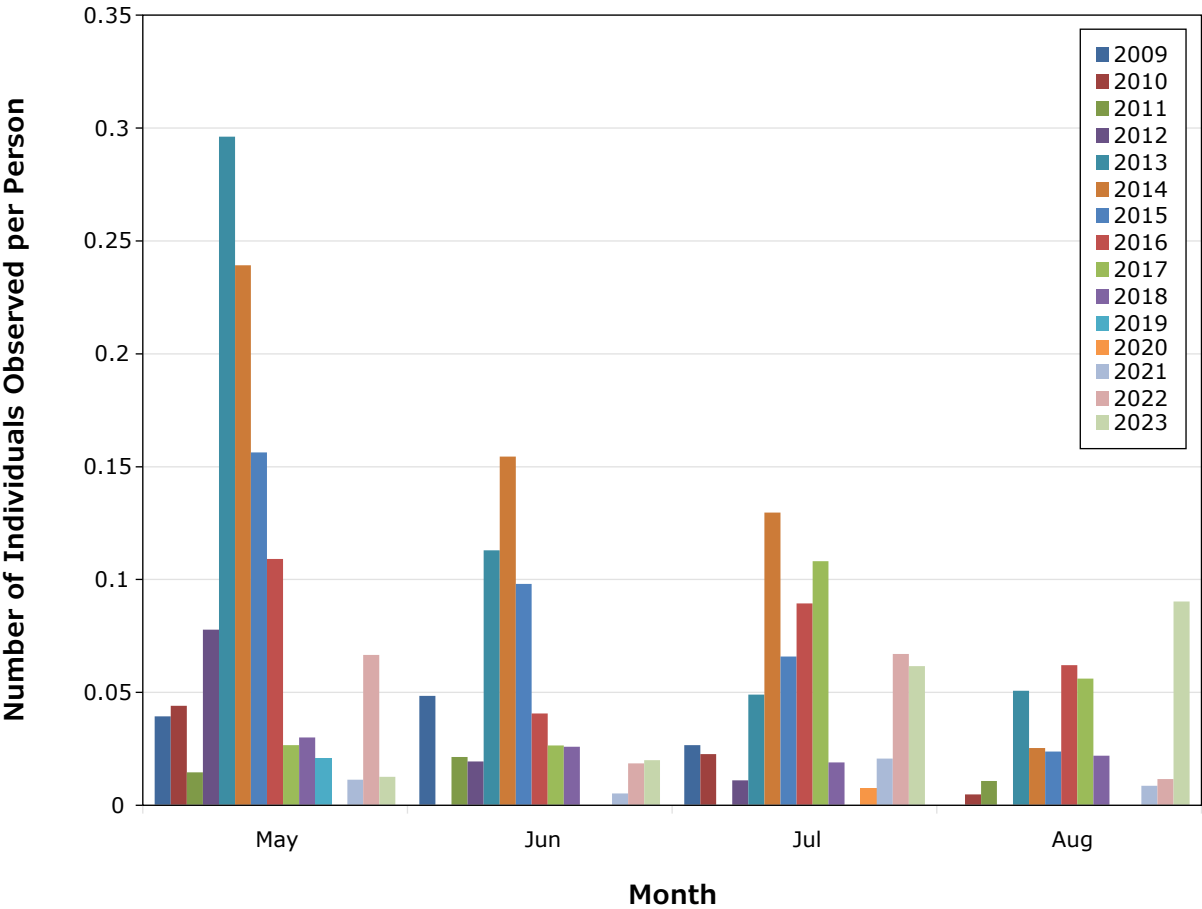
3.8.4 DISCUSSION

Nest predator events in 2023 were summarized during the breeding period for migratory birds (May 15 to August 15). Nest predator observations included red fox, unidentified fox, and common raven. Events were generally consistent across all camera zones and all monitoring months (May to August). Nest predator monitoring was initiated due to concern that the Project may attract nest predators and have a potential impact on upland breeding bird nest success near the site. However, monitoring has not indicated any attraction of nest predators to the Project area. Across years, nest predators are typically equally common across all camera zones. Additionally, the FEIS did not predict any effects related to nest predators and neither Project Certificate No. 003 nor Project Certificate No. 009 have any commitments related to nest predators. Therefore, it is proposed that 2023 will be the last year of targeted monitoring for nest predators. The incidentals, interactions, and incidents of non-VEC species (e.g., wolves and foxes) will continue to be reported in the annual WMMP Report, however camera data will not be assessed for non-VEC species. This update in the WMMP program will be included in an updated 2024 WMMP Plan, and discussed at the first IEAC meeting in 2024 prior to changes being implemented.

Two red fox events were the only nest predator events recorded on facility monitoring cameras. These events occurred on camera 51, which monitors activity at the north end of the TIA. These events represent the first nest predators captured on the TIA cameras, which suggests that the areas around the tailings dams are infrequently used by nest predators.

Fifty-three sightings of nest predators, primarily red fox individuals, were recorded in the wildlife sightings log in 2023. The number of individuals recorded in the wildlife sightings log should not be interpreted as observations of unique individuals (e.g., a population estimate) as the same individuals can be counted across time. No den sites were noted on or under infrastructure. These sightings indicate that building skirting (to prevent wildlife access) and routine inspections for denning potential have been effective mitigation strategies for preventing potential nest predators from denning on infrastructure. Overall, sightings of nest predator species are more common in May than June through August (Figure 23). Red fox and grey wolf are the most commonly detected nest predator species, while Arctic fox and birds (gulls and jaegers) are less frequently recorded.

FIGURE 23 NUMBER OF NEST PREDATOR INDIVIDUALS RECORDED PER PERSONNEL PRESENT BETWEEN MAY AND AUGUST, HOPE BAY PROJECT, 2009 TO 2023



3.9 UPLAND BREEDING BIRDS

Upland breeding birds include passerines and shorebirds. Upland breeding bird monitoring was conducted in 2023 to contribute a regional upland bird monitoring program for the Canadian Arctic led by CWS, as described in the WMMP Plan (Agnico Eagle Mines Limited 2023).

The Doris upland bird monitoring compliance program was paused from 2018-2021 while under active discussion and review with CWS and the KIA. Long term monitoring and analyses from 2006 to 2019 concluded that effects of the Project could not be detected beyond 100-200 m, which is within the predicted effects of 500-1,000 m from the 2006 FEIS.

In early 2021 the upland bird program was officially discontinued for Project effects purposes; monitoring has shifted to contribute to the CWS regional monitoring program. As described in the WMMP, survey plots were selected by CWS from the Program for Regional and International Shorebird Monitoring (PRISM) database and monitored every 5 years. Where possible, the monitoring will be split into two consecutive years of monitoring (i.e., 12 plots one year, and the remaining 12 plots the following year; Agnico Eagle Mines Limited 2023). The first year of PRISM surveys for the regional upland bird monitoring program were conducted in 2022. The second year of PRISM surveys were postponed in 2023 and will subsequently be completed in 2024. Surveys were not completed in 2023 because of logistical constraints created by the Project being in care and maintenance.

Upland breeding bird monitoring is also conducted every two years to monitor bird use of the habitat around the TIA, in compliance with Term and Condition 26 of Project Certificate No. 009 (NIRB 2018, Agnico Eagle Mines Limited 2023). This monitoring was conducted in 2021 and will be completed again in 2024.

Pre-clearing surveys for upland bird nests are conducted if clearing of natural vegetation occurs within the reproductive period for birds in the Arctic (May to August; ECCC 2016). However, pre-clearing surveys for nesting birds were not conducted in 2023, because clearing of new areas did not occur during the breeding bird period in 2023 (see Section 2.1).

