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8 April 2020

Re: 2019 Wildlife Monitoring Report

Attached is an electronic copy of the 2019 Wildlife Monitoring Program Report for Diavik Diamond Mines (2012) Inc. (DDMI). This report summarizes work performed under DDMI's Wildlife Research (Monitoring) Permit during 2019. Included as an appendix are DDMI's responses to the Environmental Monitoring Advisory Board's (EMAB) comments on the 2018 Wildlife Monitoring Report.

DDMI requests that you review these documents and provide comments and recommendations by June 8, 2020. DDMI will provide responses by August 7, 2020. If you require a hard copy of the report, or if you have any questions regarding the above, please contact the undersigned at your convenience.

Regards,



Sean Sinclair
Principal Advisor, Environment and Closure Readiness

Attachment: 2019 Wildlife Monitoring Report



REPORT

Diavik Diamond Mines (2012) Inc.

2019 Wildlife Monitoring Report

Submitted to:

Diavik Diamond Mines (2012) Inc.

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3 April 2020

Distribution List

Electronic Copy - Diavik Diamond Mines (2012) Inc.

Electronic Copy - Golder Associates Ltd.

Executive Summary

As a requirement of the Environmental Agreement, Diavik Diamond Mines (2012) Inc. (DDMI or Diavik) completes a Wildlife Monitoring Program (WMP) each year. The objective of the WMP is to collect information that will assist in determining if there are effects on wildlife in the study area and if these effects were accurately predicted in the Environmental Assessment. The WMP also collects data to determine the effectiveness of site-specific mitigation practices and the need for any modifications through adaptive management. The following report documents results collected for the 2019 WMP for the Diavik Diamond Mine (Mine) located at Lac de Gras, Northwest Territories (NWT). The data were collected according to procedures outlined in the Mine's Standard Operating Procedures. Where necessary, comparisons to the information gathered during the previous monitoring (2000 to 2018) and the pre-construction baseline (June 1995 to August 1997) have been included.

General observations for each component of the WMP are summarized below.

Landscape Changes

- In 2019, the Mine footprint increased by 0.09 square kilometres (km²). The total loss of terrestrial and aquatic habitats to date from mining activities (11.19 km²) is less than that predicted in the Environmental Effects Report (EER).
- The current footprint is expected to be at its maximum for operations, with the exception of the South Country Rock Pile. The footprint may expand slightly during progressive reclamation activities of the North Country Rock Pile.

Barren-Ground Caribou

- The total caribou summer habitat loss to date is 2.75 habitat units, which remains below the prediction made in the EER.
- Caribou aerial surveys were **not required** or completed in 2019. Diavik is waiting for recommendations and direction from the Department of Environment and Natural Resources, Government of the Northwest Territories (ENR) Zone of Influence Technical Task Group for guidelines on future caribou aerial surveys. Re-analysis of aerial survey was completed and results indicate no zone of influence was evident.
- Thirty-six ground-based caribou behavioural scanning observations were completed in 2019. All observations occurred during winter and from 0 to 26 km from Mine infrastructure.
- There were no Mine-related caribou injuries or mortalities reported in 2019.
- During 2019, the caribou traffic advisory remained at "No Advisory" for the entire year. There were six instances where greater than 100 caribou were observed at one time; however, these sightings were located offsite.
- There was no action taken to herd caribou away from potential hazards in 2019.

Grizzly Bear

- The total direct grizzly bear habitat loss to date is 8.02 km², which is below the amount predicted in the EER.
- The grizzly bear hair snagging program occurred in 2012 and 2013, was not undertaken from 2014 through 2016, and was last completed in 2017. Diavik completes this program in collaboration with Dominion Diamond Mines who operate the Ekati mine. Data analysis indicated that there have been no negative effects from the mines on the regional population of grizzly bears in the Slave Geological Province (grizzly bear populations are stable or increasing). The long-term monitoring frequency has not been determined with partners.
- In 2019, 80 reported instances of grizzly bears were recorded on East Island from 16 April to 30 October. Of these, 45 required deterrent actions and 35 did not require deterrent actions. There were no grizzly bear mortalities and no relocation events.

Wolverine

- The snow track survey was completed twice in 2019. Earnest (Patty) Lockhart from Lutseł K'e and Lisa Marie Zoe from Whatí participated in the wolverine track surveys.
- A total of 46 wolverine tracks were detected at 18 out of 40 transects across two sampling visits in 2019. Several variables were shown to affect wolverine occupancy in the study area over the period of 2008 to 2019, and conducting surveys shortly following a high wind event was found to reduce detectability of the snow tracks. Overall, wolverine occupancy rates have remained stable over this period, despite an interannual negative response to increased Mine activity measured by the number of full-time equivalents.
- The wolverine hair snagging program was not completed in 2019. The schedule for future monitoring programs will be determined after the data summary analysis report from ENR is complete and reviewed.
- There were two relocations of wolverines and no mortalities in 2019.

Raptors

- In 2019, the regional raptor nest monitoring surveys were not completed by ENR. These surveys are planned to take place every five years, with the next survey scheduled for 2020.
- A total of 45 Pit Wall/infrastructure inspections were completed from 23 March until 13 September 2019 to determine use by raptors. During the inspections, two peregrine falcon nest site were confirmed, one at the Site Services Building and one at the Process Plant. One rough-legged hawk nest was confirmed at A418. Common raven nested at the South Tank Farm and two young fledged. There was also a potential but unconfirmed nesting site for rough-legged hawk at A154.
- No raptor incidents or mortalities were reported at the Mine in 2019.

Waste Management

- In 2019, waste inspections at the Waste Transfer Area (WTA) and Landfill were conducted twice per week during the winter and once per week in the summer. A site-wide compliance inspection and underground inspection is completed on a weekly basis. Since May 2016, the A21 area has been inspected every three days. During inspections staff identified and removed any improperly disposed waste and recorded all signs of wildlife and activity. Based on the results of inspections, workers are educated on waste management practices as part of adaptive management.
- Throughout 2019, 9,295 units of aluminum containers, 11,100 units of plastic containers, and 503 units of juice containers were recycled and the total monetary value (\$20,445.30) was donated to charity. Copper wire was salvaged at the Mine with an approximate value of \$70,000, which will be donated to charity.
- During 2019, a total of 178,963 litres of waste oil were collected and burned in waste oil heat-generating boilers.
- In 2019, the wind farm generated 17,326.7 megawatt hours (MWh) of power, which represents an estimated diesel savings of 4.0 million litres.

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1.0 INTRODUCTION

1.1 Background

Diavik Diamond Mines (2012) Inc. (DDMI or Diavik) conducted wildlife baseline studies from 1995 to 1997. The information was used to describe ecological conditions in the Lac de Gras area in support of the Project Description and Environmental Assessment (DDMI 1998a, b). A Wildlife Monitoring Program (WMP) was developed as part of the Environmental Agreement for the Diavik Diamond Mine (Mine; DDMI 2002). Documents that were used in developing the WMP include the following:

- Comprehensive Study Report, Diavik Diamonds Project (The *Canadian Environmental Assessment Act* 1999);
- Environmental Assessment Overview, Diavik Diamonds Project (DDMI 1998c);
- Environmental Effects Report, Wildlife, Diavik Diamonds Project (DDMI 1998b); and
- Wildlife Baseline Report, Diavik Diamonds Project (Penner 1998).

Table 1 summarizes the Environmental Agreement provisions and compliance by the WMP.

Table 1: Environmental Agreement Provisions of Environmental Monitoring Programs, Section 7.1

Section 7.1 Provision	Wildlife Monitoring Program Compliance
(a) Meet the monitoring requirements of all Regulatory Instruments.	Compliant with the NWT <i>Wildlife Act</i> , and <i>Species at Risk Acts</i> (Federal and Territorial).
(b) Verify the accuracy of the environmental assessment of the Project.	This is an objective of the 2019 WMP (page 3), and previous WMPs.
(c) Determine the effectiveness of measures taken to mitigate any adverse environmental effects of the Project.	This is an objective of the 2019 WMP (page 3), and previous WMPs.
(d) Consider Traditional Knowledge.	A recent example includes the grizzly bear hair snagging program and the identification of high quality habitat for hair snagging station deployment. Selection of wolverine winter track survey locations and collection of data is another example.
(e) Establish or confirm thresholds or early warning signs.	For wildlife, ecological quantitative thresholds are not available. However, the WMP provides predictions such as Mine-related mortality rates (e.g., Section 5.0; Grizzly Bear).
(f) Trigger action by adaptive mitigation measures where appropriate.	Programs have been adaptively managed over time (list on page 3), which includes changes to mitigation such as early versus more current waste management practices. Possible outcomes of adaptive management related to mitigation include more, less or unchanged mitigation depending on effectiveness.
(g) Provide opportunities for the involvement or active participation of each of the Aboriginal Peoples in the implementation of the monitoring programs.	Communities participated in wolverine snow track survey (Section 6.0).
(h) Provide training opportunities for each of the Aboriginal Peoples.	Training is provided every time communities participate (e.g., program methods, orientation and safety).

Monitoring by DDMI during construction and operation of the Mine has been used to test effects predictions in the EER (DDMI 1998a, b), evaluate the effectiveness of mitigation, and provide feedback for adaptive management. The WMP also considers wildlife issues of concern identified by communities and regulatory agencies.

Based on reviews and discussions among DDMI, communities and regulators, the WMP has evolved under the principles of adaptive management since the original design in response to trends observed in the data and changes to objectives, study designs and methods. Rationale for changes were based on the completeness and rigour of data to test effects predictions, community concerns, adaptive management principles and the establishment of regional monitoring programs. Further, community site visits occur annually and provide community members an opportunity to observe Mine operations.

Due to the large degree of natural variation inherent in ecosystems, it is often difficult to detect indirect effects with only one or two years of data. Therefore, a more comprehensive analysis and discussion of all data from the WMP has been completed every three years and submitted as a separate report. Separate reporting began in 2004 following requests for more formal statistical analysis of monitoring data by the Environmental Monitoring Advisory Board (EMAB) (EMAB 2004) and ENR (ENR 2004).

Since 2010, WMP studies for caribou, grizzly bear and falcons have been suspended or removed through adaptive management and with consensus among communities, regulators, the mines and monitoring agencies after review of these programs at wildlife monitoring workshops (Marshall 2009; Handley 2010). Discontinuation through adaptive management precludes the need to complete further statistical analyses. In 2014, waterfowl monitoring was discontinued following review and agreement by Environment and Climate Change Canada (EC 2013). The current hair snagging programs completed for grizzly bear and wolverine are designed to evaluate cumulative effects and are contributed to the GNWT for this purpose. Of the studies completed in the most recent two comprehensive analysis reports in 2017 and 2014, the wolverine snow track monitoring is the only program at site that remains active and evaluates regional EER predictions.

Based on the principles of adaptive management, DDMI no longer completes an independent comprehensive analysis report for wildlife. Instead all comprehensive statistical analyses related to active monitoring programs are included every three years in the annual WMP report, and began in 2020, if applicable. For the intermediate years, the annual reports present findings from that year, and summarize cumulative data collected up to that year. If critical issues become apparent in the shorter term, then a discussion of these issues is presented in annual reports. At the request of the EMAB in 2018 (EMAB 2018), a section on Traditional Knowledge (TK) related to wildlife has been added to the WMP report (Section 2.0).

This annual WMP report includes a comprehensive analysis of aerial survey caribou data and wolverine snow track data to examine indirect Mine-related effects on these valued ecosystem components (VECs). The analyses for caribou used data from aerial surveys (post calving period) from 1998 to 2012 to test predictions whether Diavik and Ekati mines are influencing caribou distribution (i.e., zone of influence [ZOI]). Analyses for wolverine used snow track data from 2008 to 2019. The wolverine analysis was designed to test for Mine and natural-related changes in indicator variables (animal distribution, occupancy) through time (temporal trends) and across space (i.e., to determine a potential ZOI around the Mine site). This report also addresses two analysis requests by EMAB including a new ZOI analysis of aerial survey data and stratification of caribou behaviour activities within and beyond 15 km from Diavik Mine.

1.2 Objectives

The overall objectives of the 2019 WMP are to:

- Collect information that will assist DDMI to determine if there are effects on wildlife and if these effects were accurately predicted in the EER.
- Determine the effectiveness of mitigation practices intended to avoid and limit Mine-related effects on wildlife and whether or not these practices and policies require modification through adaptive management.
- Detect effects that were not predicted in the EER.
- Conduct a comprehensive analysis on aerial caribou data and wolverine snow track data.

Objectives specific to VECs are presented in the following sections.

1.3 Study Area

The Mine is located on East Island in Lac de Gras (Figure 1). The wildlife study area is 1,200 square kilometres (km²) and includes the East and West islands, aquatic habitats, many smaller islands in the northeast portion of Lac de Gras, and the mainland along the southern, eastern and northern shores of Lac de Gras. An extension to the northwest was made to include the Lac du Sauvage narrows, an important caribou migration corridor (Penner 1998). The local study area during baseline studies (Penner 1998) covered approximately 805 km².

The Mine includes accommodation facilities, operations buildings, haul roads, an airstrip, country rock piles, the A154 and A418 pits and dikes, current completed construction of the A21 dike, and all other infrastructure (Figure 2). In 2012 the Mine was expanded to include the wind farm and access roads to the wind farm. The majority of haul roads required for mining activities are complete. The current footprint is expected to be at its maximum for operations, with the exception of the South Country Rock Pile. The footprint may expand slightly during closure/reclamation activities.

1.4 Report Organization

Within each section of this report, data are presented that will be tracked over the life of the Mine.

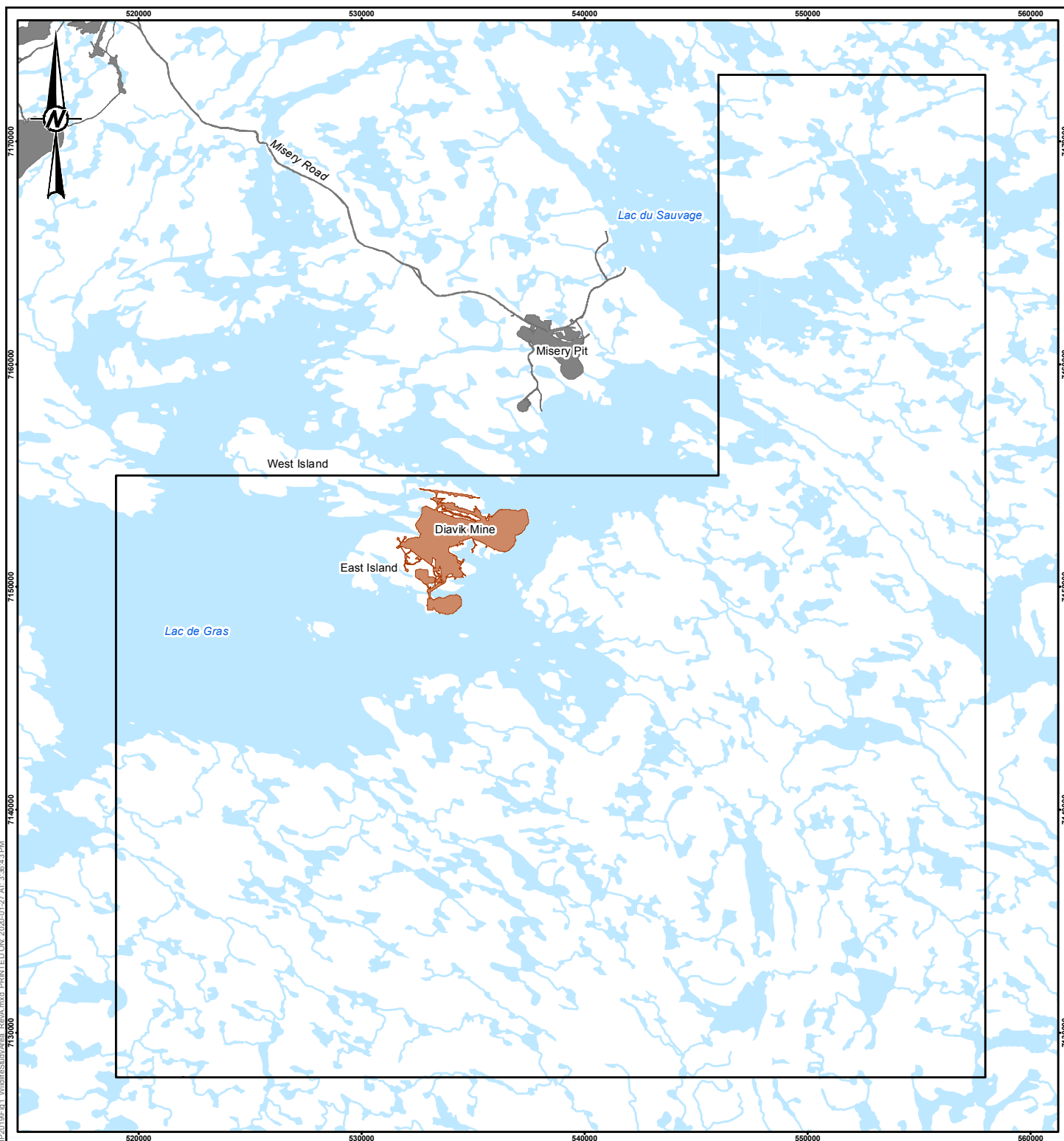
Recommendations for changes to the WMP based on adaptive management are presented at the end of each section for consideration and may be incorporated into the WMP for subsequent years. The WMP is an evolving program that reflects recommendations during previous years, as well as advances in Mine development. Changes will be captured in annual iterations of the WMP.

The EMAB is an arm's length organization that reviews the WMP report annually and provides comments and recommendations to DDMI (Golder 2018a, Appendix A). Golder provided responses to EMAB comments on the 2018 WMP report in October 2019 (Appendix A). In 2019, EMAB requested additional content and clarification for caribou monitoring that were completed and included in this report (Table 2).

Table 2: Wildlife Monitoring Program Recommendations by the Environmental Monitoring Advisory Board, 2017

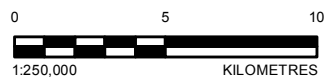
EMAB Recommendation	DDMI Response	WMP Section																												
There is now a six-year gap in caribou behavioural data analysis (2012-2018) due to insufficient data. Ekati and Diavik are cooperating on data collection. We emphasize the importance of these data in understanding the influence of the Mine on caribou and the mechanism that lead to the avoidance of the Mine vicinity. To gain a better understanding of where sample sizes are most limiting, we ask DDMI to reconcile caribou behaviour data sample size information into a single format (it has been provided in multiple formats in the past) that can be updated annually and easily referenced for future discussions. This should include information on: i. Mine operator (Ekati vs Diavik) ii. Type of scan (focal vs group) iii. Season iv. Distance from mine v. Year	In their review of the 2018 WMP, MSES has provided additional information, which requests a summary by distance strata (i.e., within and beyond 15 km from mines). Summarizing by distance strata was not explicitly requested previously. The requested summary will be provided as an appendix to the 2019 WMP report. Diavik will provide the requested information on other running and trotting activities as an appendix in the 2019 WMP report.	Appendix B																												
Provide the current sample sizes for behavioural data, perhaps in Table format, including information on mine operator (Ekati vs Diavik), type of scan (focal vs group), season, distance from mine and year.	The requested summary table is provided in this WMP report. The table includes a summary of Ekati data. Since Diavik has not collected focal scans, these are not included in the table. Note that data available have been summarized previously in Golder (2011; 2018a) and in Figure 3 of Golder (2018b).	Appendix B																												
DDMI indicated that a new analysis that considers habitat and population size, among other factors, is underway and will be reported when complete (Golder 2017b). DDMI responded that linear regression is robust against the violation of the normality assumption, particularly when sample sizes are large, such as in this case (n >142,000). DDMI indicated that the new analysis that is underway assumes a negative binomial distribution and DDMI agreed and intends to include additional factors such as habitat and population size in the new analysis. We look forward to seeing the new analysis.	The results of this analysis will be included in the 2019 WMP report.	Section 4.0																												
DDMI has committed to provide a table summarizing sample sizes of caribou behavioural data including categories for mine operator, type of scan, season, distance from mine, and year in the next WMR. Please organize the information on distance from mine into categories of less than and greater than 15 km from the mine (please see the example table below of a suggested format). The purpose of the table is to understand behavioural data availability and whether there are enough data to conduct analyses by specific categories or by pooling data from different categories (e.g., season, time period, etc.). In addition, EMAB recommended that “Diavik should continue to focus on conducting far-from-mine behavioural group scans to ensure data are balanced between Ekati’s near-mine scans and far-field scans, and to be in line with the original intent of this WMP component.” (EMAB 2019). Please explain why only four samples were collected far-from-mine in the 2018 season. <table><tr><th rowspan="2">Year</th><th rowspan="2">Mine Operator</th><th rowspan="2">Type of Scan</th><th rowspan="2">Season</th><th colspan="2">Distance from Diavik Mine</th><th colspan="2">Distance from Diavik-Ekati Mines</th></tr><tr><th><15km</th><th>>15km</th><th><15km</th><th>>15km</th></tr><tr><td>1998</td><td>Ekati</td><td>Focal</td><td>post-calving</td><td>number of groups</td><td>number of groups</td><td>number of groups</td><td>number of groups</td></tr><tr><td>2003</td><td>Diavik /Ekati</td><td>Group</td><td>post-calving</td><td>number of groups</td><td>number of groups</td><td>number of groups</td><td>number of groups</td></tr></table>	Year	Mine Operator	Type of Scan	Season	Distance from Diavik Mine		Distance from Diavik-Ekati Mines		<15km	>15km	<15km	>15km	1998	Ekati	Focal	post-calving	number of groups	number of groups	number of groups	number of groups	2003	Diavik /Ekati	Group	post-calving	number of groups	number of groups	number of groups	number of groups	DDMI will provide the summary as an appendix to the 2019 WMP report. DDMI will continue to collect caribou behaviour data when caribou are present in the study area and when it is safe for staff to do so. As DDMI has stated previously, caribou are now most common in the study area during winter when the ability to implement far field data collection is constrained by extreme environmental conditions.	Appendix D
Year					Mine Operator	Type of Scan	Season	Distance from Diavik Mine		Distance from Diavik-Ekati Mines																				
	<15km	>15km	<15km	>15km																										
1998	Ekati	Focal	post-calving	number of groups	number of groups	number of groups	number of groups																							
2003	Diavik /Ekati	Group	post-calving	number of groups	number of groups	number of groups	number of groups																							

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LEGEND

- DIAVIK WILDLIFE STUDY AREA BOUNDARY
- DIAVIK FOOTPRINT
- EKATI FOOTPRINT
- WATERCOURSE
- WATERBODY



REFERENCE(S)

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- PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

Rio Tinto

PROJECT

DIAVIK DIAMOND MINES INC.