3.9.1 FEIS PREDICTIONS

The Madrid-Boston FEIS predictions included two potential residual effects for upland breeding birds: a not significant and a negligible magnitude residual effect of disturbance at a geographic extent of the LSA, and a not significant and low magnitude residual effect of direct mortality at the geographic extent of the PDA for upland breeding birds (TMAC Resources Inc. 2017).

3.9.2 METHODS

The potential effects of Project-related activities on upland breeding birds were monitored in 2023 through the wildlife interactions, incidents, and mortalities program and incidental sightings program; these records are qualitatively assessed for trends. General methods for these programs are described in Section 3.2 and raw data are in Appendices H to J.

3.9.3 RESULTS

3.9.3.1 INTERACTIONS, INCIDENTS, AND MORTALITIES

One interaction involving upland breeding birds was recorded in 2023 (Appendix G). The interaction occurred on July 9, 2023, involving a single unknown species of ptarmigan flushed from their nest by site personnel. The nest contained four eggs and was left for the bird to return to undisturbed.

3.9.3.2 WILDLIFE SIGHTINGS LOG AND INCIDENTAL OBSERVATIONS

Upland breeding birds were observed in 29 separate sightings in 2023, mostly in the Doris area (Table 32; Appendix H). The majority of sightings ($n = 24$) were of unspecified ptarmigan species. Groups of more than 20 ptarmigan were observed on 3 occasions, including one group of 30 on October 27, at kilometer 6 of Windy Road. Additional sightings included one American robin at the Doris Creek Bridge and another American robin near the powerhouse, fifteen Lapland longspur at the South Dam of the TIA, twelve snow buntings flying over kilometer 4 of Windy Road, and over fifty snow buntings at the Robert's Bay Jetty.

TABLE 32 UPLAND BREEDING BIRDS SIGHTINGS AND INCIDENTAL OBSERVATIONS 2022

| General Location | Months | Total Sightings | Total Individuals |
|--------------------|--|-----------------|-------------------|
| Doris Area | January-March, May-November | 17 | 142 |
| Windy Road/ Madrid | January-March, May, October, November | 8 | 93 |
| TLR/TIA | April, July, August, October | 4 | 54 |

3.9.3.3 SPECIES OF CONSERVATION CONCERN

In 2023, the snow bunting was the only upland bird species of conservation concern observed. Snow buntings are listed as a vulnerable species in Nunavut (CESCC 2020). There were two incidental observations of the snow bunting in 2023. Records of species of conservation concern observed at the Project since 1996 are reported in Appendix J.

3.9.4 DISCUSSION

No pre-clearing surveys for upland breeding birds were conducted in 2023 because clearing activities did not occur. One interaction occurred, where in an unspecified ptarmigan species was accidentally flushed from its nest by site personnel. Twenty-nine incidental observations were recorded in the wildlife sightings log, primarily of ptarmigan in the Doris area.

PRISM surveys are conducted to contribute to CWS regional monitoring data. Twelve plots were surveyed in 2022 and another 12 will be completed in 2024. Regional PRISM surveys are set to be conducted on an ongoing basis in two of every five years. Monitoring at the TIA occurs every two years, was most recently conducted in 2021 and will be conducted again in 2024.

3.10 WATERBIRDS

Waterbird field surveys for the Doris compliance program have been scaled back from previous years after comprehensive analyses of the dataset from 2006-2018 and discussion with CWS. Monitoring for waterbirds and shorebirds will be conducted every two years from a height of land on the lakeshore using a spotting scope. Beginning in 2022, shoreline ground monitoring locations for the Project area were established to monitor waterbird abundance and species diversity by distance from Project infrastructure. This monitoring was conducted in 2022, and therefore was not repeated in 2023. Ground surveys for monitoring waterbirds and shorebirds will be continued in 2024.

Water quality at the TIA was monitored in 2023 in accordance with commitment 31 and condition 26 (NIRB 2018). Should water quality exceed guidelines for waterbirds, Agnico Eagle will conduct a toxicological risk assessment to determine if birds are safe using or nesting on the TIA. If that assessment determines that there is a risk to waterbird health, then waterbirds will be deterred from the TIA. Water quality was monitored at the TIA and did not exceed guidelines for wildlife in 2023, so no risk assessment was warranted (Section 3.10.3.2; Appendix T).

3.10.1 FEIS PREDICTIONS

The Madrid-Boston FEIS predictions included a not significant and a negligible magnitude residual effect of disturbance at a geographic extent of the LSA and a not significant and low magnitude residual effect of direct mortality at the geographic extent of the PDA for waterbirds (TMAC Resources Inc. 2017).

3.10.2 METHODS

In 2023 the potential effects of Project-related activities on waterbirds were monitored by water quality in the TIA (section 3.10.2.2), and the interactions, incidents, and mortalities program, as well as the wildlife sightings log. These data are summarized and qualitatively assessed for trends; general methods for these programs are reported in Section 3.2.

3.10.2.1 WATER QUALITY MONITORING IN THE TIA FOR WATERBIRDS

Water quality in the TIA at location TL-1 was sampled every week in 2023 ($n = 52$) by onsite staff as part of the existing water license requirements. Water quality data for parameters with guidelines relevant to wildlife (i.e., arsenic, cadmium, copper, lead, mercury, nickel, selenium, and zinc) are presented in Appendix T. Summary statistics (mean, standard deviation, and maximum concentrations) were compared to the CCME *Water quality guidelines for the Protection of Agriculture – Livestock* as those are the most relevant available guidelines for wildlife.

3.10.3 RESULTS

3.10.3.1 WATER QUALITY MONITORING IN THE TIA FOR WATERBIRDS

Table 33 presents summary statistics (mean, standard deviation, and maximum concentrations) for water quality parameters measured at TL-1 in the TIA in 2023 and the corresponding CCME water quality guidelines. The comparison of maximum concentrations to respective guideline

values indicates that water quality in the TIA meets guidelines for the protection of livestock and therefore no parameter was screened in for further assessment in an ecological risk assessment.

On June 20th, there was a spike in the maximum concentration of Nickel to 3.95 mg/L, however all other values were below the guideline (Table 33; Appendix T). The single occurrence of a high value indicates it is likely the result of contamination or lab error. This suggests that the value was likely not indicative of the water quality at TL-1 during sampling. Therefore, this sample was not selected for further assessment.

TABLE 33 SUMMARY STATISTICS FOR WATER QUALITY PARAMETERS WITH CCME GUIDELINES AT THE TIA (TL1)

| Parameter | CCME Water Quality Criteria, Livestock ¹ | Mean | Standard Deviation | Maximum | Selected for Further Assessment ? |
|---------------------|---|----------|--------------------|---------|-----------------------------------|
| Arsenic (As)-Total | 0.025 | 0.0024 | 0.0007 | 0.0037 | No |
| Cadmium (Cd)-Total | 0.08 | 3.0 E-04 | 1.21 E-05 | 0.0001 | No |
| Copper (Cu)-Total | 5 ² | 0.0189 | 0.0067 | 0.0305 | No |
| Lead (Pb)-Total | 0.1 | 0.0003 | 0.0001 | 0.001 | No |
| Mercury (Hg)-Total | 0.003 | 5.0 E-6 | 6.78 E-21 | 5.0 E-6 | No |
| Nickel (Ni)-Total | 1 | 0.0966 | 0.5470 | 3.95 | No, see text |
| Selenium (Se)-Total | 0.05 | 0.0004 | 0.0002 | 0.001 | No |
| Zinc (Zn)-Total | 50 | 0.0224 | 0.03 | 0.214 | No |

Notes:

Concentrations are in mg/L.

¹ Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Agriculture, Livestock.

² Guideline is variable. 5 mg/L for poultry was used, from Canadian Council of Resource and Environment Ministers (CCREM) 1987 (updated 2008) Canadian Water Quality Guidelines (CWQG).