TITLE

DIAVIK WILDLIFE STUDY AREA, 2019

CONSULTANT



GOLDER

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2020-01-27

DESIGNED

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REVIEWED

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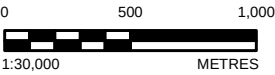
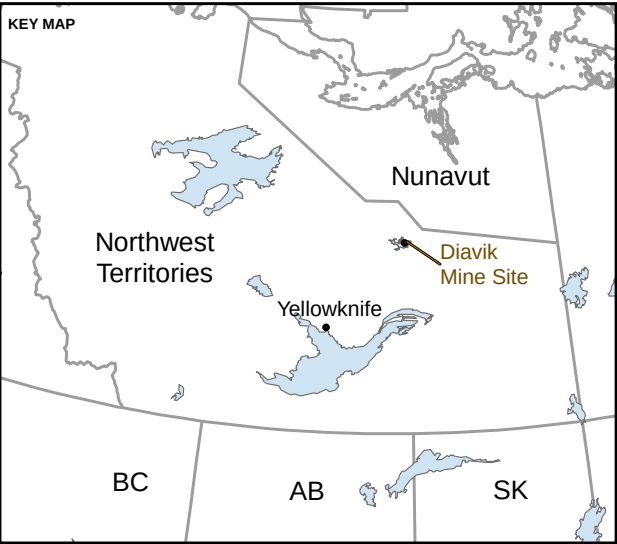
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● INFRASTRUCTURE



REFERENCE(S)

1. 2019 WORLDVIEW IMAGE OBTAINED FROM CLIENT
PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

RioTinto

PROJECT

DIAVIK DIAMOND MINES INC.

TITLE

DIAVIK MINE SITE INFRASTRUCTURE, 2019

CONSULTANT	YYYY-MM-DD	2020-01-30
	DESIGNED	DC
	PREPARED	LMS
	REVIEWED	
	APPROVED	



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2.0 COMMUNITY ENGAGEMENT AND TRADITIONAL KNOWLEDGE

Diavik engages with local Aboriginal communities and values community feedback and insights about how Diavik operates the Mine and monitors the environment or may be affecting the environment. As part of their commitment to the environment, DDMI incorporates available Traditional Knowledge (TK) in environmental plans and monitoring programs. For the WMP, TK has been incorporated through:

- input into some study designs;
- sharing of wildlife ecology and the interpretation of monitoring results; and
- community participation with data collection.

Incorporation of TK into the study design of monitoring programs has occurred for caribou habitat, grizzly bear and wolverine. For caribou, Diavik and the Tłıchq Government carried out a TK study in the summer of 2013 through a series of workshops and site visits where four participating elders from Tłıchq and Lutsel K'e shared stories and knowledge about caribou migration, preferred habitats (vegetation communities and landscape features) and traditional land use (Tłıchq Government 2013). The guidance provided by the elders resulted in selection of specific sampling sites for the vegetation and lichen monitoring program that were appropriate for caribou use. In addition to influencing the study design, TK shared in this study has also been considered in the interpretation of monitoring results (see Appendix I of Golder 2017a). Elders in the 2013 TK study noted that caribou will avoid using the areas close to the Mine during migration because dust on forage will alter its taste or smell.

In 2012, the Diavik and Ekati mines collaborated on a new regional scale grizzly bear monitoring program because past mine-specific monitoring programs yielded inconclusive results from highly variable data (Handley 2010). The regional grizzly bear program involved hair snagging methods and included TK holders to determine the best locations for hair snagging devices (Section 5; ERM 2014). From 2003 to 2006, the study design and data collection for wolverine snow track monitoring was based on the experience of Inuit Qaujimajatuqangit (IQ) to locate transects and record wolverine snow tracks (Section 6). Traditional Knowledge has also been incorporated into the caribou scan surveys through means of a questionnaire. Observed caribou are commented on from the perspectives of animal health and traditional use. For example, during 2019 caribou behaviour scans, Earnest (Patty) Lockhart from Lutsel K'e Dene First Nation and Lisa Marie Zoe from Whatı participated and caribou being observed appeared healthy.

Where possible, Diavik tries to include community members in environmental monitoring annually. For example, Earnest (Patty) Lockhart from Lutsel K'e Dene First Nation and Lisa Marie Zoe from Whatı participated in caribou scan surveys and wolverine snow track surveys in 2019. Communities have participated in a variety of programs over the history of monitoring by Diavik (e.g., Golder 2018c) and this has been documented in past reports. The WMP is anticipated to evolve as Diavik receives input through community engagement, regulatory workshops, site visits and TK studies.

3.0 LANDSCAPE CHANGES

The scope of the landscape component of the WMP is to determine if vegetation and surface water loss is within the magnitude or amounts predicted in the EER (DDMI 1998b). East Island vegetation cover is predominantly characterized by heath tundra, and tussock / hummock landscape classes, but Mine construction has also resulted in the loss of shallow and deep water. The main change from the Mine on the landscape is direct disturbance, which will be a long-term effect as the recovery of vegetation is slow in arctic environments (Burt 1997).

In addition, Diavik conducts ongoing monitoring to determine if dust from the Mine is affecting vegetation communities, and lichen and soil chemistry. Permanent vegetation plots are assessed for plant species cover (relative abundance) and richness at Mine and reference sites. Metals concentrations are analyzed in lichen and soil samples near and far from the Mine. A Comprehensive Vegetation and Lichen Analysis Report was generated every three years and was last completed in January 2017 (Golder 2017b). The frequency of vegetation monitoring was recommended to increase from three to five years (i.e., next cycle in 2021) because dustfall since 2016 has not exceeded a trigger determined from the reference site.

The objective of this component of the WMP is to:

- Determine if direct vegetation/habitat loss due to the Mine footprint exceeds the prediction of 12.67 km².

3.1 Methods

A satellite image was obtained and used to update the area of the current Mine footprint. The image was laid over the Ecological Landscape Classification (ELC) developed by the Department of Environment and Natural Resources, Government of the Northwest Territories (ENR) (Matthews et al. 2001). Each ELC type disturbed by the Mine was selected and calculations were made to determine the area (km²) of each habitat type replaced by the Mine footprint. Values provided for ELC unit loss are estimates based on the predicted Mine extent (DDMI 1998a), the actual Mine footprint, and the ELC classification (Matthews et al. 2001). Portions of terrestrial habitat within the Mine footprint have remained as physically undisturbed residual areas since construction and through the end of 2019. As such, these residual undisturbed areas were removed from the total Mine footprint calculations for the analysis. There is evidence in Appendices F, G, J and K that support these areas are used by wildlife. Historical data summaries by year were also modified to reflect actual footprint calculations.

3.2 Results

As of December 2019, a total area of 11.19 km² has been altered since Mine construction in 2000. This represents a relative loss of 88.3% of the predicted landscape disturbance (DDMI 1998a). Land cover types at or slightly exceeding the predicted loss include heath tundra, riparian shrub, birch seep and shrub, boulder complex, bedrock complex, disturbed, and esker (Table 3). In 2019, the ELC types that changed included heath tundra (0.06 km²), heath boulder (0.02 km²), and tussock/hummock (0.01 km²). The current footprint is expected to be at the maximum for operations, with the exception of the South Country Rock Pile. The footprint may expand slightly during progressive reclamation activities on the North Country Rock Pile. The annual geographic extent of landscape disturbed from the Mine footprint is illustrated in Figure 3.

Table 3: Total and Predicted Ecological Landscape Classification Unit Loss (km²) Associated with Mine Development Phases, 2000 to 2019

ELC Type	Construction and Open Pit Mining (2000 to 2005)	Open Pit Mining (2006 to 2009)	Underground Mining (2010 to 2016)	A21 Pit Development (2017 to 2019) ^(c)	Predicted ^(d)
Heath Tundra	2.59	2.95	3.29	3.52	3.68
Heath Bedrock (30% to 80%)	0.44	0.56	0.59	0.60	0.78
Health Boulder (30% to 80%)	1.06	1.48	1.62	1.70	1.89
Tussock/Hummock	1.18	1.41	1.50	1.55	1.64
Sedge Wetland	0.14	0.20	0.21	0.23	0.26
Riparian Shrub	0.03	0.03	0.03	0.04	0.03
Birch Seep and Shrub	0.08	0.09	0.10	0.10	0.11
Boulder Complex	0.03	0.04	0.05	0.05	0.05
Bedrock Complex	0.05	0.06	0.06	0.06	0.07
Esker Complex	0.16	0.16	0.16	0.16	0.16
Disturbed ^(b)	0.05	0.06	0.06	0.06	0.06
Shallow Water	0.29	0.34	0.40	0.42	0.48
Deep Water	1.92	2.11	2.62	2.69	3.46
Total^(a)	8.04	9.50	10.69	11.19	12.67

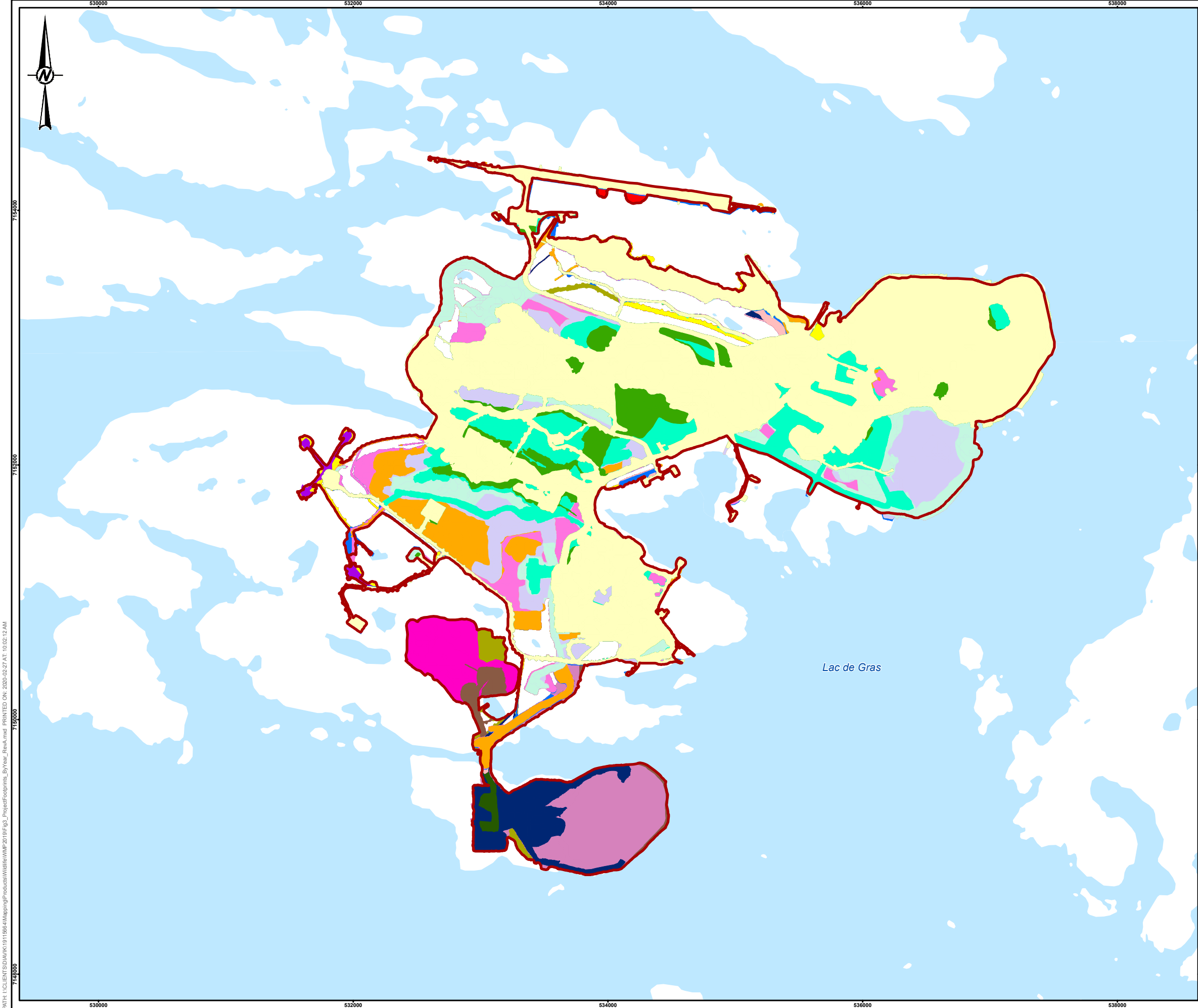
(a) Any discrepancies in totals across the rows results from the rounding of numbers in annual columns for presentation purposes.

(b) Disturbed includes areas that were already disturbed by exploration activities when the ELC was created.

(c) Also represents cumulative loss to 2019.

(d) From DDMI 1998a.

km² = square kilometres; % = percent.



LEGEND

MINE PERIMETER 2019

WATERBODY

DISTURBANCE (2002-2019)

- 2002
- 2003
- 2004
- 2005
- 2006
- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
- 2018
- 2019

KEY MAP

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REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

RioTinto

PROJECT

DIAVIK DIAMOND MINES INC.

TITLE

MINE FOOTPRINT EXPANSION BY YEAR, 2002 TO 2019

CONSULTANT	YYYY-MM-DD	2020-02-27
	DESIGNED	DC
	PREPARED	ANK
	REVIEWED	
	APPROVED	

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4.0 BARREN-GROUND CARIBOU

The Mine is within the spring (northern migration), summer and fall/rut seasonal ranges of the Bathurst caribou herd (Gunn et al. 2002). Caribou of this herd may travel through the Lac de Gras area during the northern migration to the calving grounds, and forage and move through the area during the summer and fall periods, sometimes following shorelines and onto the West and East Islands. Caribou from the Ahiak and Beverly caribou herds may also have ranges that overlap with the Mine to a lesser extent based on collared animal locations. At the time of this report, wintering caribou were present in the study area and caribou collar locations suggest these animals were most likely from the Beverly/Ahiak and Bathurst herds. While caribou from different herds may interact with the Mine, mitigation used by the Mine is designed to protect all caribou from any herd.

In 1996, the mean population size ($\pm$ 95% confidence interval) of the Bathurst caribou herd was estimated at 349,000 $\pm$ 95,000 (Case et al. 1996; Gunn et al. 1997). The most recent population estimate determined by ENR in June 2018 was 8,200 animals (ENR 2018a). Although the Beverly and Ahiak herds are not monitored as intensively as the Bathurst herd, the last census for the Ahiak herd was in June of 2011 and estimated 71,000 individuals (ENR 2018b). Similar to the Bathurst caribou herd these herds are believed to also be in decline as are a number of other circum-Arctic herds (Festa-Bianchet et al. 2011; Gunn et al. 2011). Barren-ground caribou (*Rangifer tarandus groenlandicus*) were listed as threatened by the NWT Species at Risk (SAR) Committee on 11 July 2018 (NWT SAR 2018a). The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed barren-ground caribou in November 2016 as threatened (COSEWIC 2018). To support the recovery of all barren-ground caribou herds, the 2011 to 2015 NWT Barren-ground Caribou Management Strategy was developed (GNWT 2011). The overall goal of the strategy is to maintain numbers of caribou within their natural range of variation. The GNWT has outlined five objectives to obtain this goal:

- engage co-management partners in monitoring and management of caribou;
- ensure appropriate, up-to-date information is available for management decisions;
- manage impacts of key factors affecting caribou that are within control;
- inform the public about the status of caribou and their role in management; and
- maximize benefits from caribou for NWT residents.

The strategy outlined the need to monitor the effects of predators on caribou as predation was considered a factor that could be managed. Wolves are the most important year-round natural predator of barren-ground caribou and knowledge of wolf numbers could help understand fluctuations in caribou populations and provide information required to support management decisions. A new Barren-ground Caribou Management Strategy for 2018 to 2022 is under development (ENR 2018c). In 2019, ENR developed a Bathurst Caribou Range Plan (GNWT 2019), which proposes development limitations and hierarchical management actions for different areas in the Bathurst annual range. The Mine is located in Area 2 of the draft Bathurst Caribou Range Plan, which has a proposed moderate development level and status of cautionary. Diavik is in compliance with recommended mitigation described in the Bathurst Caribou Range Plan.

4.1 Habitat Loss

Physical alteration of the landscape reduces available caribou forage (DDMI 1998b). Habitat loss on East Island is expressed in habitat units (HUs) for caribou summer habitat. A habitat unit is the product of surface area and suitability of the habitat in that area to supply food for caribou and cover from predators (DDMI 1998b). Habitats were rated on a scale of 0 to 1 HUs for their capability to support caribou, with values greater than 0.30 regarded as highly suitable habitat and values less than 0.25 rated as low suitability for caribou. The area of each habitat type on East Island was multiplied by its habitat suitability value to determine the number of foraging habitat units available to caribou.

One objective of the caribou component of the WMP is to determine if direct summer habitat loss (in habitat units [HUs]) is greater than predicted. The impact prediction in the EER (DDMI 1998b) is:

- At full development, direct summer habitat loss from the project is predicted to equal 2.965 HUs.

Dust deposition can also alter the landscape either by positively influencing vegetation vigour through deposition of nutrients and increased snowmelt rates, or by reducing plant growth by coating leaves and adversely changing soil chemistry. Either scenario can lead to a change in plant communities, and forage quality and quantity for caribou. Diavik also monitors for the effect of dust deposition on vegetation (including lichen) and soil chemistry (Section 3.0).

4.1.1 Methods

Using the ELC unit loss (Table 3), the area (km²) of ELC lost was multiplied by its habitat suitability value (DDMI 1998b) to determine habitat units lost.

4.1.2 Results

Direct summer habitat loss to date from the Mine is approximately 2.75 HUs (Table 4). As noted above (Table 3), ELC unit loss is below the level predicted in the EER. Similarly, total direct losses of summer HUs for caribou are currently below that predicted in the EER.

Table 4: Caribou Summer Habitat Unit Loss to 2019

ELC Type	Habitat Suitability Value	Cumulative ELC Loss to 2019 (km ²)	Cumulative Habitat Unit Loss to 2019
Heath Tundra	0.37	3.52	1.302
Heath Boulder	0.40	1.7	0.680
Riparian Shrub	0.46	0.04	0.018
Bedrock Complex	0.27	0.06	0.016
Tussock/Hummock	0.30	1.55	0.465
Sedge Wetland	0.28	0.23	0.064
Esker Complex	0.30	0.16	0.048
Birch Seep and Shrub	0.11	0.10	0.011
Boulder Complex	0.21	0.05	0.011
Heath Bedrock	0.23	0.06	0.138
Total	-	8.01	2.754

Any discrepancies in totals result from the rounding of numbers for presentation purposes.

4.2 Changes to Movement

Miller and Gunn (1979) described disturbance in relation to wildlife as “the phenomenon, which resulted from the introduction of unfamiliar stimuli into an animal’s environment brought about by the presence of human activities”. Mining activities have the potential to decrease the use of habitat adjacent to human developments by caribou due to behavioural disturbance (DDMI 1998b; Golder 2011; Boulanger et al. 2012).

The current objective for this component of the WMP is to determine if the area around the Mine where caribou distribution is altered (the zone of influence [ZOI]) due to mining activities is greater or less than predicted. The following section summarizes the methods used and results obtained from surveys. The revised impact prediction presented by Handley (2010) is:

- To determine whether the zone of influence changes in relation to Mine activity.

From 2002 through 2009, DDMI completed weekly aerial surveys, weather permitting, within a study area that surrounds the Mine. In 2009, the survey area was aligned with that of the Ekati Diamond Mine to improve sampling efficiencies while covering a larger area. In 2012, aerial surveys were conducted in collaboration with the Ekati Diamond Mine. Diavik and the Ekati Diamond Mine requested to omit the ZOI requirements for the caribou monitoring program in 2013; the request was approved by **ENR on 2 May 2013**. Caribou aerial surveys were not completed from 2013 through 2019.

In 2017, DDMI provided results from aerial survey data that showed there was no correlation between caribou density and distance from mines (i.e., Diavik and Ekati mines) in response to comments by the Environmental Monitoring Advisory Board (EMAB) (Golder 2017a). Following review of this result, EMAB and ENR requested additional analysis of this relationship to account for habitat and insect harassment. The new analysis is provided below.

Animals should distribute themselves across space and time in accordance to available resources that maximize fitness (i.e., survival and reproduction) (Fretwell and Lucas 1970; McLoughlin et al. 2006). **Hence, animals should show preference for these resources and match the spatial distribution of resource quality.** Animals use sensory cues, such as taste, sight, and smell from the environment to guide decisions about which habitats and patches to use and experience to increase fitness. When animals encounter new environmental stimuli, they may alter their perception of fitness risk based on previous experience in the same habitat or patch. This concept forms the ecological basis of sensory disturbance from development, where the new development stimuli represent the introduction of lights, smells, noise, infrastructure, and the presence of people to the landscape. In turn these stimuli are predicted to indirectly alter (reduce) the functional quality of habitats and patches animals choose to use even though past experience indicates they are beneficial to occupy (i.e., before human disturbance). The spatial extent of change in habitat use (animal distribution) is regarded as a ZOI and is unknown for many animals and developments (but see Vistnes and Nellemann 2008; Benítez-López et al. 2010). At the range scale, ZOI effects may have the potential to alter the carrying capacity of the landscape and connectivity of resource use.

A common practice in ZOI estimation is to use a covariable of distance from the source of disturbance or development as a predictor of caribou occurrence (e.g., Johnson et al. 2005; Boulanger et al. 2012; Johnson and Russell 2014). The distance covariable is then used in models as an additive function with other covariables, such as habitat, to describe influences on caribou distribution. Investigators conclude that if the additive coefficient associated with the distance covariable is significantly positive, then this is evidence of a change in the caribou-habitat relationship and avoidance of human disturbance (Johnson et al. 2005; Boulanger et al. 2012;

Johnson and Russell 2014). This may be a spurious or weak conclusion because the regression coefficient of the covariable describes how animals are distributed with distance from development infrastructure, but may also represent the constant difference across of the gradient of other ecologically informative covariables in the model. For example, including habitat as an additive factor in the model assumes the relationship is constant regardless of how habitat quality is spatially distributed relative to the disturbance. A more robust and informative model includes the interaction between distance and habitat covariables, which allows the relationship to vary across space (i.e., it is no longer assumed to be constant), and explicitly tests for deviations in animal observations from the distribution of habitat and distance to disturbance gradient.

The objective of the analysis was to evaluate whether the caribou distribution interacts spatially with habitat and distance from mines, after accounting for other natural factors such as insect harassment and autumn range distribution of the Bathurst caribou herd (Appendix C).

4.2.1 Methods

4.2.1.1 Aerial Surveys

Aerial surveys to determine the number, distribution, group composition, and instantaneous behaviour of caribou have been completed in the Lac de Gras area from 1999 to 2012. From 1998 through 2001, systematic transects were flown within the Ekati mine study area (Figure 4); approximately 1,600 square kilometres [km²] (BHPB 2002). Beginning in 2002, surveys were extended to include an area around the Diavik Mine and south eastern shore of Lac de Gras, providing a combined study area of approximately 2,800 km² (Golder 2004). This study area was surveyed from 2002 to 2005 (Figure 4).

In 2006 and 2007, BHP Billiton (BHPB 2007) initiated caribou surveys in an expanded study area covering 5,425 km² (Figure 5). Also in 2006, BHPB adopted new protocols for caribou aerial surveys, which excluded surveys during the northern migration period (BHPB 2007). The Diavik study area was also enlarged to 1,870 km² in 2006 and to 2,867 km² in 2007 and 2008 (DDMI 2007; Figure 5). In 2009 and 2012, DDMI and BHPB combined their efforts to sample one study area (approximately 6,000 km²) consisting of 12 transects (Figure 5; transect lines and segments of transect lines coloured red were not flown in 2009). Aerial surveys were suspended in 2010 and 2011 (DDMI 2011).

Details on the frequency of surveys and the changes in study areas, transects and transect segments are provided in Table 5. Transects were divided into 1-km segments for previous and current analyses (Golder 2011; Boulanger et al. 2012). Surveys were completed from 150 to 180 metres (m) above ground level at a speed of 145 to 160 kilometres per hour. Within the Ekati study area, transect width varied among years resulting in 50% coverage (line of sight was 1 kilometre (km) on either side of the helicopter) of the study area in 1998, and from April through July of 1999. From August 1999 through 2012, survey width was 1.2 km (line of sight was 600 m on either side of the helicopter). Coverage of the survey varied as the total size of the study areas changed (Table 5).



Table 5: Aerial Caribou Survey Frequencies and Study Areas for the Ekati and Diavik Areas, 1998 to 2012.

Year	Post-Calving Survey Frequency	Study Area	Coverage	Number of Transects	Design Number of Segments	Total Segments Surveyed
1998 to 2001	Weekly from mid-July to mid-October.	Ekati – 1,600 km ²	1998-1999: 50% 1999-2001: 30%	10	393	24,366
2002 to 2005	Weekly from mid-July to mid-September.	Ekati + DDMI – 2,800 km ²	30%	13	675	28,350
2006	Weekly from late-July to mid-November	Ekati – 5,425 km ² DDMI – 1,870 km ²	DDMI: 31% Ekati : 15%	18	968	12,584
2007 and 2008	Weekly from mid-July to mid-October	Ekati – 5,425 km ² DDMI – 2,867 km ²	DDMI: 31% Ekati : 15%	19	1,138	44,382
2009 and 2012 ^(a)	Weekly from mid-July to mid-October	2009/2012 - 5,930 km ²	15%	12	740	18,500

(a) Surveys were not completed in 2010 and 2011.

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- AERIAL SURVEY TRANSECT
- DIAMIK AND EKATI WILDLIFE STUDY AREAS, 1998 - 2005
- DIAMIK FOOTPRINT
- EKATI FOOTPRINT
- LANDCOVER TYPE
 - HEATH TUNDRA
 - HEATH TUNDRA BEDROCK
 - HEATH TUNDRA BOULDER
 - TUSsock/HUMMOCK
 - SEDGE WETLAND
 - RIPARIAN TALL SHRUB
 - BIRCH SEEP & SHRUB
 - BOULDER COMPLEX
 - BEDROCK COMPLEX
 - WATER
 - ESKER

REFERENCE(S)

- DIAMIK LANDSAT CLASSIFICATION 1997; WEST KITIKMEOT CLASSIFICATION 2001
 - BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
- PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

RioTinto

PROJECT

DIAMIK DIAMOND MINES INC.

TITLE

LANDCOVER TYPES, DEVELOPMENT, AND AERIAL SURVEY TRANSECTS WITHIN THE EKATI AND DIAMIK WILDLIFE STUDY AREAS, 1998 TO 2005

CONSULTANT



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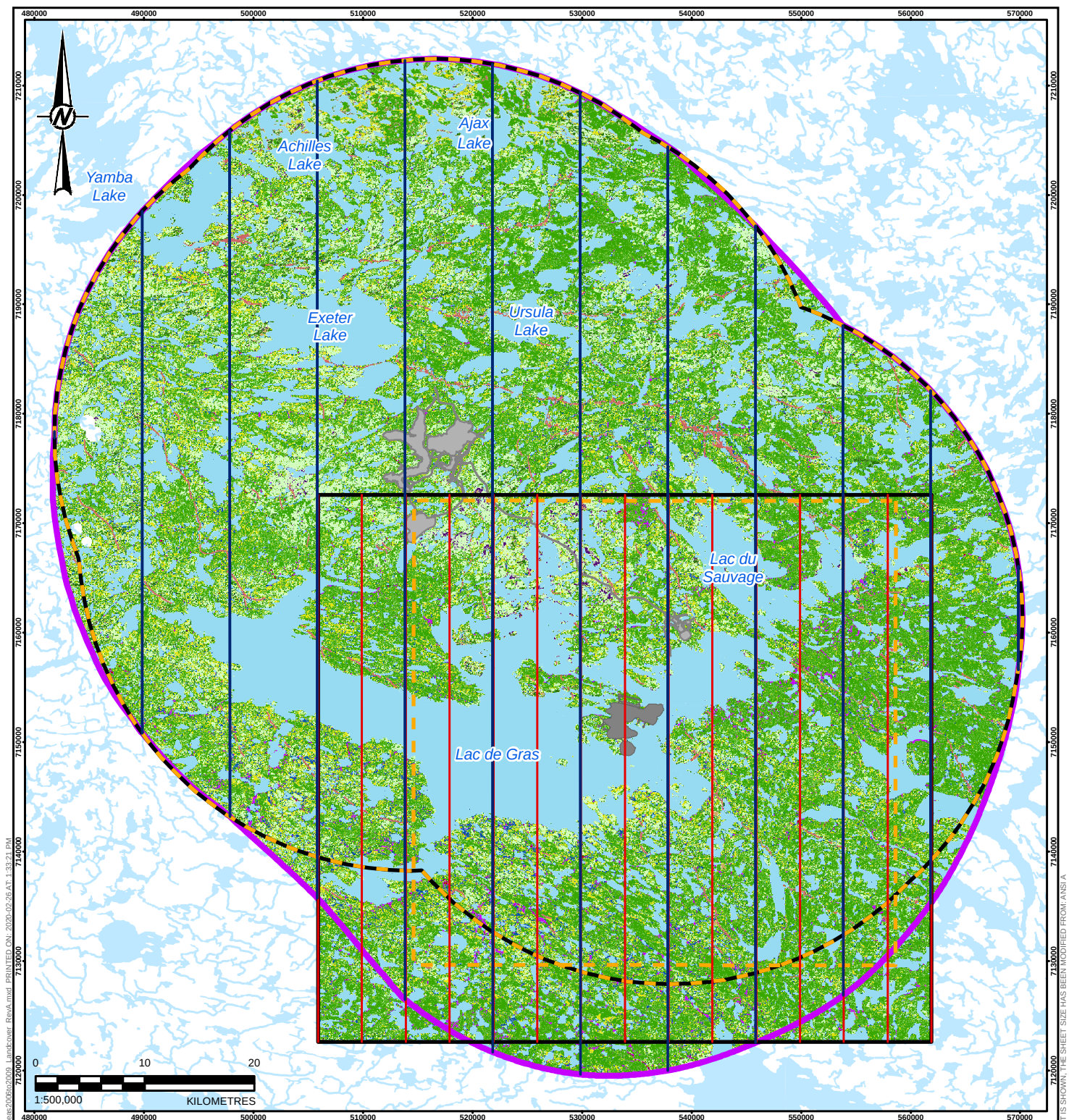
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LEGEND

- AERIAL SURVEY TRANSECT, 2006 - 2008
- AERIAL SURVEY TRANSECT, 2006 - 2012
- DIABIK AND EKATI WILDLIFE STUDY AREAS, 2006
- DIABIK AND EKATI WILDLIFE STUDY AREAS, 2007 - 2008
- DIABIK AND EKATI WILDLIFE STUDY AREA, 2009 - 2012
- DIABIK FOOTPRINT
- EKATI FOOTPRINT

LANDCOVER TYPE

- HEATH TUNDRA
- HEATH TUNDRA BEDROCK
- HEATH TUNDRA BOULDER
- TUSsock/HUMMOCK
- SEDGE WETLAND
- RIPARIAN TALL SHRUB
- BIRCH SEEP & SHRUB
- BOULDER COMPLEX
- BEDROCK COMPLEX
- ESKER

REFERENCE(S)

- DIABIK LANDSAT CLASSIFICATION 1997; WEST KITIKMEOT CLASSIFICATION 2001
 - BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
- PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

RioTinto

PROJECT

DIABIK DIAMOND MINES INC.

TITLE

LANDCOVER TYPES, DEVELOPMENT, AND AERIAL SURVEY TRANSECTS WITHIN THE EKATI AND DIABIK WILDLIFE STUDY AREAS, 2006 TO 2012

CONSULTANT

YYYY-MM-DD 2020-02-26

DESIGNED DC

PREPARED ANK

REVIEWED

APPROVED

PROJECT NO.

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FIGURE

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4.2.1.2 Analysis

The approach to this analysis focuses on changes in caribou distribution measured from aerial surveys as completed in the most recent study detecting a ZOI from these same data (Boulanger et al. 2012).

Unlike Boulanger et al. (2012), which transformed observations of animal counts to a presence-absence variable, the number of caribou observed was used as the response variable in this analysis. A caribou abundance response variable was used because a measured change in abundance is more directly linked to demographic implications than the probability of occurrence associated with presence-absence data.

The caribou analysis included a combined set of data collected from both the Diavik and Ekati study areas with the permission of Dominion Diamond Mines, who has operated the Ekati mine since 2013. Wildlife studies in the Ekati study area have occurred since 1997, and these data were used to support the current comprehensive analysis. By including Ekati mine, it is recognized that data for baseline and construction of the Diavik Mine is biased towards the northern portion of the study area.

Theoretically, geometric principles (e.g., πr^2) predict that caribou use of habitat should be positively correlated with the area associated with increasing distance from development (Figure 6A). This is because the area available for use increases with distance from disturbance. Thus, evaluating caribou abundance (or caribou use) as a function of proximity to development alone is inherently biased due to the increasing availability of space. In a setting with no development influences and no competition for resources, it would be expected that caribou use should be proportional to the amount of preferred habitat (Figure 6B). The amount of preferred habitat may also be positively correlated with distance from development because there is more available area for habitat. Without standardizing caribou use to be conditional on the spatial amount and distribution of preferred habitat (or available area), one might incorrectly conclude that more common caribou presence (or abundance) further from development is evidence of avoidance when it may really be a function of preferred habitat availability.

To sufficiently predict avoidance requires a significant interaction between distance from development and preferred habitat availability (Figure 6C), and should indicate lower use than the availability of preferred habitat based on how preferred habitat is distributed relative to development. Failure to detect a significant interaction means that the relationship between caribou use and preferred habitat is similar across distances, and that the y-intercept has changed by a systematic factor, such as time, across the distribution of sampled distances. This should be true regardless of whether the regression model type used is segmented, conditional logistic or linear. Variation in a systematic factor does not necessarily support an avoidance hypothesis.

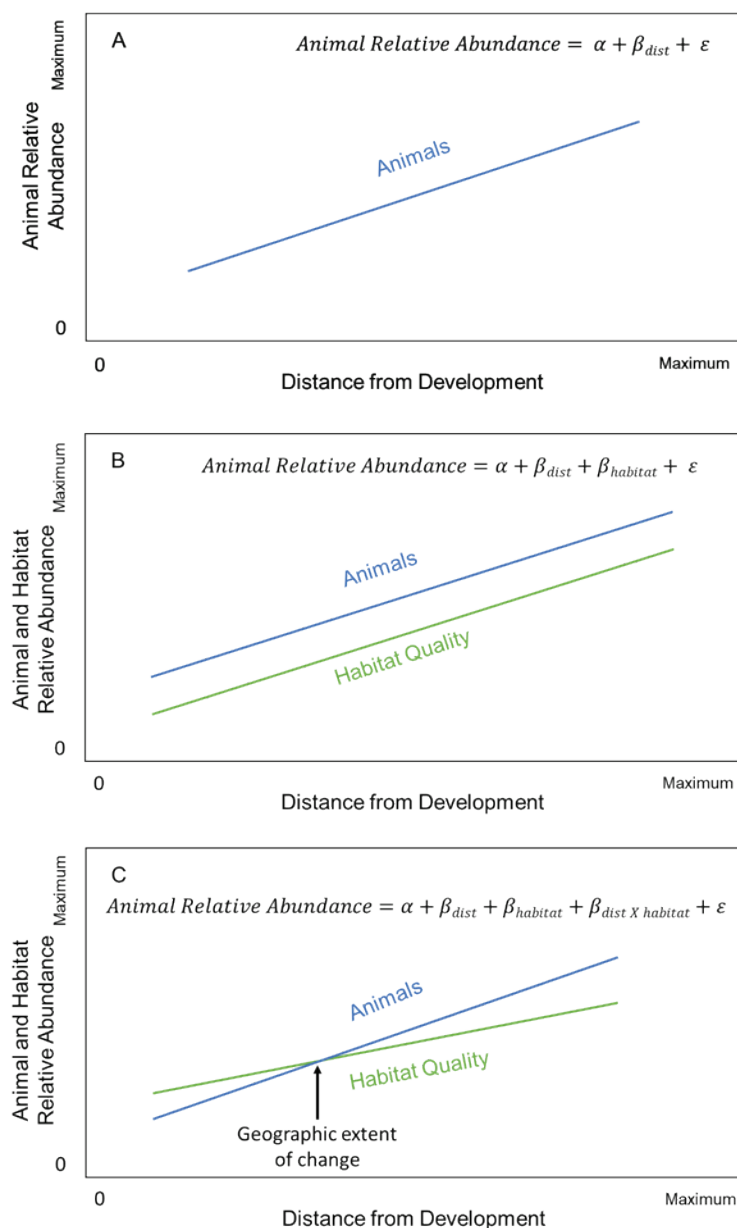
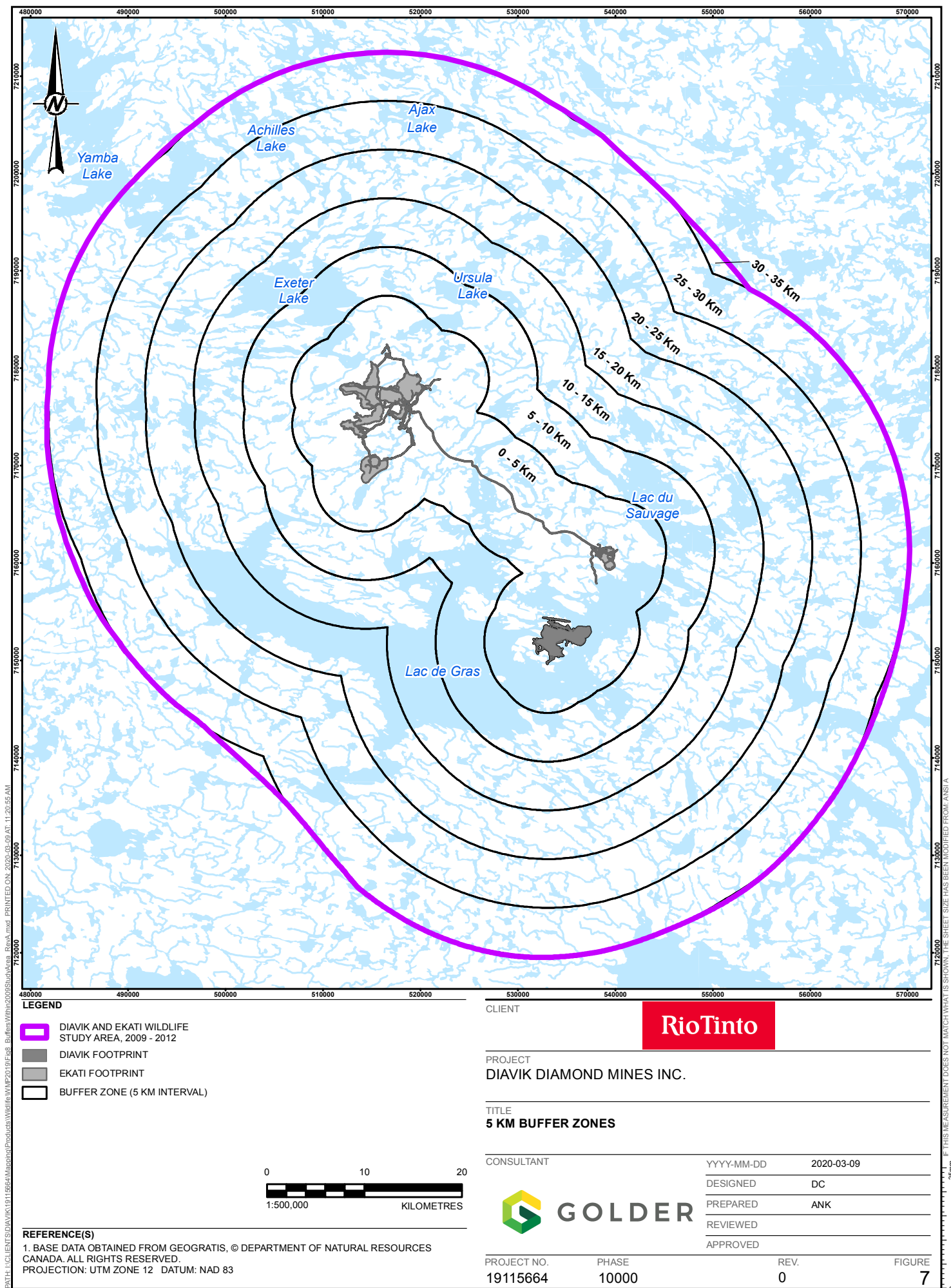


Figure 6: Predictions of Caribou use Relative to the Amount of Available Area (A), Preferred Habitat Area (B), and the Interaction Between Development Proximity and Preferred Habitat Selection Assuming an Avoidance Response (C)

To examine patterns of available area and how habitat is spatially distributed (i.e., Figure 6A and B) for the 2009/2012 aerial survey design, a series of K, 5-km distance zones (sequential radii of 5 km, 10 km, 15 km) around the mine footprints (at 2012 stage of development) were applied to the extent of the survey area boundary (Figure 7). Subsequently, the total area and area of preferred habitat was calculated within each distance zone. A sample of 1,000 points were randomly placed within the 2009/2012 study area and tabulated by distance zone. The random sample of locations illustrates how caribou may hypothetically be distributed with distance from the mines in the absence of habitat selection and potential sensory disturbance (i.e., a distribution by chance).