3.10.3.2 INTERACTIONS, INCIDENTS, AND MORTALITIES

One mortality involving waterbirds was recorded in 2023. On November 18, 2023, an unidentified shearwater was located unable to move and was later found deceased. The individual died of natural causes due to exposure to the elements and was scavenged by ravens.

No waterbird interactions or incidents were reported during 2023 (Appendix G).

3.10.3.3 WILDLIFE SIGHTINGS LOG AND INCIDENTAL OBSERVATIONS

Waterbirds were incidentally sighted on 42 occasions, primarily in September ($n = 14$), July ($n = 9$) and August ($n = 7$; Table 34; Appendix H). The majority of sightings ($n = 14$) consisted of geese, including Canada geese and unspecified geese, where sightings ranged from 1 to 60 individuals, for a total of 261 individual geese. Forty-six sandhill cranes were observed on 13 different occasions in varying group sizes from 1 to 12. Eight swans were observed on six separate occasions, three

unidentified gulls were recorded on two occasions, and three pacific loons were also sighted on one occasion. A total of 44 ducks of unidentified species were observed on four occasions. Waterbird sightings were on the tundra ($n = 21$), on water or shoreline ($n = 9$), on site ($n = 9$), in the air ($n = 2$), and within a wetland ($n = 1$).

TABLE 34 WATERBIRD SIGHTINGS AND INCIDENTAL OBSERVATIONS 2023

| General Location | Months | Total Sightings | Total Individuals |
|--------------------|-------------------------------|-----------------|-------------------|
| Doris Area | May, July-September, November | 10 | 38 |
| Windy Road/ Madrid | May-September | 23 | 270 |
| TLR/TIA | July-September | 7 | 60 |
| Airstrip | May, June | 2 | 8 |

Three observations were of ducks on the TIA ($n = 14$). Waterbirds are occasionally recorded on the TIA, however ongoing monitoring indicates that the water quality is below threshold guidelines and should not pose a risk to wildlife (see Section 3.10.3.2 above).

The number of individuals recorded in the wildlife sightings log should not be interpreted as observations of unique individuals (e.g., a population estimate) as it is likely that the same individuals can be counted across time by different observers.

3.10.3.4 OBSERVATIONS FROM ABOARD VESSELS

Aboard the Qamutik, waterbirds were observed on 14 occasions, with them occurring in August ($n = 11$) and September ($n = 3$). The majority of the sightings the waterbirds were seen flying ($n = 10$) and all others observed on the ocean surface ($n = 4$). Sixteen common loon were observed on two occasions, twelve northern fulmar were observed on six occasions, ten Canada geese were observed on a single occasion, four herring gull were observed on a single occasion, 3 black guillemot were observed on a single occasion and 2 polmarine jaeger were observed on two occasions.

3.10.3.5 SPECIES OF CONSERVATION CONCERN

None of the waterbird species of conservation concern known to occur in the Study Area were observed in 2023. Records of species of conservation concern observed at the Project since 1996 are reported in Appendix J.

3.10.4 DISCUSSION

No chemical parameters were scoped for an ecological risk assessment for waterbirds detected on the TIA, based on a comparison to the only water quality guidelines applicable to wildlife in the area, CCME *Water quality guidelines for the Protection of Agriculture – Livestock* (Canadian Council of Ministers of the Environment 1999). These guidelines have been developed primarily for the protection of livestock including poultry and are assumed to be protective of waterbirds.

A single elevated detection of Nickel concentration (3.95 mg/L) recorded on June 20 was not selected for further assessment because the value was likely the result of contamination or lab error. The value spiked during that sampling event and then immediately returned to typical values seen in the sampling events leading up to that date. There were no values over the entire sampling period of 2023 that were similar to this value. This suggests that the value was likely not indicative of the water quality at TL-1 during sampling. This is the first and only occurrence of an error in the TIA water quality sampling for this program, which indicates that sampling protocols are followed and generally values should be accurate.

Geese, sandhill cranes, ducks, swans, loons and seabirds were incidentally observed on 56 occasions from May to November. The number of individuals recorded in the wildlife sightings log should not be interpreted as observations of unique individuals (e.g., a population estimate) as it is likely that the same individuals can be counted across time by different observers. Three observations were of ducks on the TIA ($n = 14$ ducks). Waterbirds are occasionally recorded on the TIA, however ongoing monitoring indicates that the water quality is below threshold guidelines and should not pose a risk to wildlife (see Section 3.10.3.2 above).

Eleven waterbirds were observed flying between August 29 and 30, 2023. Twenty-one seabirds were incidentally observed between August 29 and September 8, 2023. Of the twenty-one observed, eleven were flying and ten were resting on the ocean surface. One species of sea duck was observed rafting in the water at sea.

3.11 RAPTORS

Raptor field surveys for the Doris compliance program have been discontinued. A comprehensive statistical analysis of raptor nesting data was performed to test FEIS predictions and presented in the 2018 WMMP Report (ERM 2019). Following comments from ECCC and the GN, a more holistic analysis was conducted, using additional data compiled by the Government of Northwest Territories from 1987 to 2004 and analyzing effects separately for each species. The analysis was submitted as a scientific publication for peer review in 2019 but the peer review process was not properly completed due to reviewer unavailability during the Covid-19 pandemic. The paper is in the process of edits and re-submission. Broadly, the analysis concluded that breeding rate was primarily driven by annual weather variation; influence of specific weather parameters (snow depth, precipitation, temperature) varied by species, connected to differences in nesting site characteristics such as overhang protection. Top AIC ranked breeding rate and productivity models generally did not include mine impact parameters, indicating that mine activity did not influence breeding rates or productivity in any of the raptor species.

Occupancy surveys of raptor territories in Madrid North were not conducted in 2023 because construction did not occur in the area during the raptor breeding period. These surveys are required if construction occurs during the raptor breeding period as part of condition 27 for Project Certificate No. 009 (NIRB 2018).

3.11.5 FEIS PREDICTIONS

The Madrid-Boston FEIS predictions included a not significant and low magnitude residual effect of disturbance at a geographic extent of the RSA and direct mortality at the extent of the PDA for raptors (TMAC Resources Inc. 2017).

3.11.6 METHODS

The potential effects of Project-related activities on raptors were monitored in 2023 through the wildlife interactions, incidents, and mortalities program and incidental sightings program; these records are qualitatively assessed for trends. General methods for these programs are described in Section 3.2.

3.11.7 RESULTS

3.11.7.1 INTERACTIONS, INCIDENTS, AND MORTALITIES

No incidents, interactions, or mortalities with raptors were recorded in 2023.

3.11.7.2 WILDLIFE SIGHTINGS LOG AND INCIDENTAL OBSERVATIONS

In 2023, a total of 39 raptors were reported in 25 sightings between April and November (Appendix H). Eagles were observed on ten occasions and included 10 unidentified eagles, two golden eagles, and one bald eagle. Peregrine falcon ($n = 6$ sightings), ravens ($n = 6$ sightings), and rough-legged hawks ($n = 1$ sightings) were also noted. Additionally, one snowy owl was recorded at kilometer 2 of Windy Road. Sightings were most common in the Doris area, typically noted soaring or flying over camp (Table 35). Raptors were also recorded occasionally along Windy Road and the TLR (Table 35). All raptors observed on the TLR were not observed within the footprint of the TIA or interacting with it.

TABLE 35 RAPTOR SIGHTINGS AND INCIDENTAL OBSERVATIONS (2023)

| General Location | Months | Total Sightings | Total Individuals |
|--------------------|-----------------|-----------------|-------------------|
| Doris Area | April-September | 15 | 27 |
| Windy Road/ Madrid | May-September | 8 | 10 |
| TLR/TIA | September | 2 | 2 |

3.11.7.3 SPECIES OF CONSERVATION CONCERN

In 2023, the golden eagle, listed as a vulnerable species in Nunavut (CESCC 2020), was the only species of conservation concern observed. There were two incidental observations of the golden eagle in 2023. Records of species of conservation concern observed at the Project since 1996 are reported in Appendix J.

3.11.8 DISCUSSION

Aerial surveys of raptor nests in the vicinity of Madrid North were not conducted in 2023 because no construction occurred in the area.

During 2023, 25 raptor sightings were recorded in April through September. The majority of individuals were peregrine falcons and eagles, while the remainder included a snowy owl and rough-legged hawks. No raptor nests were identified incidentally in 2023, and no interactions or incidents occurred.

3.12 MARINE MAMMALS

The WMMP Plan includes potential monitoring for noise and marine mammals during construction of the planned dock in Roberts Bay. Noise monitoring activities will be subject to an authorization from DFO, via an application process including information on detailed design and construction methods. The dock at Roberts Bay was not constructed in 2023 and as such, no monitoring related to construction noise was conducted (Agnico Eagle Mines Limited 2023).

The Shipping Management Plan was updated in early 2023 to include monitoring for marine wildlife in Roberts Bay during the shipping season, following condition 33 in Project Certificate No. 009 (NIRB 2018), which is specific to marine noise monitoring. Monitoring for this program was conducted for the first time 2023.

Mitigations for marine mammals related to shipping activity are described in the Shipping Management Plan (based on conditions 30, 31, and 32 in Project Certificate No. 009; NIRB 2018). These mitigations include required measures for shipping vessels and reporting of incidental sightings and incidents on shipping routes. All incidental sightings and incident reports are included in the WMMP Report (see Results).

3.12.1 FEIS PREDICTIONS

The Madrid-Boston FEIS predictions included a not significant and no potential of residual effects on ringed seals, which were used as an indicator for the larger marine mammals community. (TMAC Resources Inc. 2017).

3.12.2 METHODS

The potential effects of Project-related activities on marine mammals are monitored via observation surveys Roberts Bay during shipping activity, as well as through the Wildlife Sightings/Reporting program, results of which are presented as wildlife interactions, incidents, and mortalities and incidental sightings (see Section 3.2).

3.12.2.1 MARINE MAMMAL MONITORING

In 2023, a marine wildlife monitoring program was implemented to assess disturbance of marine wildlife during shipping season from vessel noise. The surveys were conducted in Roberts Bay, once per day for at least four days of each of the following: before the ships arrived in the bay, while they were anchored in the bay, and after they had departed. Surveys followed an SOP which details the timing, locations, data collection, and provides resources for common species ID



(Appendix AB). Surveys were completed from the shore, at locations with the best view of the Bay (the jetty or the 730 building, see map in Appendix AB). Surveys lasted thirty minutes and observers scanned for the presence and behaviour of any marine mammal in the bay.

Survey data included the date, start and end time, weather, sea state, wind (Beaufort scale), wind direction, wave height in the bay, glare conditions, and estimated visibility in kilometers. When a marine mammal was sighted, observers recorded the species, numbers of marine mammal individuals, age class, sex, and behavior of the animals. In addition, timing of the observation, distance from the observer, angle of sighting relative to observation, whether a mitigation action occurred, and location were recorded.

3.12.2.2 SHIPPING MITIGATIONS

Incidental sightings and incidents along shipping routes are also reported by shipping vessel operators. Additionally, vessel tracks were assessed via data from the Wood Mackenzie vessel tracking database to confirm that setbacks and avoidance areas were followed.

3.12.3 RESULTS

3.12.3.1 MARINE MAMMAL MONITORING

A total of 15 marine mammals surveys in Roberts Bay were completed in 2023. Surveys occurred once per day from September 2 to September 16, 2023 (Appendix U). The surveys were conducted on days before the ship arrived in Roberts Bay (September 2 to September 5, 2023), when it was anchored in the bay (September 6 to September 11, 2023), and after departure (September 12 to September 16, 2023; Table 36). On the days before the ship arrived in Roberts Bay, two adult marine mammals were observed, one unknown seal and one bearded seal. While the ship was anchored in the bay, one adult unknown seal was observed, the seal did not react to the tugboat traffic nearby. After the ship left, one adult unknown seal was observed.

TABLE 36 MARINE MAMMAL MONITORING, 2023

| Monitoring Period | Monitoring Dates | Total Marine Mammals | Notes |
|-------------------|------------------|----------------------|-------------------------|
| Before Shipping | September 2-5 | 2 | 1 bearded seal, playing |
| | | | 1 unknown seal, resting |
| During Shipping | September 6-11 | 1 | 1 unknown seal, resting |
| After Shipping | September 12-16 | 1 | 1 unknown seal, resting |

3.12.3.2 SHIPPING MITIGATIONS

No marine wildlife incidents were reported in 2023. Incidental sightings in 2023 were reported and summarized below.

Five seals, two hooded seals, one harbour seal and two bearded seals, were recorded while the Qamutik was travelling at sea in August 2023. In September 2023, an incidental sighting of a whale diving near the Qamutik at sea was reported. Incidental sightings of seabirds are included in Section 3.10.3.4 above.

The Qamutik vessel tracks, the only vessel traffic, from 2023 were summarized to confirm that mitigations for setbacks and designated routes were followed (Figure 24). The track does not reflect precise vessel locations due to gaps in GPS signals (e.g., where tracks appear to cross land; Figure 24). The Qamutik vessel had no deviations from the nominal shipping route.

3.12.3.3 INTERACTIONS, INCIDENTS, AND MORTALITIES

No incidents, interactions, or mortalities with marine mammals were recorded in 2023.

3.12.3.4 WILDLIFE SIGHTINGS LOG AND INCIDENTAL OBSERVATIONS

Two seals of unknown species were incidentally reported in 2023 (Appendix H). One individual was seen swimming at Roberts Bay and the other was seen resting on the beach of a small island.

There was also one report of a dead fish on the beach at Patch Lake, without species identification or details. The dead fish is assumed to have died due to natural causes and not related to project activity.

3.12.4 DISCUSSION

Marine mammal monitoring for Roberts Bay occurred daily from September 2-16, 2023. Surveys were conducted during three monitoring periods: before shipping activity ($n = X$ days in 2023), during shipping activity ($n = X$ days in 2023), and after shipping activity ($n = X$ days in 2023). Four marine mammals (i.e., seals) were observed during surveys. The observations were split among the three monitoring periods, with two seals recorded before shipping activity, one recorded during shipping activity, and one recorded after shipping activity. All seals observed were exhibiting normal behaviour of resting, basking, or playing. This was the first year of surveys for this monitoring program under T&C 33, and as such the sample size is too small to analyze patterns in marine mammal occurrence with shipping activity. As per the Shipping Management Plan, the first two years of monitoring will inform appropriate indicators and thresholds to determine if negative impacts on marine wildlife are occurring. Indicators and thresholds cannot be set until the overall rate of marine wildlife observations is known.

Two seals of unidentified species were reported in Roberts Bay incidentally through the Wildlife Sightings/Reporting program in 2023.

Additionally, shipping vessels incidentally reported marine mammals along the shipping route. In August 2023, two hooded seals, one harbour seal and two bearded seals were observed while at sea. In September 2023, an incidental sighting of a whale diving was reported. No marine wildlife incidents were reported along shipping routes in 2023. Vessel operators were provided with Project-specific training and review of marine wildlife setbacks and mitigations. In addition, operators were trained on reporting requirements prior to the shipping season, as is described in the Shipping Management Plan. Operators were also provided with identification guides for seabirds, whales, and pinnipeds.

An assessment of vessel tracks indicated that vessels followed setbacks and sensitive areas for wildlife in the shipping area.