A combination of Landsat Ecological Landcover Classification and Slave Geological ELC data (Matthews et al. 2001) were used to quantify land cover types considered as preferred caribou habitat. Preferred caribou habitat included heath tundra, heath boulder, esker, tall shrub, sedge wetland and tussock-hummock land cover types (Johnson et al. 2005; Boulanger et al. 2012). Spatial trends in land cover area, including water (ha), preferred habitat area (ha), and number of random points were evaluated with Spearman correlation analysis (Zar 1999). Since the study area boundary is approximately 31 km, a distance zone of 30 km to 35 km only included part of the 2009/2012 study area and was not consistent with closer distance zones. The 30 km to 35 km distance zone was not included in correlation analyses, but metrics are shown graphically.

Covariables

During the post-calving migration, caribou groups ranging from 1 to 5,000 animals were observed along aerial survey transects and their location recorded with a Global Positioning System. In a geographic information system (GIS) platform, aerial survey transects were divided into 1 km segments and caribou groups were assigned to the nearest transect segment. The statistical sampling unit is the segment of a transect. For segments where no caribou were observed, a value of zero was assigned. An observation width of 600 m on either side of the survey aircraft was assumed (i.e., segment area was approximately 1.2 km²). Survey design sample sizes ranged from 393 segments in 1998 to 1,138 segments in 2007 and 2008 (Table 5). The total effort for each study area design over time ranged from 12,584 segments in 2006 to 44,382 segments in 2007 and 2008.

The amount of preferred habitat within each segment was measured by intersecting land cover data with segment areas of the different aerial survey designs over time. The area (ha) of heath tundra, heath boulder, esker, tall shrub, sedge wetland and tussock-hummock land cover types were then summed for each segment. The nearest distance from either mine footprint boundary to the centre of each segment was measured as an index of sensory disturbance and is consistent with previous studies (Golder 2011; Boulanger et al 2012). Distance to each segment was measured through time as mine footprints changed. Ordinary least-squares linear regression of habitat area in each segment on distance from mines was completed to assess if preferred habitat increased, decreased or was uniform with distance from mines (Zar 1999).

Insect harassment, particularly oestrid flies, can reduce the ability of caribou to forage optimally during the summer and fall (Hagemoen and Reimers 2002) and have a negative effect on body condition and fecundity (Weladji et al. 2003). Ideal weather conditions for caribou (i.e., low insect harassment) occur when mid-day ambient temperatures are less than 13 degrees Celsius (°C) and when wind speeds are greater than 6 metres per second (m/s) (Weladji et al. 2003). Meteorological data from Diavik (and when missing from Ekati) were used to generate an insect severity index for each day of aerial surveys. Temperature and wind speed thresholds determined by Weladji et al. (2003) (13°C and 6 m/s) were applied with a modification to transform the result from a binomial outcome (potential insect harassment or not) to a continuous residual value by multiplying positive threshold exceedances of either wind speed or temperature. The formula used was:

$$\text{Residual value} = (6 - \text{mean daily windspeed}) \times (\text{mean daily temperature} - 13)$$

When either or both wind speed and temperature resulted in a zero or negative residual value, the value was fixed to equal zero and yielded no potential for insect harassment (Weladji et al. 2003). Thus, the distribution ranged from 0 (no potential insect harassment) to a maximum positive value (increasing severity of potential insect harassment).

The Bathurst caribou post-calving range overlaps with the Ekati and Diavik mines and the herd has declined from over 300,000 animals in the 1990s to 8,200 in 2018 (Adamscewski et al. 2009; ENR 2020; Figure 8). Analysis of collared female Bathurst caribou from 1996 to 2013 detected a significant increase in the distance from

the centroid of the autumn range to the treeline during the decline of the herd, and animals moved into the forest later in the year (Virgl et al. 2017; Appendix C). The annual distance of the Bathurst autumn range centroid to the Paul Lake bridge on Misery Road of the Ekati mine was included to account for potential temporal changes in the number of caribou observations in the study areas related to seasonal range movements and distribution. The Paul Lake bridge was used as a reference location because it is centrally located in the 1998 Ekati study area and present throughout the duration of aerial survey monitoring.

The surveyed area of the study designs was also included as a covariable to account for the varying transect spacing and study area extent of sampling over time. The area of each survey design was rescaled by dividing the area (km²) by 1,000.

All covariables were centre-scaled prior to analysis by subtracting the mean and dividing by the standard deviation. Thus, covariable values were expressed as standard deviation units. Negative binomial mixed models were generated using the lme4 package (Bates et al. 2015) in R (version 3.6, R Core Team [RCT] 2019) and formulated with covariables, which are described in more detail below. Other supporting packages used included lmerTest (Kuznetsova et al. 2017) and DHARMa (Florian 2020). Bootstrap prediction intervals were generated using the boot package (Canty and Ripley 2019).

Preliminary examinations of temporal patterns for year and month of surveys were completed. Caribou counts indicated a high frequency (97.2%) of zero values (i.e., no caribou observed). The presence of zero-inflation was tested and not significant (observed/expected ratio = 1.0, $P = 0.92$), so a zero-inflation model was not required. Multi-collinearity among covariables was assessed by estimating the variance inflation factors (VIF; Zuur et al. 2010) and none of the covariables exceeded a VIF score of three (range: 1.0 to 1.2), indicating that multi-collinearity was not present.

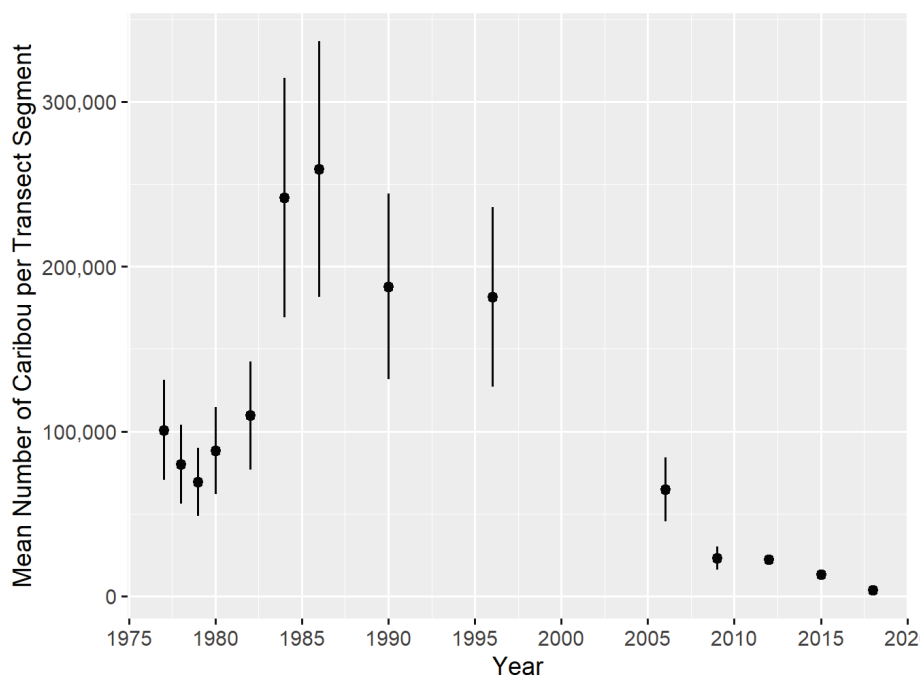


Figure 8: Total Number ($\pm$ 1SE) of Bathurst Female Caribou Estimated during Calving Ground Surveys, 1977 to 2018

Model Structure and Assumptions

Mixed-model negative binomial regressions were used to examine the relationship between the number of caribou observed and the explanatory variables of distance to mines (or distance), annual insect harassment, autumn range centroid distance from the Ekati mine (i.e., Paul Lake bridge), and study area size. A categorical factor of study year was included as a random effect to account for other annual factors that could influence caribou distribution, such as the decline of the Bathurst herd from 1998 to 2012. Four candidate models were evaluated for their relative support of the data (Table 6). The candidate model sets included additive and interactive combinations of variables with biological relevance. Model M1 contained the greatest number of parameters and other candidates were reduced forms of this model so the variable of distance and the interaction with preferred habitat could be evaluated. The structure of model M1 was explicitly designed to test for the presence of a ZOI. A null or equal means model was included to serve as a benchmark; models ranked above the null are deemed to have notable explanatory value.

Table 6: Candidate Mixed-Models Evaluating Aerial Survey Counts of Caribou and Assumptions of Distance-Habitat Relationship

Model	Covariables	Assumptions of Distance-habitat Relationship	Predicted Pattern Tested
M1	design survey area + distance + preferred habitat + distance*habitat + insect harassment + autumn range distance to Ekati	Caribou abundance-preferred habitat relationship depends on the proximity to mines (i.e., ZOI is present), after accounting for other factors	Figure 6C
M2	design survey area + distance + preferred habitat + insect harassment + autumn range distance to Ekati	Caribou abundance-preferred habitat relationship does not depend on proximity to mines (i.e., no ZOI), after accounting for other factors	Figure 6B
M3	design survey area + preferred habitat + insect harassment + autumn range distance to Ekati	Caribou abundance is correlated with the amount preferred habitat (i.e., no ZOI).	Figure 6B
Null	no covariables included, only a y-intercept is estimated	Caribou distribution is constant across space and time	

All models included year as a random effect.

Autumn range centroid distance was measured to Ekati mine's Paul Lake bridge.

It is important to recall that there are no true models of reality, only models that best approximate reality given the data recorded. Therefore, an information-theoretic approach was used to evaluate the candidate set of models (Burnham and Anderson 2002). Information theory is based on the concepts of simplicity and parsimony, which suggest that the simplest explanation is probably the most likely. Akaike's Information Criteria (AIC) balances explanatory value with the number of variables in evaluating a model by using a parameter penalty of 2.0. The candidate set was ranked by delta AIC (ΔAIC), the difference between the AIC score of the best fitting model and each model in the set. Akaike's Information Criteria weights (AICw) were used to deduce the relative support for each model. In addition to AIC selection, the regression coefficient estimates were also reviewed to determine the presence of uninformative parameters (Arnold 2010). Uninformative parameters are identified when the estimated 95% confidence intervals overlap zero (i.e., not statistically different than zero).

4.2.2 Results

The study area boundary for the 2009/2012 aerial survey is approximately a 31 km radius from the Diavik and Ekati mine footprints, so distance zone 35 km contains less of the study area than the closer distance zones (Figure 7). Distance zone 35 km was not included in correlation analyses, but is shown graphically. The spatial patterns associated with the 2009/2012 aerial survey study area and distance zones shows a pattern of significantly increasing area with distance from mines (Spearman correlation, $\rho = 1.0$, $P < 0.01$; Figure 9), amount of preferred habitat with distance (Spearman correlation, $\rho = 0.94$, $P < 0.01$; Figure 10) and numbers of random points with distance (Spearman correlation, $\rho = 0.94$, $P < 0.01$; Figure 11). The number of random points also significantly increases with area (Spearman correlation, $\rho = 0.94$, $P < 0.01$).

In contrast, the proportion of distance zones comprised of deep water land cover (lakes) is largely inversely related to distance from the mines (Spearman correlation, $\rho = -0.89$, $P < 0.01$; Figure 12). Deep water land cover is more concentrated at closer distances to the mines (e.g., Lac de Gras, Lac du Sauvage), and lakes are avoided by caribou during open-water conditions (Boulanger et al. 2012). Based on these results, it can be expected that without standardizing per unit area and in the absence of sensory disturbances from the Ekati and Diavik mines, that caribou distribution should be positively correlated with distance from mines. Regression of preferred habitat within a transect segment indicated a significant positive relationship with distance from mines (GLM, $F_{1,128,180} = 2956.0$, $P < 0.01$; Figure 13) and also varied by aerial survey design (GLM, $F_{9,128,172} = 568.4$, $P < 0.01$).

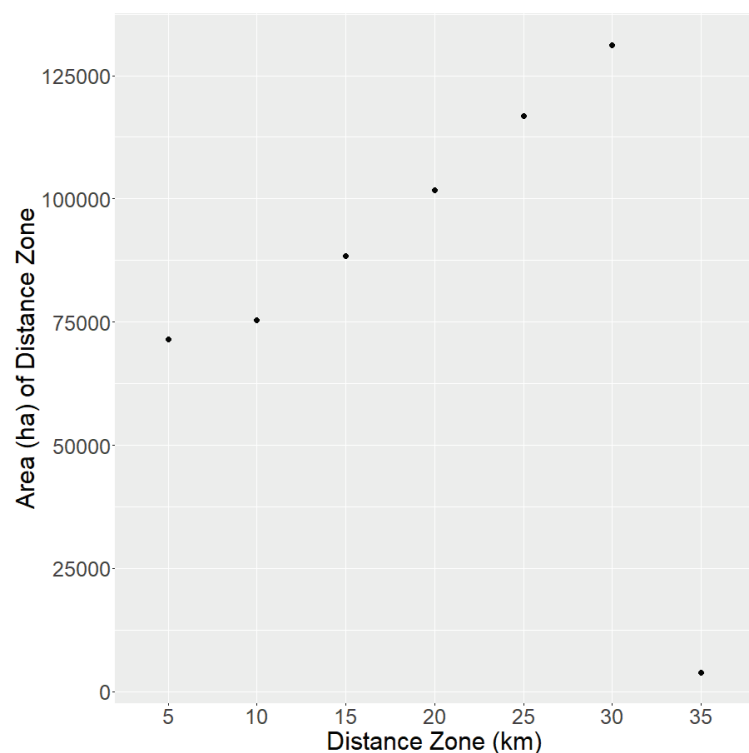


Figure 9: Area (ha) of Distance Zones for the 2009/2012 Aerial Survey Study Area

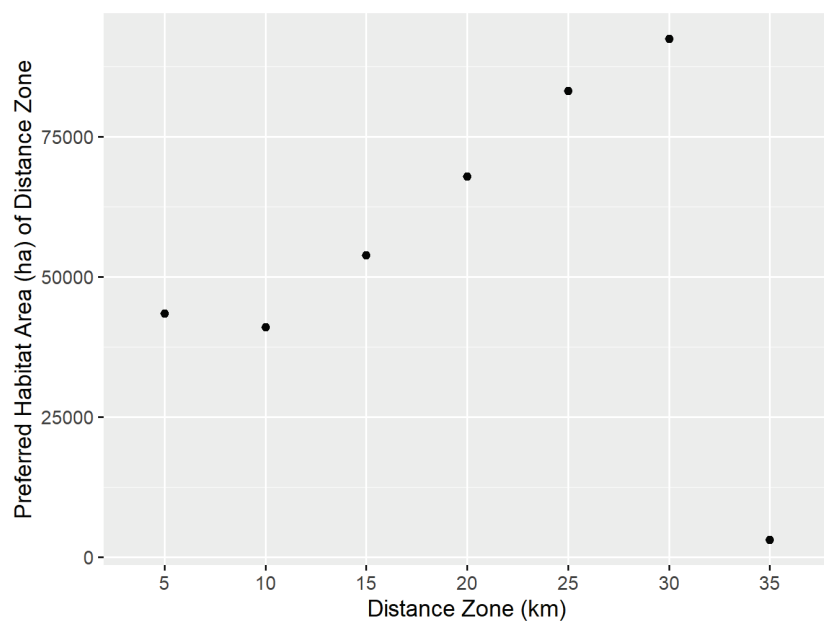


Figure 10: Area (ha) of Preferred Caribou Habitat within Distance Zones for the 2009/2012 Aerial Survey Study Area

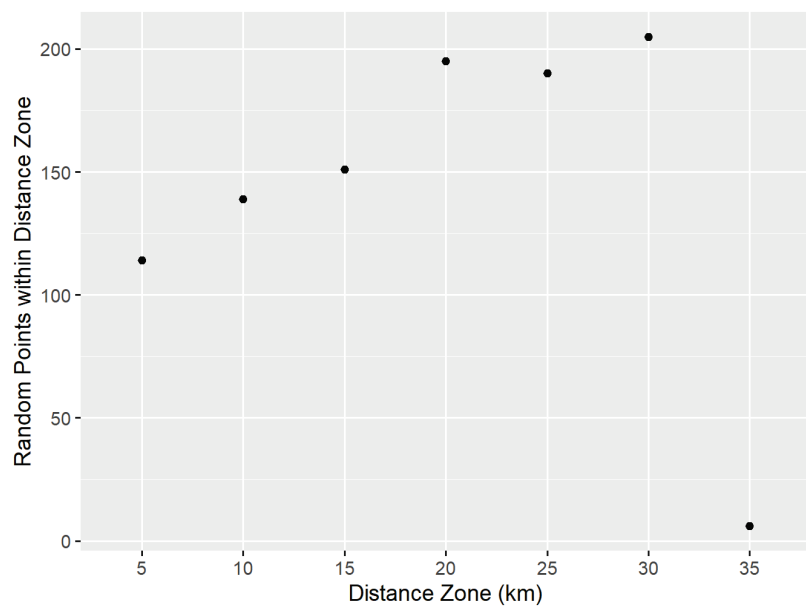


Figure 11: Number of Random Points in Distance Zones for the 2009/2012 Aerial Survey Study Area

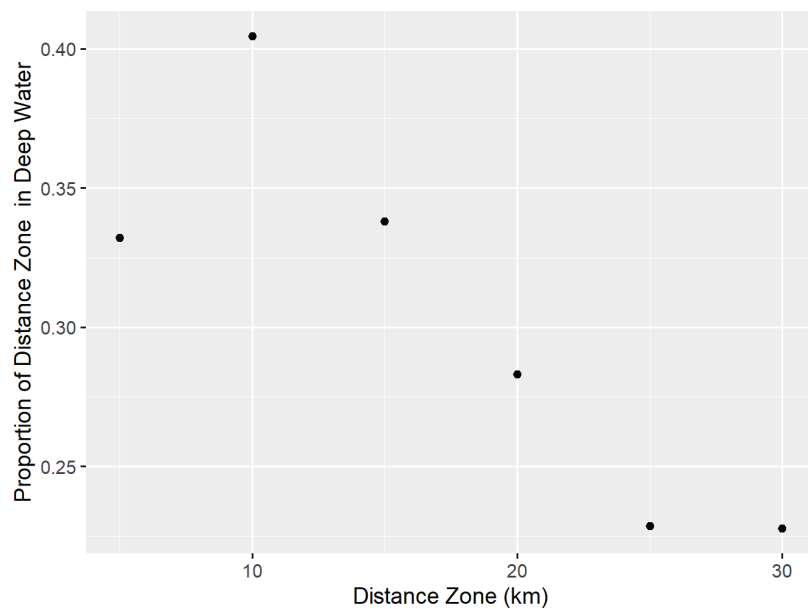


Figure 12: Proportion of Distance Zone Area (ha) Comprised of Deep Water (ha) for the 2009/2012 Aerial Survey Study Area

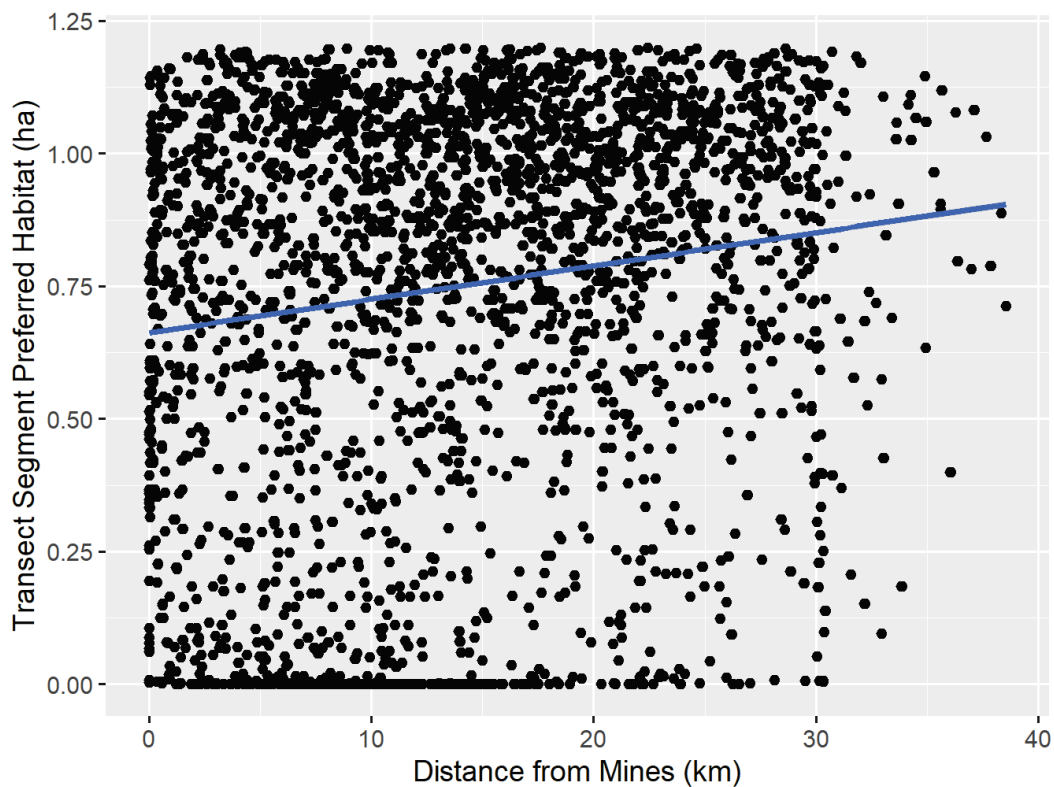


Figure 13: Spatial Distribution of Preferred Caribou Habitat Area (ha) of Aerial Survey Transect Segments, 1998 to 2009, and 2012

Review of temporal patterns of caribou numbers observed during aerial surveys from 1998 through 2009 and 2012 indicate abundance varied annually (LR Test, $X^2 = 287.6$, $P < 0.01$; Figure 14) and monthly (LR Test, $X^2 = 425.1$, $P < 0.01$; Figure 15). In particular, the pattern of monthly abundance indicates that the mean number of caribou was highest in July, decreased in August and then increased again during the fall/rut (Figure 15). As expected, the monthly pattern of the insect severity index was highest in July, lower in August and then approximately zero for September, October and November when temperatures are colder (Figure 16). Although consistent with caribou numbers in July, the insect severity index was not a good predictor of caribou abundance (LR Test, $X^2 = 1.30$, $P = 0.25$). Given the monthly patterns of numbers of caribou and lack of relationship with the insect severity index, the insect severity index was replaced with month as a number (e.g., July = 7) in the candidate models except for the null (which has no covariables). The distance between the autumn range centroid and the Ekati mine (Paul Lake bridge) shows a significant negative association over time (Spearman correlation, $\rho = -0.37$, $P < 0.01$; Figure 17).