FIGURE 24 VESSEL TRACKS DURING SHIPPING SEASON, SEPTEMBER 2023



3.13 PLANTS

A sedge sampling program for tissue metal concentrations was initiated in 2018; additional data collection will be discussed when operations of the Madrid and/or Boston areas is underway.

Monitoring for invasive plants occurred during baseline work for the FEIS. At that time, no invasive plants were found onsite. Ongoing monitoring for invasive plants is required by condition 17 and commitment GN#04 in Project Certificate No. 009 (NIRB 2018). The WMMP Plan includes invasive plant monitoring along Project infrastructure at 5-year intervals. This monitoring was conducted during the baseline for the Phase 2 FEIS, and again for the second time in 2023. Surveys will be conducted again in 2029.

3.13.1 FEIS PREDICTIONS

The FEIS did not include any predictions about invasive plants related to potential effects of the Project on vegetation. The potential for habitat loss related to special landscape features is included in Section 2.1.

3.13.2 METHODS

3.13.2.1 SURVEY AREA

Monitoring for non-native invasive plant species was completed across existing Project infrastructure and disturbed areas within the Local Study Area, including:

1. Doris Camp and surrounding area including airstrip, helipad, TIA dams, vent rails, water treatment plant, and other disturbed areas;
2. Disturbed portions of Madrid North (Windy Road, Naartok pits and waste rock storage);
3. Boston Camp and airstrip;
4. The reclaimed Windy Camp;
5. Roberts Bay;
6. Road infrastructure including Windy Road and the TLR; and
7. All other cleared areas including rock quarries, overburden storage/stockpiles, open pits, waste rock piles, pads and laydowns, bridges, etc.

3.13.2.2 INVASIVE PLANT MONITORING PROTOCOL

Invasive plant surveys targeted species with the greatest potential to occur at the Hope Bay site. Further information on the invasive plant species monitoring methodology can be found in Appendices V to Y.

The list of invasive plant species targeted in surveys (Appendix V) referenced the *Non-native and Invasive species in Nunavut* list (Government of Nunavut 2022) and the *Hope Bay Belt Project: 2010 Ecosystems and Vegetation Baseline Report* (Rescan 2011). Since Nunavut does not currently maintain a Conservation Data Centre nor does it have an invasive plant council to track exotic or invasive plant species, supplemental information was obtained from neighbouring

Northwest Territories (e.g., NWT Species Infobase) and invasive plant databases, as described in Rescan (2011). Incidental observations of other non-native plants were also recorded.

A grid-based survey method was implemented across Project infrastructure for comprehensive coverage of the Project area. A survey grid was developed for the area defined by the 2022 as-built project footprint. This consists of a 50 m by 50 m grid, in addition to an elongated grid (10 m buffer on either side of road cut to 250 m segments) adapted for rapid roadside surveys (Appendix AD). Within each 50 m by 50 m grid cell, surveyors walked an 'S' shaped search pattern to ensure good survey coverage, beginning at one corner and ending in the diagonally opposite corner. Search pattern is adjusted for site features or visibility, for example buildings or compacted gravel which lack vegetation are skipped or surveyed more quickly.

Rapid roadside surveys are completed within a 10 m wide buffer on either side of the road edge. Roadside surveys are conducted from vehicles travelling at approximately 5 km/h, with one crew member driving while the surveyor is in the passenger seat scanning the roadside for invasive plants.

Since Nunavut has no invasive plant survey standards, monitoring attributes were informed by the InvasivesBC Reference Guide (BC Ministry of Forests 2023), formerly the Invasive Alien Plant Program (IAPP). Field data collection utilizes ArcGIS Field Maps for navigation and tracking survey progress, in combination with Survey123 for efficient and standardized data collection (Appendix X). Invasive plant surveys collect information on:

- Species and location;
- Abundance (percent cover) of each species in grid cell;
- Distribution of each species in grid cell;
- Density (plants per m²) within patches of vegetation;
- Life stage/phenology; and
- Additional details such as date, notable features, opportunistic management applied, etc.

Additional information on survey attributes, such as description of rankings, can be found in the InvasivesBC Reference Guide (BC Ministry of Forests 2023). A list of invasive plant attributes is shown in Appendix W and an example of the data collection form is shown in Appendix X.

Identification of plants is completed to the species level, with unknown and potentially non-native specimens collected as samples along with detailed photos taken for follow-up identification. Plant identification utilized references including local plant identification keys such as Saarela et al. (2020) and *Flora of the Canadian Arctic Archipelago* (Aiken et al. 2007). Invasive plant identification features can be seen in Appendix Y, Slides 23 to 65.

To limit disturbance and spread of invasive plants if observations occur, invasive plant patches will have yellow and black striped flagging put around them in the field (e.g., tie to wood stakes inserted into ground) to indicate areas containing invasive plants. If observations of invasive plants occur, a 10 m buffer distance will be and plants should be targeted for follow-up management. The invasive plant survey digital field form also enables the ability to record opportunistic management (e.g., hand pulling) applied to small patches of invasive plants.

3.13.2.3 SURVEY TIMING

Invasive plant surveys are completed during the peak growing season to ensure easier identification of plant species. For the Project area, suitable times for invasive plant monitoring are between early July to mid-August. Plant phenology will vary slightly year to year, but with peak flowering of target invasive species generally expected mid-July. Survey timing may also be dependent on timing of invasive species management.

3.13.2.4 QUALITY CONTROL/ASSURANCE

Survey design using ArcGIS Field Maps and Survey123 allows for auto-populated values and standardized options for invasive plant survey attributes (i.e., dropdown menus), reducing data collection errors. Survey data are reviewed prior to submitting a record. Records of completed surveys are also reviewed and updated as necessary using ArcGIS Online and ArcGIS Pro. ArcGIS Field Maps is used to track survey progress made in each area within the disturbance footprint. Following the completion of invasive surveys, all survey data including spatial data and invasive attribute data are reviewed in detail and any necessary edits made.

3.13.3 RESULTS

Invasive plant surveys were conducted July 26 to August 1, 2023. A total of 909 grid cells (264.1 ha) overlapping the current disturbance footprint were completed in 2023. Seventy-three of the completed grids (61.6 ha) were completed using the rapid roadside survey method while 836 area grids (202.5 ha) were completed on foot. A map of areas surveyed in 2023 is shown in Appendix AD. Fifty-nine grid cells (14.9 ha) were inaccessible due to proximity to the restricted Doris portal area (Appendix AD).

No invasive or non-native plant species were observed during 2023 surveys. Two native species which closely resemble invasive species were identified: seaside chamomile (*Tripleurospermum maritimum* subsp. *phaeocephalum*) and horned dandelion (*Taraxacum ceratophorum*). Photos of these species can be seen in Photo 15. Additionally, surveys observed native grasses which could be mistaken for target invasive grasses, particularly native alkali grasses which could be mistaken for invasive spreading alkali grass (*Puccinellia distans*), or native broadleaf Arctagrostis (*Arctagrostis latifolia*) which could be mistaken for invasive reed canary grass (*Phalaris arundinacea*). Information on plant identification characteristics and how to differentiate non-native invasive from look-alike native species can be found in the *Hope Bay Mine Site Invasive Plant Survey Presentation* presented on August 2, 2023 in Appendix Y.

3.13.4 DISCUSSION

Prevention, early detection, and eradication of invasive plants is the most economical and effective means of managing impacts from invasive species (Hobbs & Humphries 1995). To date, no invasive or non-native plant species have been recorded at Hope Bay. Mitigation to prevent the introduction of invasive plant species through Project activities is described in Section 2.11.1 of the WMMP (Agnico Eagle Mines Limited 2023). Monitoring of invasive plant species will continue every 5 years to ensure early detection and rapid response to eradicate detected non-native invasive species. Future surveys will account for any expansions to the as-built site footprint.

Areas with the highest likelihood of invasive plant introduction would be areas where activity is the greatest (e.g., Doris Camp) and where incoming shipments are received or processed, such as Roberts Bay.



Photo 15 Look-alike native plant species observed during
2023 Hope Bay invasive plant surveys

Top: seaside chamomile (*Tripleurospermum maritimum* subsp. *phaeocephalum*), similar to invasive scentless chamomile (*Tripleurospermum inodorum*); and Bottom: horned dandelion (*Taraxacum ceratophorum*), similar to invasive common dandelion (*Taraxacum officinale*).

The absence of non-native plant species in both 2010 baseline (Rescan 2011) and in 2023 can likely be explained by the harsh growing conditions and isolated (fly-in only) location of Hope Bay which limit risk of introduction, as well as effective implementation of mitigation measures to prevent species introduction. However, climate change associated regional warming in addition to increased activity/development in the Arctic are expected to result in increases in invasive species regionally (Clements & DiTommaso 2011; Turbelin & Catford 2021; Rew et al. 2020; Ricciardi et al. 2017).

The target invasive plant species list should be maintained and updated for future surveys, with consideration of new non-native species that may establish in Nunavut between the 5 year survey periods at Hope Bay. A 2008 Canadian Food Inspection Agency study reported 16 invasive plant species in Nunavut, the least of all Canadian provinces and territories, and 85 for the Northwest Territories (CFIA 2008); however, this number has increased in recent years. Nunavut is also currently building the capacity to host a Conservation Data Centre with NatureServe, which would enable tracking of non-native plant species in the territory.

To facilitate early detection and rapid response, site environmental team familiarize with the local native Arctic flora, to facilitate incidental sightings and reporting of potential non-native plants. This facilitates earlier identification and control measures, when management is most successful and least-costly (Hobbs & Humphries 1995). Plant identification resources can be referenced in the *Hope Bay Mine Site Invasive Plant Survey Presentation* presented on August 2, 2023 in Appendix Y.

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APPENDIX A DETAILED METHODOLOGY FOR THE HOPE BAY PROJECT PROGRAMS, 2023



APPENDIX A: DETAILED METHODOLOGY FOR THE HOPE BAY PROJECT PROGRAMS, 2023

APPENDIX CONTENTS LIST

| | | |
|-------|---|----|
| 1. | OVERVIEW | 3 |
| 2. | HABITAT LOSS | 3 |
| 3. | FACILITIES AND WILDLIFE CAMERA PROGRAMS | 3 |
| 3.1 | CAMERA PROGRAM STUDY DESIGN | 4 |
| 3.1.1 | Doris and Madrid Program Study Design | 4 |
| 3.1.2 | Boston Program Study Design | 14 |
| 3.2 | CAMERA SET UP AND OPERATIONS | 14 |
| 3.3 | CAMERA DATA ANALYSIS | 17 |
| 3.3.1 | Photo Review Process | 17 |
| 3.3.2 | Camera Effort | 18 |
| 3.3.3 | Summarization of Wildlife Events | 18 |
| 3.3.4 | Species-specific Analysis | 19 |
| 4. | ON-SITE MONITORING AND MITIGATION | 20 |
| 5. | INCIDENTAL WILDLIFE OBSERVATIONS BY ENVIRONMENT PERSONNEL | 20 |
| 5.1 | WILDLIFE SIGHTINGS LOG | 20 |
| 5.2 | INCIDENTAL WILDLIFE OBSERVATIONS BY ENVIRONMENT AND ON SITE PERSONNEL | 21 |
| 6. | VEC AND OTHER SPECIES MONITORING AND MITIGATION | 22 |
| 6.1 | CARIBOU | 22 |
| 6.1.1 | Analysis of Satellite Collar Data | 22 |
| 6.1.2 | Statistical Analysis of Camera Data | 24 |
| 6.2 | MUSKOX | 25 |
| 6.3 | GRIZZLY BEAR | 25 |
| 6.4 | WOLVERINE | 26 |
| 6.5 | NEST PREDATORS | 26 |
| 6.6 | UPLAND BREEDING BIRDS | 26 |
| 6.6.1 | PRISM Plot Surveys | 26 |
| 6.7 | WATERBIRDS | 27 |
| 6.7.1 | Ground Surveys | 27 |
| 6.7.2 | Water Quality Monitoring | 27 |

| | | |
|-----|------------|----|
| 6.8 | RAPTORS | 27 |
| 7. | REFERENCES | 28 |

LIST OF TABLES

| | | |
|-------------|--|----|
| TABLE 1-1 | MONITORING PROGRAMS AND CORRESPONDING 2023 REPORT SECTIONS | 3 |
| TABLE 3.1-1 | CAMERA LOCATIONS AND RATIONALE FOR PLACEMENT UNDER THE CURRENT CAMERA STUDY DESIGN, SEPTEMBER 2016 TO SEPTEMBER 2023 | 5 |
| TABLE 3.2-1 | DETAILED CAMERA SETTINGS FOR MOTION AND TIMED PHOTOS, SEPTEMBER 2022 TO SEPTEMBER 2023 | 16 |
| TABLE 3.3-1 | MONTHLY DARKNESS CORRECTION FACTOR FOR CAMERA EVENT DATA | 19 |

LIST OF PHOTOS

| | | |
|---------------|--|----|
| PHOTO 3.1-1: | EXAMPLE OF THE WINTER MONITORING VIEW OF CAMERA 2 AT ONE OF THE TWO CARIBOU CROSSING RAMPS ALONG THE DORIS-WINDY AWR (RAMP INDICATED IN MID-LEFT). | 7 |
| PHOTO 3.1-2: | EXAMPLE OF THE SUMMER MONITORING VIEW OF CAMERA 2 AT ONE OF THE TWO CARIBOU CROSSING RAMPS ALONG THE DORIS-WINDY AWR (RAMP INDICATED IN MID-LEFT). | 7 |
| PHOTO 3.1-3: | EXAMPLE OF THE WINTER MONITORING VIEW OF CAMERA 35 AT ONE OF THE TWO CARIBOU CROSSING RAMPS ALONG THE DORIS-WINDY AWR. | 8 |
| PHOTO 3.1-4: | EXAMPLE OF THE SUMMER MONITORING VIEW OF CAMERA 35 AT ONE OF THE TWO CARIBOU CROSSING RAMPS ALONG THE DORIS-WINDY AWR. | 8 |
| PHOTO 3.1-5: | EXAMPLE OF THE WINTER MONITORING VIEW OF CAMERA 22 AT ROBERTS CREEK. | 9 |
| PHOTO 3.1-6: | EXAMPLE OF THE SUMMER MONITORING VIEW OF CAMERA 22 AT ROBERTS CREEK. | 9 |
| PHOTO 3.1-7: | EXAMPLE OF THE MONITORING VIEW OF CAMERA 21 AT THE ROBERTS BAY WASTE MANAGEMENT FACILITY. | 10 |
| PHOTO 3.1-8: | EXAMPLE OF THE WINTER MONITORING VIEW OF CAMERA 18 AT THE ROBERTS BAY WASTE MANAGEMENT FACILITY. | 10 |
| PHOTO 3.1-9: | EXAMPLE OF THE SUMMER MONITORING VIEW OF CAMERA 18 AT THE ROBERTS BAY WASTE MANAGEMENT FACILITY. | 11 |
| PHOTO 3.1-10: | EXAMPLE OF THE MONITORING VIEW OF CAMERA 52 AT THE NORTH DAM OF THE TIA, SEPTEMBER 2016. | 11 |
| PHOTO 3.1-11: | EXAMPLE OF THE MONITORING VIEW OF CAMERA 52 AT THE NORTH DAM OF THE TIA, SEPTEMBER 2017. | 12 |
| PHOTO 3.1-12: | EXAMPLE OF THE MONITORING VIEW OF CAMERA 51 AT THE FUTURE SITE OF THE SOUTH DAM OF THE TIA, SEPTEMBER 2016. | 12 |
| PHOTO 3.1-13: | EXAMPLE OF THE MONITORING VIEW OF CAMERA 51 AT THE FUTURE SITE OF THE SOUTH DAM OF THE TIA, SEPTEMBER 2017. | 13 |
| PHOTO 3.1-14: | CULVERT WILDLIFE CAMERAS AND THEIR APPROXIMATE FIELD OF VIEWS, FACING SOUTH ON EITHER SIDE OF WINDY ROAD. AUGUST 2023. | 14 |
| PHOTO 3.2-1: | EXAMPLE OF CAMERA SET UP CAMERA HEIGHT APPROXIMATELY 1.2 M). | 15 |
| PHOTO 3.2-2: | EXAMPLE OF CAMERA SET UP CAMERA HEIGHT APPROXIMATELY 1.4 M). | 16 |