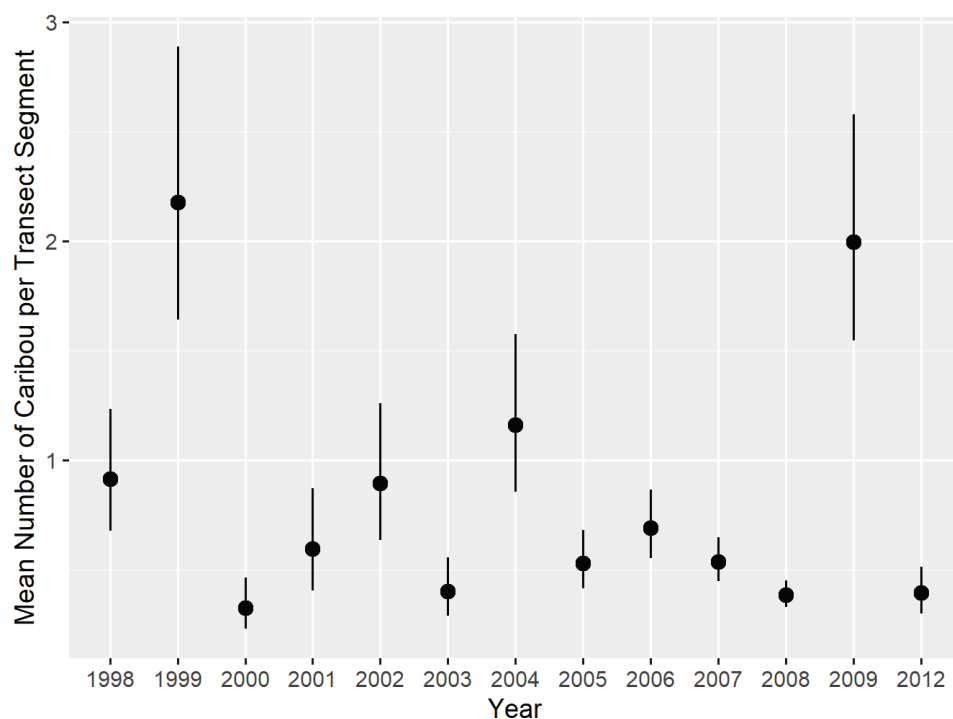


Figure 14: Mean Number of Caribou per Transect Segment ($\pm$ 95%CI) by Year, 1998 to 2009, and 2012

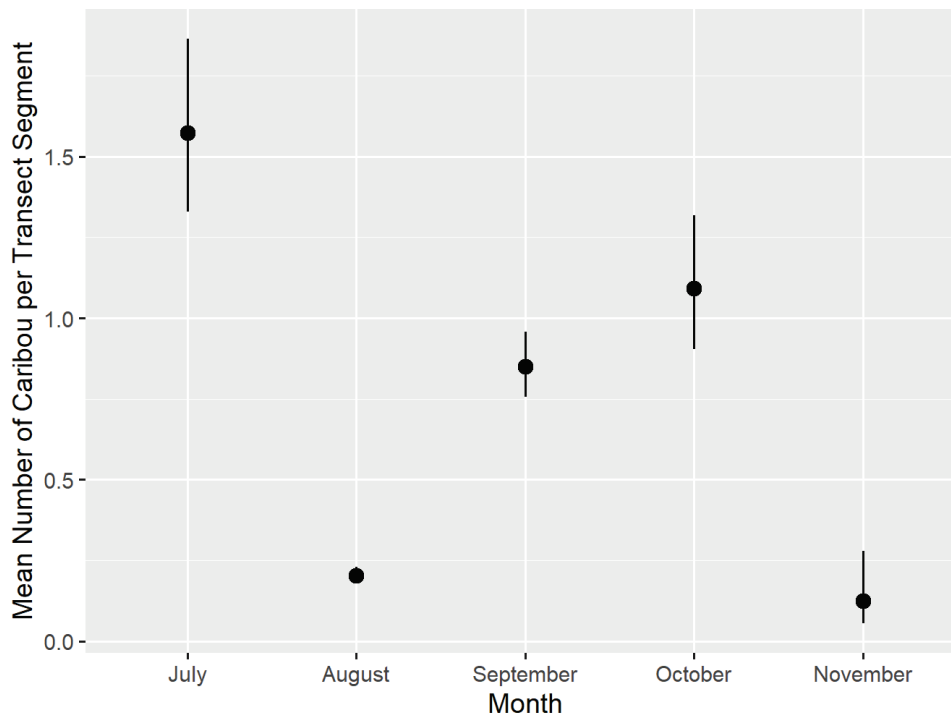


Figure 15: Mean Number of Caribou per Transect Segment ($\pm$ 95%CI) by Month, 1998 to 2009, and 2012

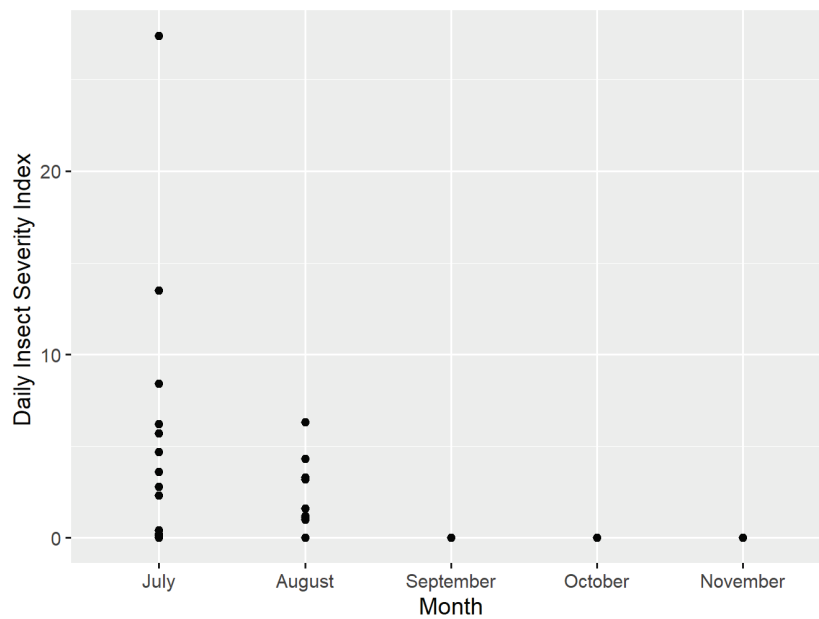


Figure 16: Weather-based Daily Insect Severity Index by Month of Aerial Surveys, 1998 to 2009, and 2012

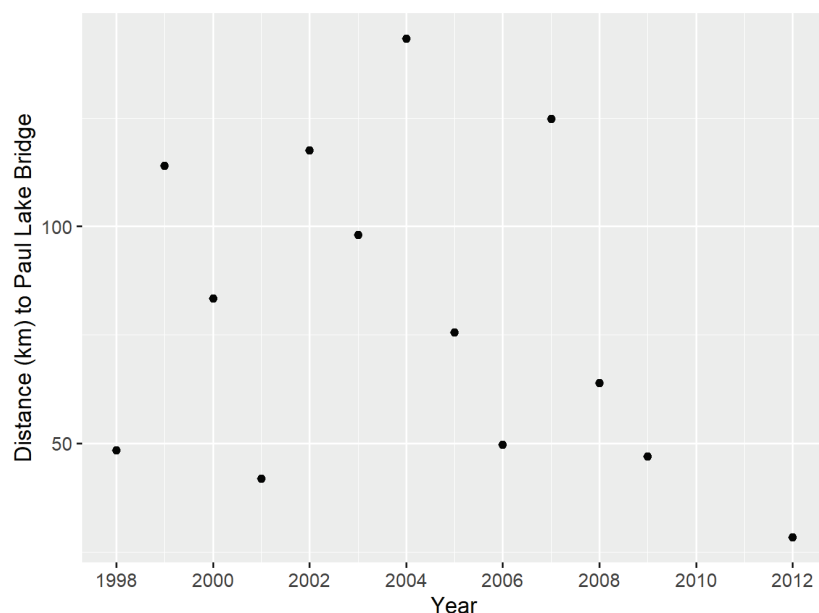


Figure 17: Distance of the Bathurst Caribou Autumn Range Centroid to the Paul Lake Bridge, 1998 to 2009 and 2012

Model selection results indicated that model M2 provided the best fit to the aerial survey data and model M1 was ranked second (Table 7). Model M1 was specifically designed to test the interaction between distance from mines and preferred habitat variables, and thus tested for the presence of a ZOI. The higher ranked model M2 only differed from M1 by not including this interaction term (see Table 6), and both models were within 2 AIC suggesting similar explanatory value. Further examination of M1 determined that the interaction term for distance and preferred habitat was -0.05 (95%CI: -0.15 to 0.05), indicating a non-informative parameter, so a measurable ZOI was not detected or supported by the aerial survey data. Models M1, M2 and M3 were all ranked above the null model indicating each provided explanatory value.

Table 7: Negative Binomial Mixed-Model Selection Results of Aerial Survey of Caribou

Model	K	AIC	Δ AIC	Model Likelihood	AICc Weight	-log-likelihood
M2	8	54898.60	0.00	1.00	0.64	-27441.30
M1	9	54899.72	1.12	0.57	0.36	-27440.86
M3	7	54948.03	49.43	0.00	0.00	-27467.02
Null	3	55264.71	366.11	0.00	0.00	-27629.35

K = number of model parameters

AIC = Akaike's Information Criteria score.

Δ AICc = Difference in AIC score relative to the top model.

Regression coefficients of model M2 are presented in Table 8. The regression coefficients for design survey area, distance from mines, preferred habitat and month were unique from zero and considered informative.

The covariable of autumn range centroid distance to the Paul Lake bridge had a non-measurable influence on caribou distribution in the study areas over time. Spatial predictions of caribou distribution from model M2 are shown in Figure 18.

Table 8: Regression Coefficients (95% Confidence Intervals) of the Top-ranked M2 Model

Design Survey Area (km ²)	Distance (km)	Preferred Habitat (ha)	Month ^(a)	Distance of Autumn Range Centroid to Paul Lake Bridge
-0.49 (-0.86 to -0.12)	0.34 (0.24 to 0.43)	0.86 (0.76 to 0.95)	0.16 (0.09 to 0.24)	0.28 (-0.05 to 0.60)

Note: 95% confidence intervals that overlap zero are not considered statistically different from zero. All predictor variables were centre-scaled prior to analysis.

(a) Month number replaced insect severity as a covariable in all models except for the null model.

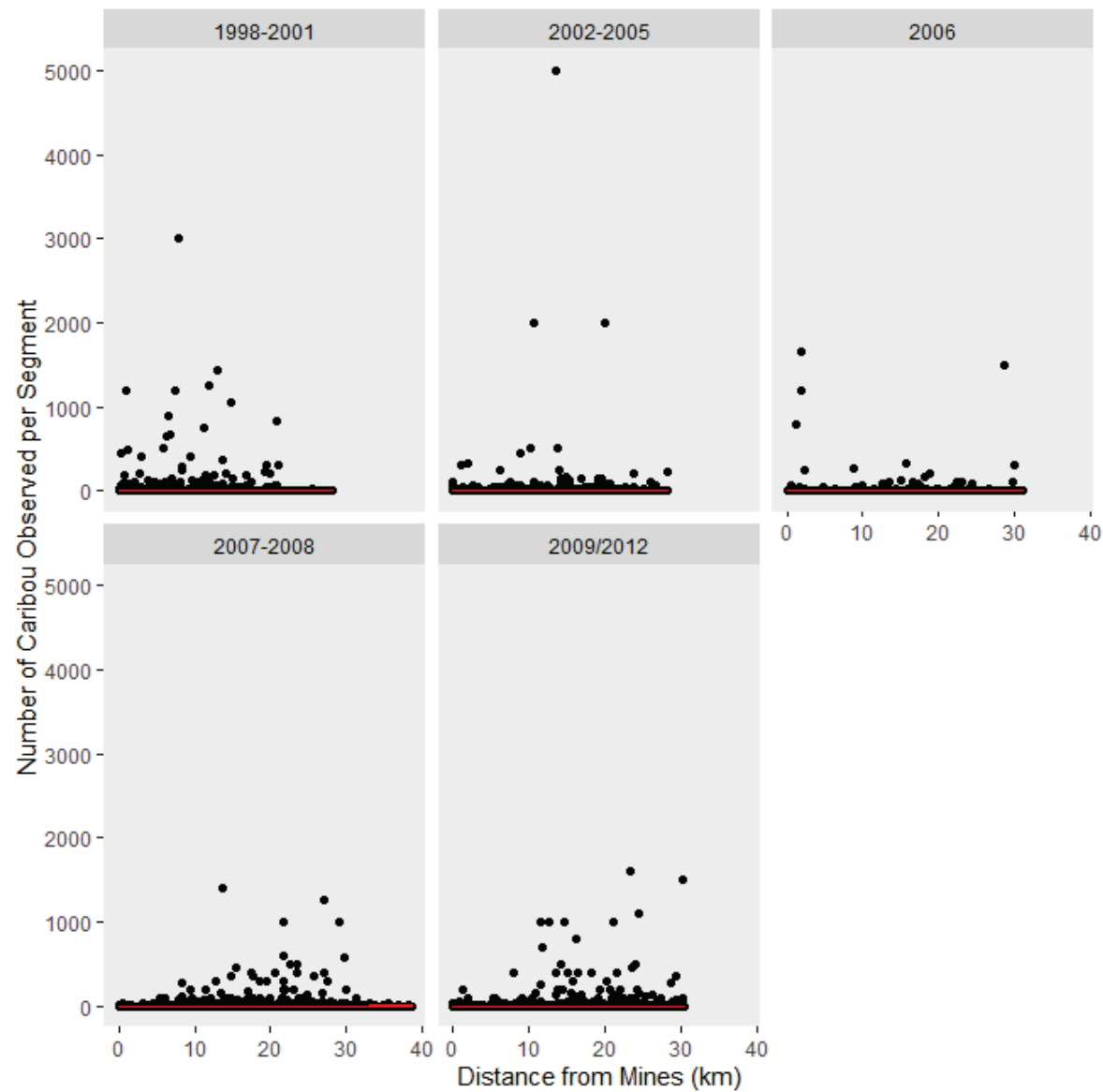


Figure 18: Predicted ($\pm$ 95%CI) Spatial Trend of Caribou Distribution from Model M2 for July with All Other Covariables Fixed at their Mean Value.

Relative to the 14 km ZOI modelled by Boulanger et al. (2012) and using these same aerial survey data, predicted values of caribou abundance with model M2 at kilometres 0 and 16 from mines (i.e., inside the extreme and just beyond the modelled 14 km ZOI distance) are shown in Table 9 for each aerial survey design through time. For any given study design the difference in the predicted abundance of caribou between kilometres 0 and 16 is less than 0.4 caribou. Importantly, these predictions reflect the increase of preferred habitat with increasing distance from mines (Figure 13).

Table 9: Predicted of Caribou Abundance per Transect Segment in July at Distance 0 km and 16 km From Mine from Model M2, with All Other Covariables Fixed at Their Mean Value

Aerial Survey Design	Distance from Mine (km)	Mean Caribou Abundance ($\pm$ 95%CI)
1998 to 2001	0 km	0.45 (0.27 to 0.77)
	16 km	0.83 (0.50 to 1.40)
2002 to 2005	0 km	0.27 (0.17 to 0.39)
	16 km	0.51 (0.34 to 0.70)
2006	0 km	0.24 (0.14 to 0.35)
	16 km	0.45 (0.28 to 0.63)
2007 to 2008	0 km	0.17 (0.08 to 0.26)
	16 km	0.31 (0.15 to 0.48)
2009 and 2012	0 km	0.12 (0.05 to 0.23)
	16 km	0.23 (0.09 to 0.43)

Conclusions

Under a habitat selection framework as applied in this study, caribou distribution is expected to match the spatial distribution of preferred habitats (Fretwell and Lucas 1970). The spatial patterns showed that the availability of area and preferred habitat increases with distance from the mines. In the absence of sensory disturbance effects, caribou abundance and distribution should also increase with distance from mines. Regression results of 13 years of caribou monitoring with greater than 128,000 observations indicate that caribou in the Lac de Gras region are distributed in accordance to the spatial distribution of preferred habitat in undisturbed areas adjacent to two diamond mines. In contrast to previous analysis of these same data (Boulanger et al. 2012) a ZOI was not detected. While previous analysis applied a presence-absence (i.e., binomial) approach, it is believed that the conclusion of the presence of a ZOI was due to misinterpretation of statistical support for a positively correlated distance variable that was specified as an additive model effect. Other studies (Johnson et al. 2005; Johnson and Russell 2014), including Golder (2011), have made similar conclusions about significant positive regression coefficients for a distance to mine variable. The application and pattern of random points demonstrated that a positive correlation with distance can be explained by increasing sampled area from the mines. Standardizing variables to be in per unit area is a way to adjust for such geometric phenomena (e.g., Weir et al. 2007).

Assuming that a 14 km ZOI does exist, the predicted caribou abundance at distance 0 km and at 16 km for the different study designs indicate a difference of about 0.4 caribou per 1.2 km² after accounting for other factors, including insect harassment. Bergerud et al. (2008) suggested that a density of 5 caribou per km² would trigger demographic consequences through decreased survival or fecundity or both. An increase by 0.4 caribou per 1.2 km² is equivalent to 0.3 caribou per km², which is much smaller than 5 caribou per km². Demographic implications associated with a change of 0.3 caribou per km² from sensory disturbance are likely not measurable. Collar data from Bathurst caribou indicate a typical cow spends up to three weeks within 15 km of the Diavik and Ekati mines (Dominion Diamond 2014), which can occur over a period 3.5 months of the year (Boulanger et al. 2004; Dominion Diamond 2017). Thus, caribou interactions with the mines are temporary over their annual life-cycle.

During the time of this study (1998 to 2012), the covariable of surveyed area for each survey design had a significant negative relationship with caribou abundance, and is correlated with decreasing animal numbers in the Bathurst herd (Figure 8). The study areas and amount of area surveyed generally increased over time. The distance of the autumn range centroid to the Paul Lake bridge had little influence on caribou abundance in the study area. This distance decreased over time, which is consistent with range contraction and a northward shift in the autumn range observed during the decline phase of Bathurst caribou (Virgl et al. 2017; Appendix C). The result of no change in caribou abundance over time relative to changes in the autumn range suggests that the Lac de Gras region remains an important seasonal area for the Bathurst herd despite the presence of two diamond mines.

The habitat selection framework used in this study to detect a ZOI can be broadly applied for use with other statistical designs such as piece-wise (e.g., Boulanger et al. 2012) and conditional logistic regression used in resource selection functions (Manly et al. 2002; Johnson et al. 2005). This is because the interaction term functions in the same manner by testing for dependency between distance and habitat variables. Failure to test for an interaction results in a model that assumes animals are distributed in accordance to habitat quality, which is equivalent to assuming no ZOI. As well, not testing for an interaction only describes how animals are distributed across the landscape and provides no information on the underlying process for the observed distribution beyond the availability of habitat.