1. OVERVIEW

Detailed descriptions of the methods used during the 2023 monitoring programs that were subsequently used to compile the 2023 Wildlife Mitigation and Monitoring Plan Compliance Report (the 2023 Report) are provided below. Table 1-1 outlines the monitoring programs executed in 2023 and for which detailed methods are provided in this appendix; the corresponding results section numbers of the 2023 Report are also provided.

TABLE 1-1 MONITORING PROGRAMS AND CORRESPONDING 2023 REPORT SECTIONS

| Monitoring Program | 2023 Report Section |
|---|--|
| Habitat Loss | Section 2.1 |
| Valued Ecosystem Components (VEC) Specific Monitoring and Mitigation | Section 3 |
| Facilities and Wildlife Camera Programs | Included with each VEC in Section 3; Methods in Section 3.2 |
| On-site Monitoring and Mitigation (interactions, incidents and mortalities) | |
| Incidental wildlife observations by Environment and Onsite Personnel | |
| Caribou | Section 3.4 |
| Muskox | Section 3.5 |
| Grizzly Bear | Section 3.6 |
| Wolverine | Section 3.7 |
| Nest Predators | Section 3.8 |
| Upland Breeding Birds | Section 3.9 |
| Waterbirds | Section 3.10 |
| Raptors | Section 3.11 |
| Marine Mammals | Section 3.12 |
| Plants | Section 3.13 |

2. HABITAT LOSS

The Project Footprint used to assess habitat loss includes as-built infrastructure up until December 2023, not including unbuilt permitted infrastructure. Because no new infrastructure footprint was cleared in 2023, habitat loss was not calculated for the annual report.

3. FACILITIES AND WILDLIFE CAMERA PROGRAMS

A wildlife camera monitoring program was implemented in late 2012 to monitor for VEC species on and adjacent to the Project site and at control sites. Wildlife VEC species monitored by wildlife camera include caribou, muskox, grizzly bear, and wolverine. Muskox were added as a VEC after the Madrid-Boston expansion approval as part of Project Certificate No. 009. Muskox are not common in the Study Area and there is not currently sufficient data of muskox occurrence across the camera Study Area and throughout all years of data collection for statistical analysis.

Nest predators are also monitored using cameras. Mammalian nest predators are monitored through the wildlife camera program, including Arctic fox, red fox, and grey wolves, which are an opportunistic nest predator. Avian nest predators, including gulls, jaegers, and the common raven, in addition to weasels, are also considered to be potential nest predators. However, birds are generally underreported in camera data due to their smaller size and aerial mobility, making them difficult to monitor through camera traps. Similarly, weasels are a small-bodied animal and are underreported in camera data. For these reasons, birds and small mammals were not included in the camera data analyses.

This section of the Report presents the results of the ninth year of wildlife camera studies at the Project (September 2022 to September 2023). Results from the first eight years of monitoring were presented in ERM Rescan (2014), ERM (2015), ERM (2016a), ERM (2017), (ERM 2018), ERM (2019), ERM (2020), ERM (2021), and ERM (2022).

In February 2016, TMAC met with representatives of the Kitikmeot Inuit Association (KIA) and Government of Nunavut Department of Environment (GN DOE) to redesign the camera program. This redesign was conducted to address a variety of comments from regulators on camera placement and use (ERM 2016b). Cameras were deployed in June 2016 using the new design (Section 3.1.1). Data have been statistically analyzed for differences in caribou, grizzly bear, and wolverine occurrence according to distance from the mine from the new design program starting 2016 and continuing onwards.

In September 2018, an additional camera program was initiated in the Boston area. Wildlife cameras around the Boston area collected baseline data during the September 2018 to September 2023 monitoring period. These data are reported in a short summary in Section 3.3 of the 2023 Report. Analysis of the Boston camera program will not begin until data have been collected for both baseline and construction/operations periods in the Boston area. The Boston camera program will be discontinued in Spring 2024 with over five years of baseline data. Development plans for the Boston area are currently paused. The camera program will resume once construction plans are in place for the Boston area.

3.1 CAMERA PROGRAM STUDY DESIGN

3.1.1 DORIS AND MADRID PROGRAM STUDY DESIGN

A total of 60 Reconyx™ PC800 HyperFire Professional cameras were used to monitor caribou, muskox, grizzly bear, wolverine, nest predators, and other wildlife from June 2016 to September 2023. The camera layout is shown on Figure 7 of the 2023 Report. A minimum convex polygon (MCP) was generated in ArcGIS 10.5.1 around all camera locations to generate an estimate of the monitoring area, as suggested by Meek et al. (2014). The resulting MCP area around all cameras was 50,837 ha including all terrestrial and aquatic (freshwater and marine) habitats, and 40,025 ha considering only terrestrial habitats. The total area of the MCP inclusive of aquatic habitats is representative of area that could be used by wildlife that could encounter wildlife cameras during the winter period, as lakes, rivers, and the ocean are frozen at this time. The area of the MCP including only terrestrial habitats is representative of the areas that could be used by wildlife that could encounter wildlife cameras during the spring through the fall.

The placement of wildlife cameras was modified in June 2016 relative to the first three years of the camera program. The new camera layout addressed two monitoring aspects: 1) facilities interaction monitoring: cameras associated with specific infrastructure and gathering site specific data, and 2) wildlife camera monitoring: cameras placed in various distances from the Project and used to look for changes in species relative abundances with proximity to the Project.

Under the current camera study design, cameras are arrayed in three zones:

1. Treatment, with cameras placed at distances within 2 km of the Project site;
2. Zone of Influence (ZOI), with cameras placed at distances between 2 and 10 km of the Project site; and
3. Control, with cameras placed at distances beyond 10 km of the Project site.

One area was designated a “Ladder Area” where two cameras were placed in the area of tundra where the Madrid expansion will be constructed; for the purposes of the 2023 camera program, these cameras functioned as ZOI cameras. Once the Madrid expansion has been constructed, these cameras will become Treatment cameras. These two cameras will allow for a before-after analysis that will have greater sensitivity in determining potential effects related to the Madrid expansion on grizzly bears, and possibly wolverine, and caribou.

Cameras were deployed in relatively equal numbers in each of the three zones, including 21 Treatment cameras, 17 ZOI cameras, and 19 Control cameras (see Figure 7 in the 2023 Report; Table 3.1-1). The ZOI and Control cameras were located along a predominantly east-west axis such that Control and ZOI cameras were located at relatively similar distances from the ocean shoreline as the Treatment cameras. This was done to account for the relative abundance of predators such as bears and wolverine at the coast versus inland.

TABLE 3.1-1 CAMERA LOCATIONS AND RATIONALE FOR PLACEMENT UNDER THE CURRENT CAMERA STUDY DESIGN, SEPTEMBER 2016 TO SEPTEMBER 2023

| Camera Zone | Camera No. | Total Cameras | Site Specific Monitoring Objective |
|-------------|--|---------------|---|
| Treatment | 1, 11, 13, 15, 17, 19, 28, 32, 42, 50, 53, 54, 59, 60 | 14 | - |
| | 2, 35 | 2 | Road Crossing Ramp (caribou only) ¹ |
| | 18, 21 | 2 | Waste Management Facility (grizzly bear, wolverine, and nest predators) ² |
| | 22 | 1 | Roberts Creek Boulder Field/ERM Fish Fence (grizzly bear, wolverine, and nest predators) ² |
| | 51, 52 | 2 | Tailings Impoundment Area (TIA; all VECs and nest predators) |
| ZOI | 10, 12, 14, 23 - 26, 30, 34, 39, 41, 44, 46 - 48, 55, 57 | 17 | - |
| Control | 3 - 9, 16, 29, 31, 33, 36, 37, 40, 43, 45, 49, 56, 58 | 19 | - |

¹ Caribou interactions: Road crossing ramp = cameras installed at crossing ramps along the Doris-Windy AWR.

² Grizzly bear, wolverine and nest predator interactions: Roberts Bay Waste Management Facility and Roberts Lake Outflow/ERM Fish Fence.

ZOI and Control cameras were placed in habitats comparable to habitat where Treatment cameras were placed. The habitat considerations included microhabitat (i.e., similar habitat within the 'trigger zone' field of view between Treatment, ZOI, and Control cameras) and broader habitat considerations including distance to ocean, distance to large and medium lakes, and distance to streams and rivers. To improve independence, cameras were not in line of sight of each other. Cameras were oriented so that the area within at least 40 m in front of the camera was clear and the cameras were equal in their field of view. The minimum distance between all cameras in any zone was 71.3 m, which was the distance between Treatment cameras 18 and 21 at the Roberts Bay Waste Management Facility (Figure 7 in the 2023 Report). These two cameras, while not in line of sight of one another, have site specific monitoring objectives (see below). Hence, these two cameras were placed closer to one another for the purposes of facilities monitoring. The next closest distances between cameras was 487.9 m, between Treatment cameras 17 and 18 (Figure 7 in the 2023 Report). The maximum distance among all cameras was 38.5 km, the distance between Control cameras 37 and 56; camera 37 is in the Control zone on the east side of the Project while camera 56 is in the Control zone on the west side of the Project. Overall, the average distance among all cameras was 12.3 ± 6.7 km (\pm standard deviation).

There were seven cameras that were placed near Project infrastructure to address the facilities interaction monitoring component of the camera program (Table 3.1-1). These seven cameras included:

- Two cameras located at caribou crossing ramp locations along the Doris-Windy AWR (Cameras 2 and 35; Photos 3.1-1 to 3.1-4);
- One camera facing the in-stream boulder field in Roberts Lake Outflow¹ (Camera 22; Photos 3.1-5 and 3.1-6);
- Two cameras set up at the Roberts Bay Waste Management Facility (Cameras 18 and 21; Photos 3.1-7 to 3.1-9); and
- Two cameras set up at the Tailings Impoundment Area (TIA; Cameras 51 and 52; Photos 3.1-10 to 3.1-13).

The seven cameras that monitor Project facilities are considered to be cameras with site specific monitoring objectives for wildlife VECs (Table 3.1-1). The cameras located at the caribou crossing ramps are specifically monitoring for caribou usage, while the two cameras located at the Roberts Bay Waste Management Facility and one camera at Roberts Lake Outflow are monitoring for grizzly bear and other predators/scavengers (wolverine, wolves, and foxes) interactions. Cameras 51 and 52 monitor for interactions of all wildlife VECs as well as nest predators.

As per the revised Study Design, the Doris Landfill will be monitored by remote camera (ERM 2016b). The landfill has not been constructed and will be located on the east side of the TIA. A remote camera will be placed at this location when it has been constructed and a suitable location for long-term monitoring has been assessed.

¹ This camera also faces the site where the ERM Fish Fence has been installed in previous years; the ERM Fish Fence was not installed in 2020.



Photo 3.1-1 Example of the winter monitoring view of Camera 2 at one of the two caribou crossing ramps along the Doris-Windy AWR (ramp indicated in mid-left).



Photo 3.1-2 Example of the summer monitoring view of Camera 2 at one of the two caribou crossing ramps along the Doris-Windy AWR (ramp indicated in mid-left).



Photo 3.1-3 Example of the winter monitoring view of Camera 35 at one of the two caribou crossing ramps along the Doris-Windy AWR.



Photo 3.1-4 Example of the summer monitoring view of Camera 35 at one of the two caribou crossing ramps along the Doris-Windy AWR.



Photo 3.1-5 Example of the winter monitoring view of Camera 22 at Roberts Creek.



Photo 3.1-6 Example of the summer monitoring view of Camera 22 at Roberts Creek.



Photo 3.1-7 Example of the monitoring view of Camera 21 at the Roberts Bay Waste Management Facility.



Photo 3.1-8 Example of the winter monitoring view of Camera 18 at the Roberts Bay Waste Management Facility.



Photo 3.1-9 Example of the summer monitoring view of Camera 18 at the Roberts Bay Waste Management Facility.



Photo 3.1-10 Example of the monitoring view of Camera 52 at the North Dam of the TIA, September 2016.

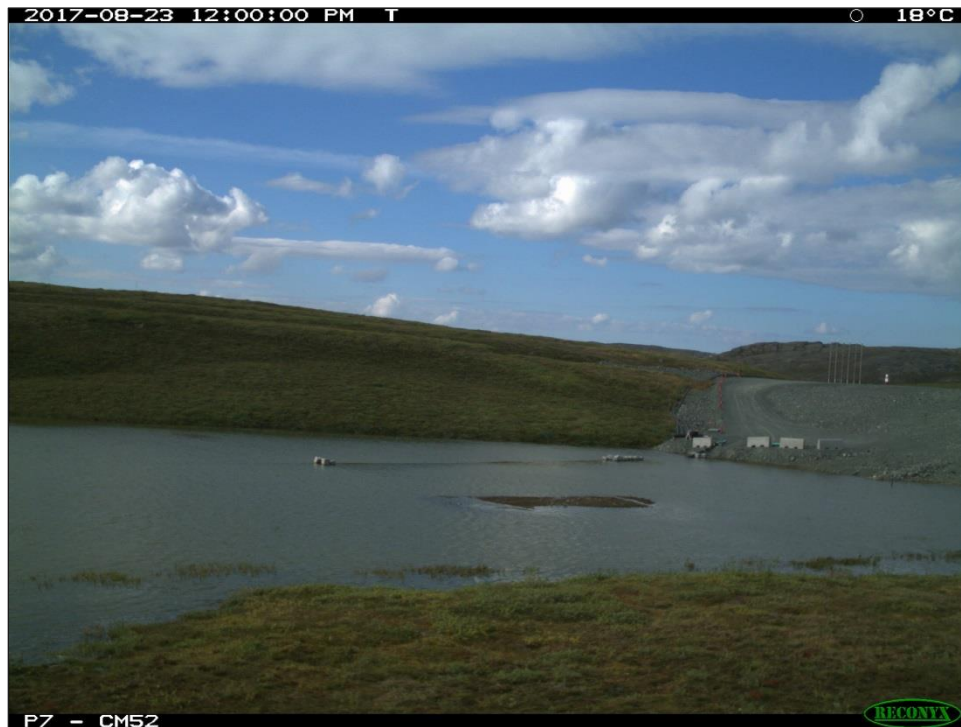


Photo 3.1-11 Example of the monitoring view of Camera 52 at the North Dam of the TIA, September 2017.



Photo 3.1-12 Example of the monitoring view of Camera 51 at the future site of the South Dam of the TIA, September 2016.