As was demonstrated in this analysis, an understanding of the distribution of habitat quality relative to sources of sensory disturbance is important for assessing the pattern of animal use in the study area. A graphical representation of habitat quality distribution is an informative first step for understanding how caribou or other animals should be distributed in the absence of sensory disturbance. Sensory disturbance is expected to reduce habitat use (through avoidance) relative to proximity to human development. Thus, use of preferred habitat by caribou should change with proximity to human activity and the magnitude and spatial extent of the change is expected to be measured through statistical support of an interaction between distance and preferred habitat, which was not the case for these data.

4.3 Changes to Behaviour

Ground-based behavioural observations, or scan sampling, are conducted to provide data on changes in caribou behaviour as a function of distance from the Mine. Monitoring is conducted cooperatively with the Ekati mine as caribou are often close to the Ekati mine infrastructure. Because the primary habitat within 5 km of the Mine footprint is water, DDMI is focused on collecting scanning observations further from the mines. However, due to low population numbers and logistical challenges that arise from far distance surveys during winter when caribou are currently present in the study area, the majority of scans are still near the Mine. The revised impact prediction from Handley (2010) is:

- To determine if caribou behaviour changes with distance from the mines.

4.3.1 Methods

Caribou groups were scanned every eight minutes for a minimum of four observations and a maximum of eight observations. For each scan, the number of animals exhibiting each type of behaviour was recorded (Murphy and Curatolo 1987). Individual caribou activities were recorded as feeding, bedded, standing, alert, walking, trotting or running. Individuals were classified as feeding when they were actually foraging or searching for food (i.e., walking with head down). The GPS location was recorded, and observations were conducted during the autumn (and more recently, during winter) when more caribou were passing through the area. Group composition was classified, and the number of animals in the group was recorded. If a group was too large and recording behaviour of each individual was not feasible, the total group size was noted, and a subset of the group was observed for behaviour. The response variable is caribou behaviour, while the covariates include distance from either mine, group composition, and weather variables. To control for the effects of habitat, all observations were performed within one habitat type (tundra with <30% bedrock or boulders). For the scan observations, weather conditions such as wind speed and direction, temperature, and type of precipitation were documented.

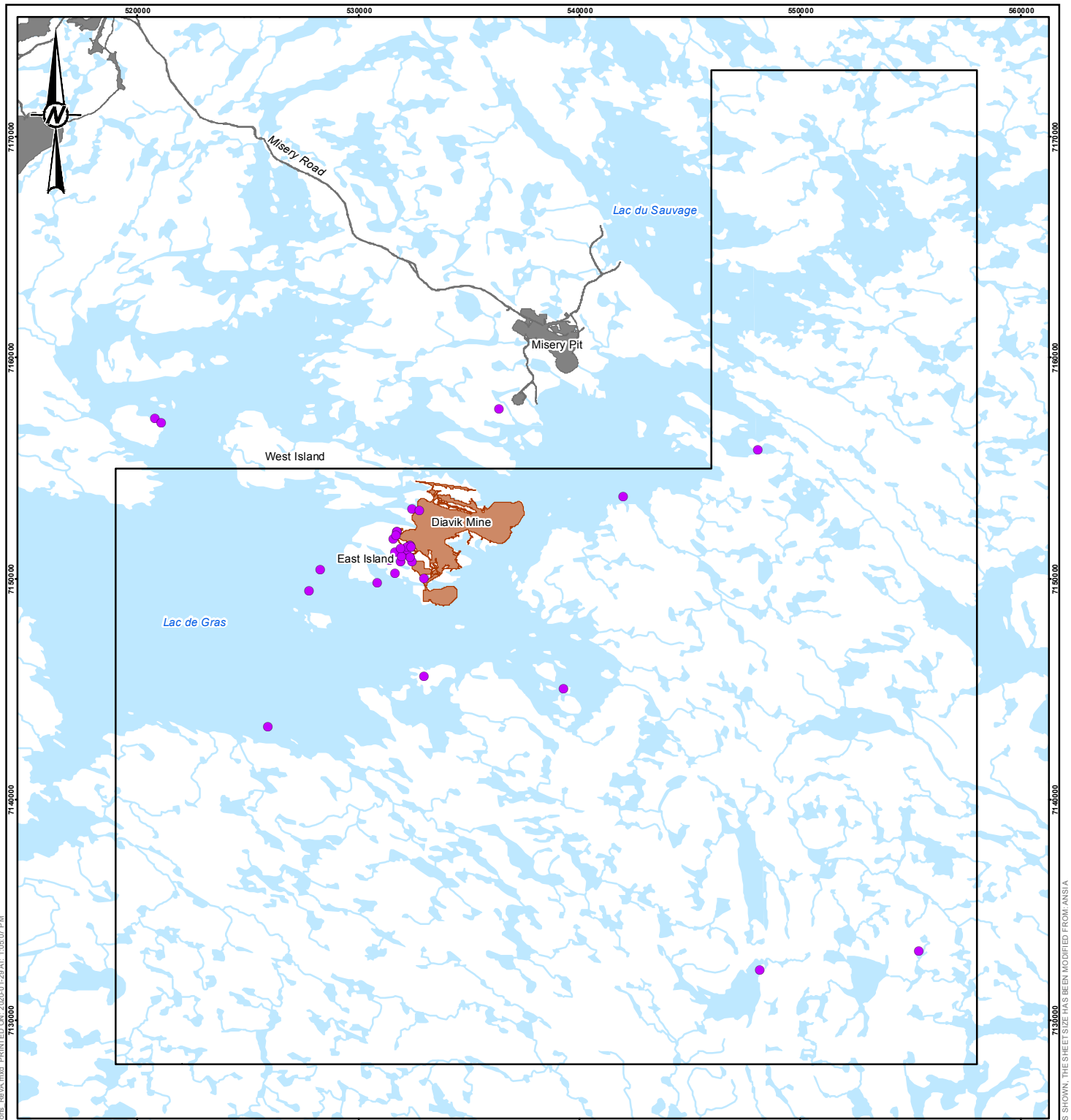
Response of caribou to stressors (natural or anthropogenic) was also assessed. In the event that a stressor was introduced during scan sampling, the observers noted the time and recorded the response of caribou to stressors as either no response, looked in the direction of the stressor, trotted or ran away. The reaction of the majority of the group was used in selecting the category. Estimated distance (m) from the stressor was also recorded. Stressors included type of wildlife, type of aircraft, type of vehicle, and blasts from pits. The observers then waited until the animals resumed their previous behaviour (usually 1 to 2 minutes) and would begin scanning observations again.

In addition to group-level scans, focal scans are completed on a single caribou. Focal scans provide information on activity budgets (i.e., the amount of time an animal is engaged in different behaviours), the temporal sequence of behaviours relative to stressors or other stimuli, and the length of time it takes the animal to return to a non-stressed state following a stressor event. For focal surveys, an individual is selected from a group for observation. Behaviour and time of behaviour changes are recorded. Focal surveys are undertaken on both cows and bulls, for a minimum of 20 minutes. The emphasis by DDML continues to be collection of group scan data until a fulsome set of observations that align with other regional observations is achieved.

4.3.2 Results

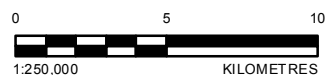
From 11 January to 18 April behaviour scans were completed on 33 caribou groups from 0 km to 15 km from the Mine and an additional three groups greater than 15 km from the Mine (Figure 19; Appendix B). These caribou were potentially from the Beverly/Ahiak and Bathurst herds. The total number of caribou observed was 518; however, behaviour was recorded for 311 individuals. Where behaviour was recorded, group size ranged from 2 to 30 with the average group size of 9 animals and a standard deviation of 5.6. One group observed was estimated to be approximately 220 individuals; however, behaviour was recorded for 13 individuals of this large group. The estimated mean proportion ($\pm$ 2SE) of caribou behaviour observed is as follows; bedded 22% (14%), feeding 40% (16%), standing 8% (9%), alert 3% (5%), walking 24% (14%), trotting 3% (5%) and running <1% (3%). No focal scans were completed in 2019.

These behaviours were observed during winter and likely reflect differences in seasonality from previous observations collected during summer and autumn. Fewer caribou groups were observed in 2019 than in 2018. As such, there remain insufficient numbers of groups to detect a 15% change in behaviour as 55 unique groups in two distance groups (i.e., total of 110 caribou groups) are required (Golder 2018b, Appendix D). Effects related to seasonality would need to be included for these data to be combined with past observations collected during summer/autumn (because caribou were not present in past winters) and would require larger sample sizes. Seasonal variation in female and male behaviour is expected due to differences in energetic and nutritional demands and environmental conditions (e.g., milk production for calves, autumn rut, insect harassment, and snow depth and hardness). Based on a comparison of behaviour requested by EMAB, caribou behaviour activities vary across years and by distance category. Proportion of time feeding varied annually but not in a systematic way within or beyond 15 km from mines (Appendix D). Caribou are spending a low amount of their time exhibiting higher energetic activities such as running ($\leq 1.4\%$) and trotting ($\sim 2\%$), although one group was observed trotting 25% of the time greater than 15 km from the mines in 2008 (Appendix D).



LEGEND

- CARIBOU ACTIVITY LOCATION
- DIAVIK WILDLIFE STUDY AREA BOUNDARY
- DIAVIK FOOTPRINT
- EKATI FOOTPRINT
- WATERCOURSE
- WATERBODY



REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

Rio Tinto

PROJECT

DIAVIK DIAMOND MINES INC.

TITLE

LOCATIONS OF CARIBOU BEHAVIOUR SCANNING OBSERVATIONS, 2019

CONSULTANT

YYYY-MM-DD 2020-01-29

DESIGNED DC

PREPARED ANK/LMS

REVIEWED

APPROVED

PROJECT NO.

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FIGURE

19

4.4 Changes to Distribution

Deflection of caribou movements due to mining activities was also predicted (DDMI 1998b). Information collected from caribou collar locations is used to examine the distribution of caribou within the wildlife study area. Prior to 2015, only female caribou were collared. In 2015, ENR placed additional collars on male caribou. These observations are then compared with predicted trends in movement.

The impact prediction in the EER (DDMI 1998b) is:

- During the northern (spring) migration, caribou would be deflected west of East Island and during the southern migration (fall), caribou would move around the east side of Lac de Gras.

Applying the principles of adaptive management, collared caribou movements to assess this prediction should no longer be monitored. The results from 1996 to 2018 have shown that there are years where collared caribou do not follow predictions but over the long-term there are no strong deviations from deflection predictions (Golder 2019). The deflection analysis does not inform on mitigation effectiveness so results will not lead to changes in how the Diavik Mine operates.

EMAB has suggested that there has been a trend in reduced eastern movements by collared Bathurst caribou cows since 2011. The rate at which collared caribou move east around Lac de Gras may be influenced by how the Bathurst herd is distributed relative to Lac de Gras before migrating through the area. Figure 20 illustrates the patterns between autumn range centroid easting (Appendix C; lower UTM easting values are more west) and the proportion of collared Bathurst cows that move east around Lac de Gras as quantified in Golder (2019). Points are labeled by year to provide temporal context. There is no significant relationship between annual autumn range UTM easting and the proportion of collared caribou cows moving east around Lac de Gras (Spearman correlation, $\rho = 0.12$, $P = 0.58$).

Figure 20 suggests that since 2011 the autumn range of Bathurst caribou has tended to be west of Lac de Gras (except 2013 and 2014) and generally corresponds with a lower proportion of Bathurst collared cows moving east around Lac de Gras. Herd size is related to year since the Bathurst herd has continued to decline since before the Diavik Mine was constructed (Adamschewski et al. 2009; Figure 8). Figure 20 also suggests that herd size may be a factor influencing the location of the autumn range relative to Lac de Gras, where recent years with lower herd sizes tend to have a more western autumn range. Another factor that might influence eastern movements around Lac de Gras includes how caribou are distributed relative to Contwoyto Lake (see Golder 2014). For example, in 2013, fall movements showed that some collared caribou moved northwest around Contwoyto Lake, which would have placed these caribou further west of Lac de Gras.

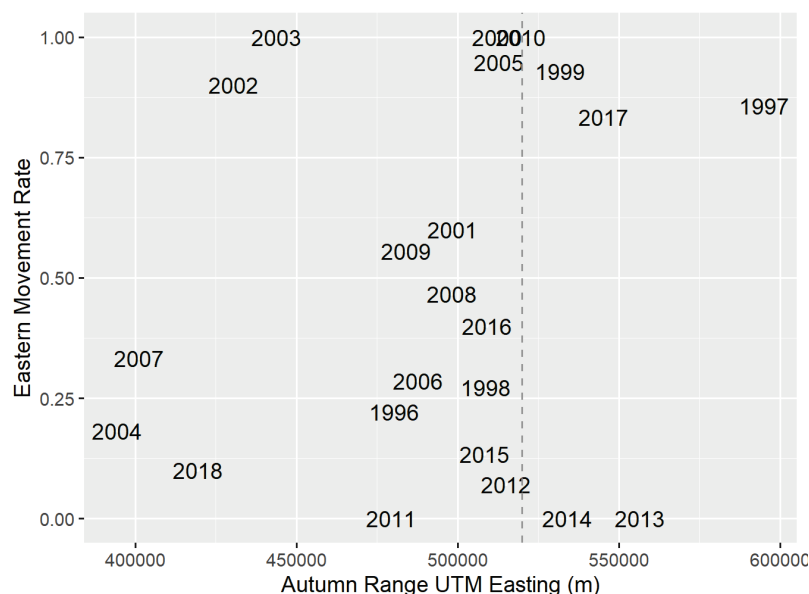


Figure 20: Proportion of Collared Caribou Cows Moving East Around Lac de Gras During the Southern Migration and Autumn Range Centroid by Year. Dashed Line Represents the Centroid Easting of Lac de Gras

Alternatively, a decrease in the proportion of Bathurst cows moving east around Lac de Gras could be influenced by mining activity. An adverse response to mining activity would be associated with a decrease in collared caribou movements east around Lac de Gras. Figure 21 shows the pattern of the proportion of east movements relative to mean annual full-time-equivalents, which is an index of mining activity (Golder 2017a). The patterns between east movements and mean annual full-time-equivalents is not statistically correlated (Spearman correlation, $\rho = 0.26$, $P = 0.31$). There is no clear discernable pattern; in years where FTEs are lower, such as 2003, eastern movements are high, which is similar to when FTEs peaked in 2002.

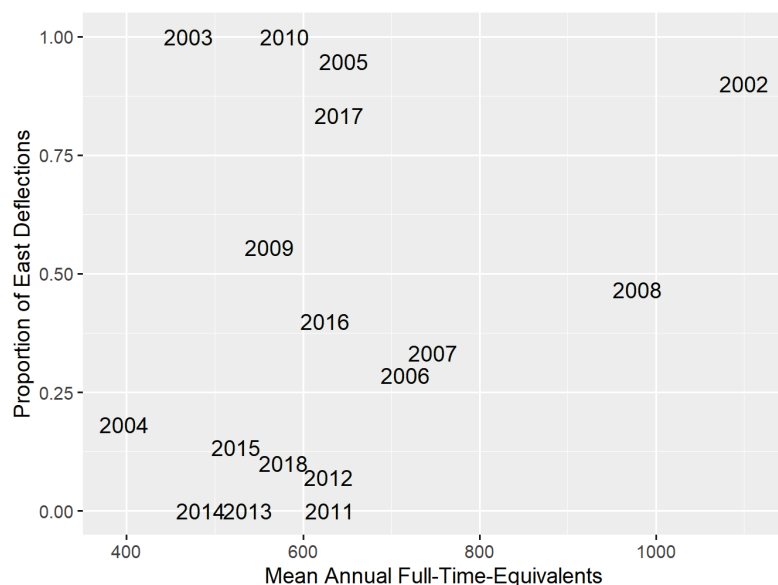


Figure 21: Proportion of Collared Caribou Cows Moving East Around Lac De Gras during the Southern Migration and Mean Annual Full-Time-Equivalents at Diavik Mine, 2002 to 2018

Changes in rates of eastern movements by collared Bathurst caribou cows were not associated with autumn range distribution or activity level at the Mine. While natural factors did not strongly influence eastern movement rates, the result of no association with mining activity supports previous analyses and conclusions that the Mine is not having a strong influence on caribou migration patterns. Deflection monitoring does not inform on mitigation effectiveness. Diavik maintains the position that deflection monitoring is no longer necessary and should be discontinued.

4.5 Incidents and Mortalities

Mineral development in the Bathurst caribou herd range created concerns about increased mortality, which includes vehicle collisions, aircraft collisions, and accidents associated with caribou in hazardous areas around mining activities (DDMI 1998b). Mitigation practices and policies have been implemented to avoid and reduce the potential for mortalities such as, wildlife have the right-of-way on all roads, communicating the presence of caribou via radio, and the caribou traffic advisory. The objective for this component is to determine the number of caribou deaths or injuries associated with the Mine. The following section summarizes the methods applied and the results produced from incident reporting and road observations. The impact prediction in the EER (DDMI 1998b) is:

- Mine-related mortality is expected to be low.

4.5.1 Methods

Mine-related incidents and mortalities are reported to the Environment Department for documentation in a detailed incident investigation for immediate follow-up (Appendices E and F). All caribou mortalities are reported immediately to ENR, and ENR is consulted for follow-up mitigation and disposal procedures. The information is tabulated and provided for annual comparisons.

4.5.2 Results

In 2019, there were no Mine-related caribou injuries or mortalities recorded, which has been the case for the past 15 years (Table 10). The only Mine-related caribou mortality reported to date occurred in 2004.

Table 10: Caribou Mortalities on East Island, Baseline to 2019

	Natural Caribou Mortalities on East Island	Mine-related Mortalities
Baseline ^(a)	8	0
2000	7	0
2001	1	0
2002	1	0
2003	0	0
2004	2	1
2005	0	0
2006	0	0
2007	1	0
2008	0	0
2009	0	0
2010	0	0
2011	1	0

Table 10: Caribou Mortalities on East Island, Baseline to 2019

	Natural Caribou Mortalities on East Island	Mine-related Mortalities
2012	1	0
2013	1	0
2014	1	0
2015	0	0
2016	0	0
2017	1	0
2018	0	0
2019	1	0

(a) Includes data from 1995 to 1997.

4.6 Caribou Advisory

The objective of the Caribou Advisory Monitoring program is to make certain that workers are aware of the approximate numbers of caribou on and near East Island, which is related to the potential for interactions between caribou and mining activities. This raises general awareness so that employees are alert to the likelihood that mitigation could be triggered. The number of animals on the island and in specific areas dictates the type of mitigation practices that will be undertaken (e.g., haul road closure, speed reduction).

4.6.1 Methods

Various methods were used to determine whether or not animals were present in the vicinity of East Island, which included incidental observations reported from pilots and workers, and using the satellite collar locations provided by ENR. If animals were reported in the general area, ground surveys were initiated. Ground-based surveys are completed by Environment personnel travelling in vehicles along the haul roads twice per day during a caribou advisory and documenting approximate caribou numbers. Caribou road surveys, and PKC and rock pile monitoring surveys were discontinued on a scheduled basis in 2014 because they were ineffective at detecting caribou at the Mine in addition to those already detected and reported to Environment Department staff by Mine employees, environment staff completing other monitoring programs, and pilots.

4.6.2 Results

In 2019, caribou numbers on the East Island reported by staff ranged from 2 to approximately 2,000 animals. Caribou were most likely from the Beverly/Ahiak and Bathurst herds. Photos of wildlife taken at the Mine are included in Appendix G. There were also three instances where groups of 150 caribou or more were observed away from site, once on 13 February north of the Emulsion Plant, once on 21 February southwest of the Emulsion Plant, and once on 25 March, approximately 28 km from site. In addition, a herd of approximately 2,000 caribou were observed on 22 February at an unrecorded location. In total there were 79 different incidental observations reported with all observations except one occurring before 1 June (Appendix H and I). Animals remained far from haul roads so elevation from “No Advisory” was not required for the protection of caribou in 2019. There were no reported incidents involving caribou in 2019. Caribou were observed near the airport on two occasions but did not trigger deterrent actions.

4.7 Caribou Herding

When caribou are present on East Island their movements are monitored so that Mine personnel are aware of their presence and location. Of particular importance from a safety perspective (both human and animal), is caribou presence near hazardous areas (such as the airstrip and blast areas). When caribou are sighted adjacent to potentially hazardous areas, DDMI implements its Standard Operation Procedure for caribou herding.

4.7.1 Methods

The method used to move caribou away from hazardous areas consists of the slow advancement of Environment Department staff behind the caribou, encouraging the movement of the animals in a safe direction.

4.7.2 Results

In 2019, herding of caribou at the Mine was not required while caribou were observed on East Island.

4.8 Adaptive Management and Recommendations

Re-analysis of Diavik and Ekati aerial survey data from 1998 to 2012 did not detect a change in how caribou are distributed relative to preferred habitat. In contrast to past inferences from these data, the results demonstrate that caribou are distributed in accordance with habitat selection theory as would be expected in the absence of sensory disturbance from Diavik and Ekati mines. These results support that the EER (1998) was conservative in predicting ZOIs from sensory disturbances and also raises the question as to whether aerial surveys are needed in the future.

DDMI will continue to focus monitoring of caribou activity budgets that describe changes to behaviour at distances up to 30 km from the Mine and the Ekati mine during the summer and fall. DDMI will continue to work with ENR to collaborate and assist with government led caribou monitoring and/or research where possible.

Based on the principles of adaptive management, DDMI will no longer analyze collared caribou deflections during the northern and southern migrations. The lines of evidence indicate that caribou east-west movements around Lac de Gras are not influenced by mining activity and there are no strong departures from predictions. Seasonal range attributes indicate caribou are able to use the same areas of their seasonal ranges from year-to-year despite deviations from predicted movements around Lac de Gras. Deviations appear to be more related to natural factors such as the decrease in population size and associated changes in seasonal range attributes (e.g., area, location, date below the treeline) (Virgl et al. 2017; Appendix C).

5.0 GRIZZLY BEAR

The barren-ground grizzly bear (*Ursus arctos*) ranges throughout most of the NWT. The western population of grizzly bear is currently listed as a species of special concern by COSEWIC (COSEWIC 2018) and listed as sensitive under the NWT General Status Rank (NWT SAR 2018b).

Grizzly bears have low population densities, low reproductive rates and are sensitive to human activity (DDMI 1998b; McLoughlin et al. 1999). While some grizzly bears may avoid mineral developments, others may be attracted to human activity through odours associated with development (Gau and Case 1999; Johnson et al. 2005).

Effects to grizzly bears from mining may occur through direct habitat loss, reduction in habitat suitability and direct mortality. The focus of the monitoring program is to estimate direct habitat loss, monitor grizzly bear presence and distribution, and report Mine-related mortalities.

5.1 Habitat Loss

Grizzly bears use a wide variety of vegetation and habitats types. Studies of grizzly bears in the NWT have led to understanding their seasonal habitat preferences (McLoughlin et al. 2002). Loss of habitat may result in negative effects on grizzly bears. The objective of this component of the WMP is to determine if direct habitat loss for grizzly bear from the Mine footprint is within the prediction in the EER (DDMI 1998b):

- At full development, direct terrestrial habitat loss for grizzly bear from the project is predicted to be 8.67 km².

5.1.1 Methods

Methods used to determine grizzly bear habitat loss are similar to that described in Section 4.1; grizzly bear habitat is assumed to include all terrestrial habitats (i.e., all landscape types in Table 3 except for deep water, shallow water and disturbed area).

5.1.2 Results

Cumulative direct grizzly bear habitat loss resulting from the Mine up to 2019 was 8.02 km², which is below that predicted in the EER.

5.2 Presence and Distribution

Mining activities can affect the presence of grizzly bears due to disturbance and habitat loss (DDMI 1998b). Vegetation loss and changes to caribou distribution from mining activities may also influence the presence, abundance and distribution of grizzly bears (Gau and Case 1999; Johnson et al. 2005).

Monitoring is completed to determine if mining activities influence the presence of grizzly bears in the study area. The predicted effect is:

- Mine development is not predicted to influence the presence of grizzly bears in the area.

The revised monitoring objective in Handley (2010) is to:

- Determine if Mine-related activities influence the relative abundance and distribution of grizzly bears in the study area over time.

In 2010, a pilot study using a hair snagging technique was initiated to assess its effectiveness in determining grizzly bear abundance in the DDMI wildlife study area. In April 2012, a request was made on behalf of DDMI, BHP Billiton Canada and De Beers Canada Inc. to undertake a joint grizzly bear hair snagging program that encompassed Ekati, Diavik, Snap Lake and Gahcho Kué (Rescan 2013a). Following discussions and clarification of methods (Rescan 2013b), the program was initiated in June 2012 using a standard set of sampling protocols. At the March 2013 Wildlife Monitoring Workshop hosted by the GNWT, the monitoring objective for grizzly bear was revised to:

- Provide estimates of grizzly bear abundance and distribution in the study area over time (GNWT 2013a).

5.2.1 Grizzly Bear Hair Snagging Program

5.2.1.1 Methods

Diavik, Snap Lake, Gahcho Kué and Ekati mines jointly completed the regional grizzly bear hair snagging program. The study area consisted of a northern section, sampled by the Diavik and Ekati mines (ERM Rescan [ERM] 2014), and a southern section, sampled by Snap Lake and Gahcho Kué (Jessen et al., 2014). The northern section was sampled in 2012, 2013 and 2017 and included 113 stations, arranged in a grid pattern spaced at approximately 12 km by 12 km (ERM 2014, 2018). A wooden tripod with a fixed base and the legs wrapped in barbed wire was used to collect grizzly bear hair for DNA analysis. The wooden tripod was placed in high quality grizzly bear habitat (e.g., esker, riparian area, upland meadow, wetland meadow) to increase the likelihood of capturing grizzly bear hair. Community participants applied Traditional Knowledge to inform on high quality habitat for site selection (Rescan 2014). Non-reward lures (e.g., cured cows blood, fish oil, seal oil and sweeter scented oils) were used to attract the bears to the tripods. The lures were poured on the top of the posts and down the legs, and in the centre of the ground to encourage a bear to squeeze between the legs. The posts were not relocated between each sampling period, but a novel scent combination was used each session to prevent habituation.

At the end of each session, all grizzly bear hair was removed from the tripod and placed in a paper envelope. Each grouping of hair was stored separately, and supporting information such as the tripod identification, date, and location on tripod were recorded. The hair samples were sent to Wildlife Genetics International for DNA fingerprinting.

5.2.1.2 Results

Results of the 2012, 2013 and 2017 hair snagging program are provided in ERM (2014) and ERM (2018). Table 11 summarizes results from the hair snagging program. Hair snagging was not completed in 2018 or 2019.

Table 11: Number of Grizzly Bears Identified during DNA Analysis (ERM 2018)

Year	# Samples	Individuals	
		Males	Females
2012	1,902	42	70
2013	4,709	60	76
2017	3,657	55	81

Note: refers to grizzly bears that had no previous detections in the regional database.

Analysis of these data indicated a stable or increasing number of grizzly bears in the northern section relative to monitoring completed in the late 1990's (McLoughlin and Messier 2001). Analysis indicates that there have been no negative demographic effects on the regional population of grizzly bears in the Slave Geological Province due to the Ekati and Diavik mines. The long-term monitoring frequency will be discussed at the next wildlife monitoring workshop and determined with partners.

5.3 Incidents and Mortalities

Although there is some interaction between the Mine and grizzly bears, every effort is made to immediately report any animals that come into contact with the Mine. Bear awareness instruction is provided to employees and has contributed to the timely reporting of bears approaching site, which limits interactions. Despite mitigation, Mine activities may lead to grizzly bear mortalities, injuries or relocations from year to year. The specific impact prediction in the EER (DDMI 1998b) is:

- Mortalities associated with mining activities are predicted to be 0.12 to 0.24 bears per year.

5.3.1 Methods

Incidental observations of grizzly bears are recorded and are usually made by Mine staff and reported to the Environment Department. Typically, each independent grizzly bear observation is recorded, because it is usually not known if it is the same bear. As the number of incidental observations may be partially related to the number of people on site, the occurrences of incidental observations of grizzly bears was compared to the camp population.

Mine-related incidents and mortalities are reported to the Environment Department for documentation in a detailed incident investigation for immediate follow-up. All grizzly bear mortalities are reported immediately to ENR, and ENR is consulted for follow-up mitigation and disposal procedures. If wildlife had to be deterred to reduce the risk of a wildlife-human incident, then all effort is made by the Environment staff to start with the least intrusive method available, and all deterrent actions are recorded.

5.3.2 Results

There were 80 reported instances of grizzly bears on East Island, and a total of 125 grizzly bears observed (Table 12; Appendix J). Grizzly bears were observed on East Island from 16 April to 30 October. These sightings were observed over 70 days. While these observations are not collected systematically, and contain repeated observations, incidental observations provide an indication of the potential for wildlife incidents or problem wildlife.

In 2019, there was an average of 584 people at the Mine. The number of incidental observations of grizzly bears does not appear to be influenced by the number of people on site (Spearman correlation $r=-0.23$, $P=0.36$); however, staff reporting incidental observations does foster an awareness of wildlife issues at the Mine (Table 12). Of the 125 grizzly bears seen (80 observation instances), 45 involved deterrent actions and 35 did not involve deterrent actions (Table 13). Deterrents used to encourage bears to move away from infrastructure included trucks, air horn, bear bangers, rubber bullets, explosives markers, gun cycles, and clapping (Appendix K).

Table 12: Average Camp Population and Number of Incidental Grizzly Bear Observations, 2002 to 2019

Year	Average Camp Population	Grizzly Bear Reported instances on East Island
2002	1100	5
2003	470	19
2004	397	24
2005	646	43
2006	716	21
2007	747	41
2008	979	5
2009	562	22
2010	579	44
2011	630	56
2012	629	97
2013	537	65
2014	484	69
2015	524	77
2016	625	137
2017	641	89
2018	578	90
2019	586	80

In 2019, there were no Mine-related grizzly bear mortalities or relocation events (Table 13). Construction began at the Mine in the year 2000. The calculated Mine-related mortality rate over the 20-year monitoring period is 0.05 bears per year, which is below the range predicted in the EER.

Table 13: Grizzly Bear Deterrent Actions, Incidents and Mortalities, 2000 to 2019

Year	Days with Bear Visitations on East Island	Days Deterrent Actions were Utilized	Relocations	Mortalities
2000	15	10	0	0
2001	14	8	1	0
2002	5	2	0	0
2003	15	6	1	0
2004	24	20	0	1
2005	34	23	0	0
2006	20	8	0	0
2007	34	20	0	0
2008	5	3	0	0
2009	22	18	0	0
2010	44	40	0	0
2011	41	31	0	0
2012	77	65	1	0
2013	47	40	1	0
2014	59 ^(a)	39	0	0
2015	56 ^(b)	27	0	0

Table 13: Grizzly Bear Deterrent Actions, Incidents and Mortalities, 2000 to 2019

Year	Days with Bear Visitations on East Island	Days Deterrent Actions were Utilized	Relocations	Mortalities
2016	94 ^(c)	50	0	0
2017	73 ^(d)	51	1	0
2018	70 ^(e)	36	0	0
2019	70 ^(f)	45	0	0

(a) Over 59 separate days, 69 grizzly bear observations were recorded.

(b) Over 56 separate days, 77 grizzly bear observations were recorded.

(c) Over 94 separate days, 137 grizzly bear observations were recorded.

(d) Over 73 separate days, 89 grizzly bear observations were recorded.

(e) Over 70 separate days, 90 grizzly bear observations were recorded.

(f) Over 70 separate days, 125 grizzly bear observations were recorded.

5.4 Adaptive Management and Recommendations

Diavik participated in regional grizzly bear monitoring in collaboration with BHP Billiton and De Beers Canada Inc. in 2012 and 2017. The results through 2017 indicate that the regional grizzly bear population is stable or increasing and is not adversely affected by the Diavik and Ekati mines. The long-term monitoring frequency was not discussed at the 2018 wildlife monitoring workshop but will be determined with the partners. Deterrent actions used by DDMI continue to keep grizzly bears and people safe.

6.0 WOLVERINE

6.1 Introduction

Wolverine (*Gulo gulo*) are annual residents in the Lac de Gras region (DDMI 1998b). Wolverines are federally listed as Special Concern under Schedule 1 of the *Species at Risk Act* (SARA; Government of Canada [GOC] 2019) and is considered Not at Risk in the NWT (NWT SAR 2018b, Species at Risk Committee 2014).

Wolverine home ranges have been estimated at 126 km² for adult females and 404 km² for adult males (Mulders 2000). The feeding behaviour of wolverine may result in their attraction to camps and habituation if they receive a food reward, which has been demonstrated during baseline, construction, and operations in the Lac de Gras area. Wolverines in the tundra have been shown to depend primarily on barren-ground caribou for their diet (Mattisson et al. 2016), particularly in the winter (Magoun 1987) and are scavengers that will travel long distances in search of carrion (NWT SAR 2018b).

6.2 Presence and Distribution

The objective of this component of the WMP is to determine if mining activities are influencing the presence of wolverines in the study area, and the revised monitoring objective determined in Handley (2010) is to:

- Provide estimates of wolverine abundance and distribution in the study area over time.

To meet this objective, DDMI is currently participating in a joint research program in cooperation with Dominion Diamond Mines and the GNWT. This program involves hair sampling for DNA fingerprinting to estimate abundance of wolverine in the Lac de Gras region.

Wolverine presence around the Mine is monitored using the following systematic and anecdotal methods:

- snow track surveys;
- hair snagging; and
- incidental observations at site.

6.3 Snow Track Surveys

6.3.1 Background

Surveys designed to detect organisms on the landscape are important for understanding factors influencing population dynamics and species ranges. Many surveys stratify the landscape into sampling locations or sites and seek to determine whether a site is occupied by a given species or not. To estimate patterns of site occupancy, methods either assume perfect detection in the sampling methods or statistically control for imperfect detection in the analysis. Snow-track surveys are a popular non-invasive method for surveying mammalian communities with better detectability than alternative methods (Bayne et al. 2005). In snow-track surveys, the site occupancy of an animal is inferred by the presence of tracks in snow; however, the assumption of perfect detection is rarely met (Whittington et al. 2015), but see Squires et al. (2012) for an example where near perfect detection is achieved through sampling design for Canada lynx (*Lynx canadensis*).

For the length of a transect to be occupied by an animal, the tracks of that animal must intersect with the transect at some point and leave behind distinguished, identifiable tracks. Detection depends on the observer(s) visually detecting the track and correctly identifying the source of the track. There is a non-zero probability that a transect be occupied by an animal and tracks go undetected either through failure to see the track, or misidentification. To test hypotheses relating to the spatial distribution of animals on the landscape by way of contrasting occupied sites against unoccupied sites, the analysis must concurrently account for the probability that a site was occupied but the animal was not detected (MacKenzie et al. 2002).

In some circumstances the parameter of interest is not site occupancy itself, but rather the change in occupancy over time. For example, long-term monitoring programs might be more interested in the temporal variation in occupancy and factors influencing the probability of a site changing state (i.e., from occupied to unoccupied). These multi-season analyses require parameterization of the extinction probability and the colonization probability; that is an occupied site becoming unoccupied, and an unoccupied site becoming occupied, respectively. It is important to note that in this context 'extinction' refers to a site becoming unoccupied and not the extinction of a species. MacKenzie et al. (2003) developed a statistical approach to model these processes along with site occupancy (at time $t = 1$) while correcting for the imperfect detection of a species in multi-season datasets. The multi-season occupancy model (MSOM), or dynamic occupancy model, allows for the parameterization of covariate effects on any of these four processes, and at the scale of either the visit, the season (i.e., typically year), or the site. A MSOM approach was used to analyze the snow-tracking data for wolverines in the Diavik study area.

6.3.2 Methods

Snow track surveys began in 2003 and have been conducted with the assistance of a community member, when available. From 2003 to 2006, the study design and data collection used the experience of Inuit Qaujimagatunqangit (IQ) to locate transects and record wolverine snow tracks. This included surveys of 23 transects of variable length and distance from the Mine within a 1,270 km² area. In 2008, DDMI revised the wolverine track survey to increase statistical power to detect changes in wolverine occurrence in the study area. Design changes included the

placement of 40 survey transects of equal length (4 km long, total length = 160 km) located in areas of preferred wolverine habitat including heath tundra and heath boulder habitat. The final locations of snow track survey transects were the result of a stratified random sampling process of potential locations in the study area, but some transects were relocated from Lac de Gras to areas of preferred wolverine habitat, based on IQ. Because the survey transects were redistributed and standardized in 2008, all data prior to 2008 were excluded from this analysis.

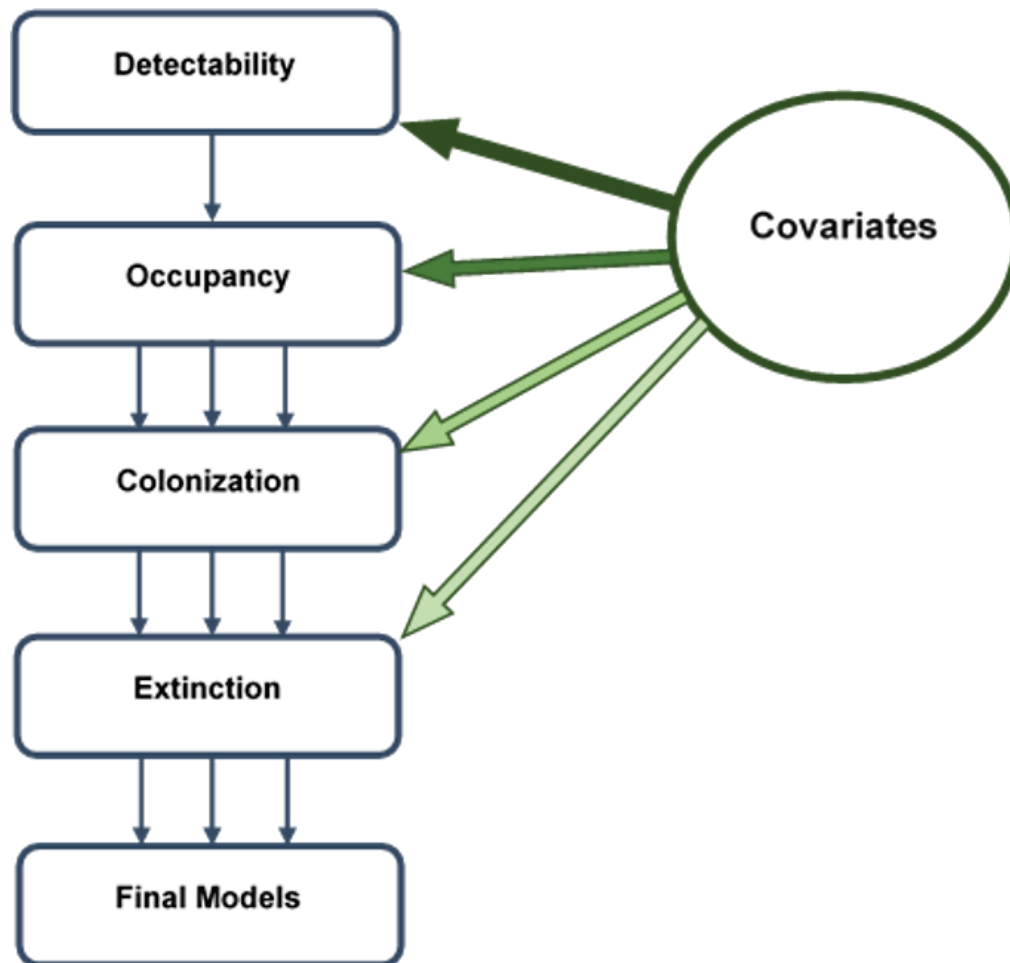
Each transect was driven by a snowmobile in March and/or April and all wolverine tracks and other sign (e.g., digs and dens) were recorded. Since 2015, each transect was surveyed twice so that detection probability could be estimated. All data from 2008 to 2014 is single visit data, but the MSOM structure allows for the inclusion of “missing” data where only a single visit was conducted (MacKenzie et al. 2003). Therefore, despite only having multi-visit data since 2015, imperfect detectability can be accounted for in data collected since 2008.

The detection of snow tracks can be influenced by wind or snowfall. The effect of snowfall was estimated by determining the number of days from the survey date since the most recent snowfall. A wind threshold index was estimated by determining the number of days prior to the survey date that the mean hourly wind speed eclipsed 7.7 metres per second (m/s) because a wind speed of 7.7 m/s is sufficient to move dry snow along the ground (Li and Pomeroy 1997). The effect of a weather threshold covariate was tested on track detectability by using the minimum number of days since the most recent snowfall or high wind event. For each transect, a track density index (TDI) was calculated as the number of wolverine tracks per transect length per number of days since recent snowfall or threshold wind speed.

6.3.2.1 Multi-season Occupancy Model

The MSOM approach uses the detection history at a given site (i.e., transect) to estimate changes in occupancy over time while accounting for imperfect detection (MacKenzie et al. 2003). Primary sampling periods, in this case years, are used to estimate occupancy, colonization and extinction rates, while secondary sampling periods, (i.e., repeat visits within a year) are used to estimate the detection probability. The MSOMs were developed in R version 3.5.1 (RCT 2018) using the *colext* function in the package ‘unmarked’ (Fiske and Chandler 2011).

A forward stepwise model selection procedure was conducted to produce the final model. Models were compared using the Akaike Information Criterion (AIC) as recommended by Kery and Chandler (2012) to produce the best model without overfitting variables. Initially a null model was tested with no covariate effects on occupancy, colonization, estimation, or detectability, and then covariates were strategically added based on *a priori* hypotheses (Figure 22). If no covariate effects improved model fit, the null model was retained to the next step. Covariates were retained if they resulted in an improved model fit given $\Delta AIC \leq 2.0$ relative to the competing candidate models, thus multiple competing covariates could be retained at each step. Covariate effects were first tested for detectability, followed by occupancy, colonization, and extinction in the stepwise model selection procedure. Once a covariate was deemed significant based on AIC model selection, it was included in all subsequent candidate models. The covariates tested in the MSOMs are summarized in Table 14, and the associated process for which an effect was hypothesized are summarized in Table 15.



Note: A different set of covariates were tested on each process based on our *a priori* hypotheses, and the same covariate may be tested on multiple processes (e.g., habitat could influence both detectability and occupancy). Multiple candidate models may be carried forward at any stage if they are within 2.00 AIC; thus, the final stage of the model selection process may test many combinations of parameters on various processes.

Figure 22: Infographic Depicting Model Selection Process

Table 14: Covariates Tested in the Multi-Season Occupancy Modeling Framework

Covariate Name ^a	Description ^b	Scale ^c	Process
thresh	The minimum number of days since the last snowfall or high wind event, whichever was more recent	Secondary	Detection
snow	The number of days since the last snowfall	Secondary	Detection
wind	The number of days since the last windy day (i.e., hourly average >7.7m/s)	Secondary	Detection
year	Scaled year of survey (years since first survey in 2008)	Primary	Extinction, Colonization, Occupancy
habitat	Exponent of mean resource selection function score for each transect	Site	Occupancy
distance	Distance (km) from transect center point to nearest Mine infrastructure	Site	Occupancy
caribou	Distance (km) from the winter range centroid of the Bathurst caribou herd to the center of the study area	Primary	Extinction, Colonization
FTE	Full-time equivalents is the number of full time staff at the Mine in March when winter tracking surveys were conducted; an index of Mine activity level	Primary	Extinction

(a) Covariates are hereafter referred to by these names rather than their descriptions.

(b) All covariates were scaled from 0-1 to improve convergence of the maximum-likelihood routine (Kery and Chandler 2012).

(c) Primary = yearly covariate constant across sites; Secondary = visit level covariate; Site = site-level covariate constant across years.

Table 15: Hypotheses Tested with Each Covariate and Process in the Multi-Season Occupancy Model

Covariate	Process	Hypothesis test
wind snow thresh	Detectability	The effects of weather on the ability for observers to detect a track if one is present. Snowfall effects may be bidirectional, as fresh snow creates opportunities for easy to identify tracks, but will also cover pre-existing tracks, whereas wind effects should only have a negative effect on detectability.
year	Detectability	Annual variation in detectability could be due to observer ability.
habitat	Detectability	Different habitat conditions may produce variable snow conditions, which could influence track detectability and identification.
distance	Occupancy	The occurrence of wolverines may vary by proximity to the Mine.
habitat	Occupancy	The occurrence of wolverines is driven by habitat quality as determined by a resource selection function previously produced for Slave Geological Province (Johnson et al. 2005).
distance*habitat	Occupancy	Wolverine occurrence in response to habitat quality is mediated by the distance to the Mine. This interaction explicitly tests for a zone of influence (see Section 4.2).
caribou	Colonization	Wolverines move into areas when prey availability in the form of caribou carrion is present.
year	Colonization	Wolverines are moving into areas due to positive population growth and/or range expansion over the course of the study.
FTE	Colonization	Wolverines are attracted to increased mining activity and are moving into unoccupied areas.
habitat	Colonization	Wolverine habitat selection is changing over time, and individuals are colonizing areas with varying habitat quality.
FTE	Extinction	Increasing mining activity is forcing wolverines out of areas they previously occupied.
year	Extinction	Wolverines are abandoning areas previously occupied due to negative population growth and/or range contraction over the course of the study.
caribou	Extinction	Wolverines are leaving areas previously occupied when prey availability decreases.

6.3.3 Results

In 2019, Earnest (Patty) Lockhart from Lutset K'e and Lisa Marie Zoe from Whatí participated in the wolverine track surveys. Wolverine tracks were identified at 7 of 40 transects for the first visit of the snow tracking surveys, and at 15 of 40 transects for the second visit; a total of 18 of 40 transects (45% naïve occupancy). A total of 14 tracks were identified in the first visit, and a total of 32 tracks were identified in the second visit (Figure 19). The naïve track index for visit one was 0.09 tracks per km and increased to 0.20 tracks per km for visit two. Weather-adjusted measures of track density index (TDI) yielded a mean TDI ($\pm 2SE$) of 0.138 ± 0.109 tracks/km/day for visit one and 0.206 ± 0.115 tracks/km/day for visit two; a grand mean of 0.172 ± 0.112 tracks/km/day since last weather threshold (Table 16; Appendix L).

Table 16: Wolverine Track Index and Mean Days Since Snow Fall, 2003 to 2019

Year	Survey Period	Number of Tracks	Distance Surveyed (km)	Mean Days Since Snowfall ^(a)	Mean Days Since Threshold Wind Speed ^(a)	Track Index (Tracks/km)	Mean Track Density Index ($\pm 2SE$) ^(b)
2003	10 – 12 Apr	13	148	2.2	2.1	0.09	0.046 ± 0.044
2004	16 – 24 Apr	22	148	4.0	4.6	0.15	0.061 ± 0.040
2004	2 – 8 Dec	10	148	3.9	2.5	0.07	0.048 ± 0.042
2005	30 – 31 Mar	7	148	7.5	3.9	0.05	0.026 ± 0.022
2005	7 – 12 Dec	18	148	2.4	3.5	0.12	0.106 ± 0.044
2006	30 Mar – 1 Apr	5	148	1.0	2.5	0.03	0.029 ± 0.010
2007 ^(c)	-	-	-	-	-	-	-
2008 ^(d)	30 Apr – 2 May	15	160	17.1	4.1	0.09	0.022 ± 0.011
2009	2 – 4 Apr	11	156	31.0	9.0	0.07	0.007 ± 0.005
2010 ^(e)	-	-	-	-	-	-	-
2011	30 Mar – 3 Apr	23	156	0.9	6.7	0.15	0.167 ± 0.072
2012	28 Mar – 3 Apr	22	160	2.8	4.4	0.14	0.096 ± 0.065
2013	2 – 6 Apr	26	156	3.1	2.9	0.17	0.076 ± 0.043
2014	23 – 26 Mar	25	160	6.7	1.0	0.13	0.156 ± 0.082
2015	24 – 29 Mar	21	160	5.3	11.0	0.13	0.062 ± 0.049
	14 – 17 Apr	17	160	2.1	1.6	0.11	0.172 ± 0.130
2016	22 – 27 Mar	50	160	6.5	5.5	1.25	0.190 ± 0.129
	8 – 13 Apr	50	160	6.7	3.1	1.25	0.215 ± 0.099
2017	22 Mar – 4 Apr	10	160	4.1	2.5	0.06	0.019 ± 0.014
	9 – 19 Apr	42	160	2.4	2.7	0.26	0.258 ± 0.013
2018	23 Mar – 11 Apr	10	132	4.5	1.8	0.08	0.076 ± 0.060
	13 – 22 Apr	4	132	3.2	1.7	0.03	0.030 ± 0.029
2019	23 Mar – 2 Apr	14	160	1.6	1.2	0.09	0.138 ± 0.109
	13 – 21 Apr	32	160	2.1	2.3	0.20	0.206 ± 0.115

(a) Presented as a summary of the data used to calculate track densities. Wind threshold speed = 7.7 metres per second.

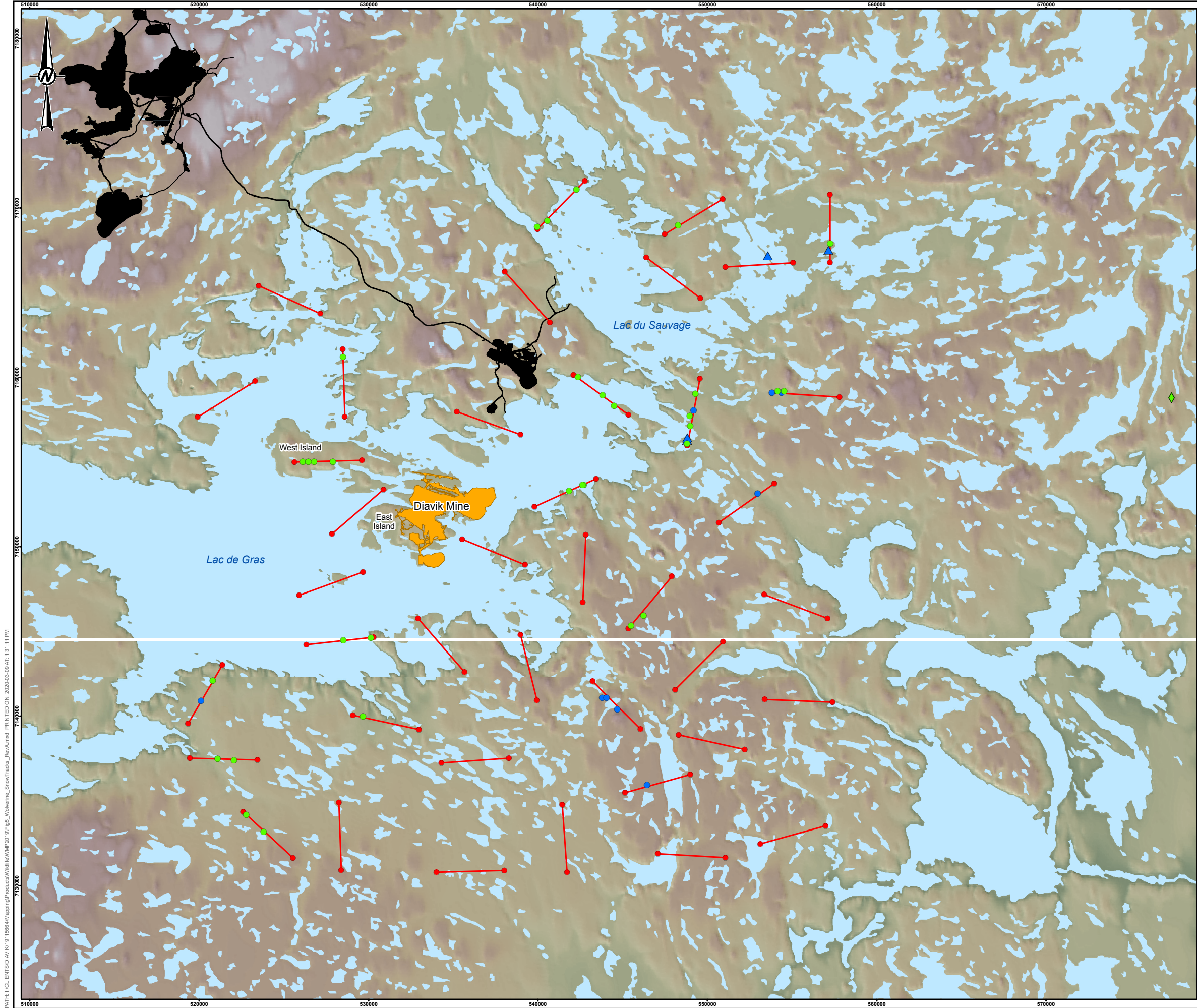
(b) For each transect, a track density index (TDI) was calculated as the number of wolverine tracks per transect length per number of days since recent snowfall or threshold wind speed. TDI is reported as mean Track Density Index ± 2 times the standard error (Appendix L).

(c) Survey was not completed in 2007 because a Wildlife Research permit was not acquired in time.

(d) The new survey technique was introduced in 2008. Only data hereafter was included in the multi-season occupancy analysis.

(e) Survey was not completed in 2010 due to community assistant not being available to participate in survey.

km = kilometres; tracks/km = tracks per kilometre; SE = standard error.



LEGEND

WOLVERINE SURVEY

- SURVEY 1 - TRACKS OBSERVED
- ▲ SURVEY 1 - ANIMALS OBSERVED
- SURVEY 2 - TRACKS OBSERVED
- ◆ SURVEY 2 - DEN OBSERVED
- TRANSECT
- DIAVIK FOOTPRINT
- EKATI FOOTPRINT
- WATERBODY

KEY MAP

REFERENCE(S)

1. DEM AND HILLSHADE OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

2. HYDROLOGY OBTAINED FROM CLIENT.

PROJECTION: UTM ZONE 12 DATUM: NAD 83

CLIENT

RioTinto

PROJECT

DIAVIK DIAMOND MINES INC.

TITLE

WOLVERINE SNOW TRACK SURVEY, 2019

CONSULTANT	YYYY-MM-DD	2020-03-09
	DESIGNED	TS
	PREPARED	ANK
	REVIEWED	
	APPROVED	

PROJECT NO.	PHASE	REV.	FIGURE
19115664	10000	0	23

6.3.3.1 Multi-Season Occupancy Model

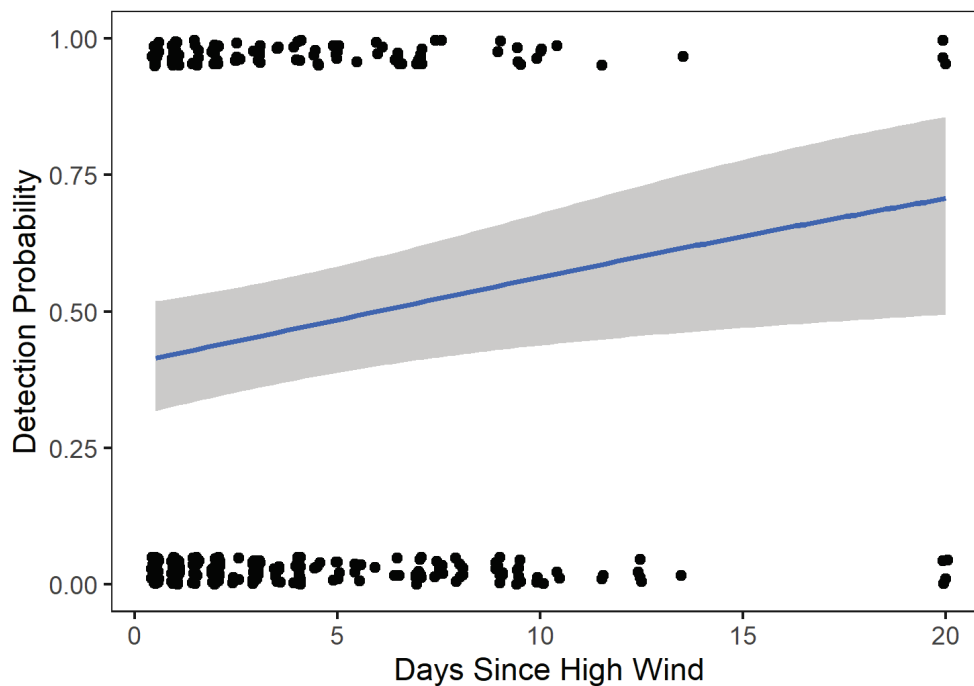
Detectability

Five covariates with potential effects on the detection process were tested against the null model to determine factors affecting wolverine snow track detectability. The following variables were assessed: year, habitat, wind, snow, and thresh. The best fitting variable was wind (Table 17). The number of days since the last wind event had a positive effect on detectability ($\beta = 0.77$, $Z = 2.47$, $P = 0.01$), indicating that detectability improves as the number of days since the last high wind event increases (Figure 24). The number of days since snowfall was a weaker predictor of detectability, which supports the hypothesis that snow has a bidirectional effect on detectability. Fresh snowfall creates ideal tracking conditions making it easy to detect new tracks, while covering and eliminating previously accumulated tracks reduces detectability. However, wind has a unidirectional effect in that it only negatively influences detectability by blowing snow and distorting existing tracks. This result highlights the importance of continuing to account for imperfect detection due to wind events.

Table 17: Candidate Models for Detectability

Model	AIC	Δ AIC	<i>p (detection)</i>	
			Intercept	OR
wind	790.90	0.00	0.41	3.40
null	795.71	4.81	0.48	-
thresh	796.53	5.62	0.46	1.46
year	796.86	5.96	0.57	0.62
snow	797.00	6.10	0.47	1.47
habitat	797.46	6.56	0.45	1.24

Note: The intercept is presented as a probability and is interpreted as the probability of detection when the associated covariate values is set to '0'. The covariate is presented as the odds ratio (OR) and is the predicted change in the odds of a detection when the covariate value is set to '1' (i.e., the maximum). Candidate models are indicated in bold face text.



Note: Observed points are plotted with jitter to show all points, but always exist at 0 or 1 (observed or not observed).

Grey Ribbon is 95% Confidence Interval.

Figure 24: Effect of Days Since High Wind (Mean Hourly Wind >7.7m/s) on the Detectability of Wolverine Tracks

Occupancy

The effects of distance to the Mine (distance) and habitat were tested on the initial probability of site occupancy of wolverines in the study area. An interaction was also tested between distance and habitat to tease apart the potential confounding effect of habitat availability across the distance gradient. The habitat and interaction models did not converge, so those effects cannot be interpreted. Model convergence issues are usually due to insufficient sample size (Bolker et al. 2009) or inadequate sampling across the range of the covariate within the study, the latter of which does not appear to be an issue with the data (Figure 25).

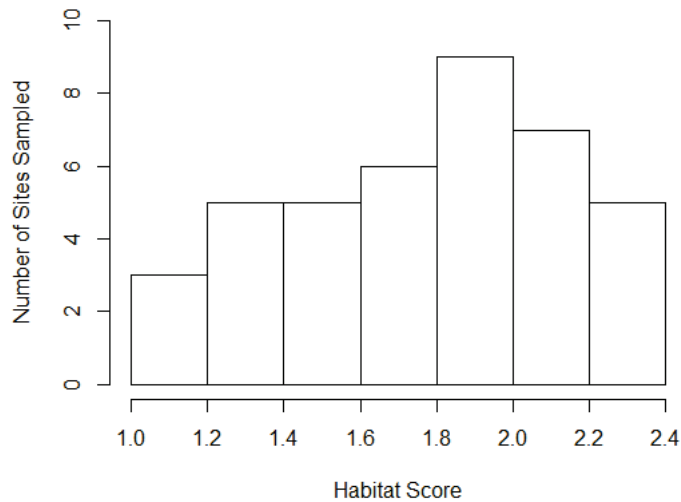
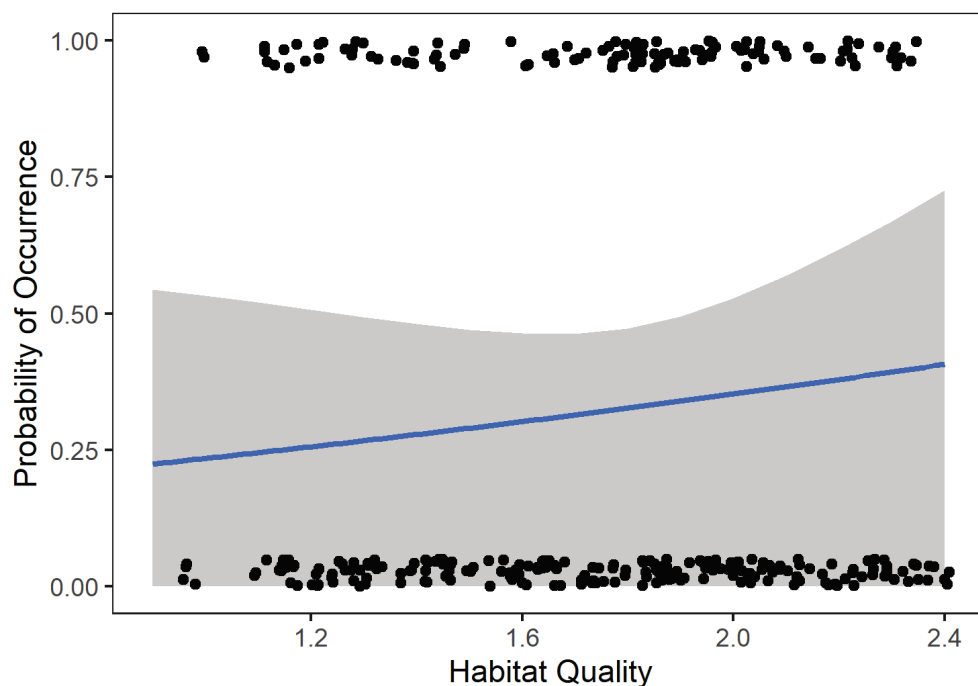


Figure 25: Histogram Showing Frequency of Transects Surveyed Across the Range of Habitat Scores

It is possible the models did not converge because the occupancy estimation occurred during the first year of the survey (2008), which was a single-visit survey and the lack of recapture data prevented a maximum likelihood estimate. As an alternative approach, the effect of habitat suitability on occupancy in 2008 was modelled separately in a generalized linear model without accounting for detectability. The habitat and intercept-only models were equally supported (Table 18). There was a weak positive effect of habitat on the probability of wolverine track occurrence (Figure 26). It is important to note that because imperfect detectability was not accounted for, the model should only be interpreted as an illustration of the positive relationship between habitat quality and the probability of wolverine occurrence, and not occupancy.



Note: Observed points are plotted with jitter to show all points, but always exist at 0 or 1 (observed or not observed).

Grey Ribbon is 95% Confidence Interval.

Figure 26: The Effect of Habitat Quality as Estimated by a Resource Selection Function Model (Johnson et al. 2005) on the Probability of Wolverine Occurrence at the Start of the Study In 2008.

Table 18: Model Comparison of Habitat Effect on Occurrence Compared to Null Model

Model	AIC	Δ AIC	Occurrence	
			Intercept	OR
null	52.45	0.00	0.32	-
habitat	54.09	1.64	0.15	1.78

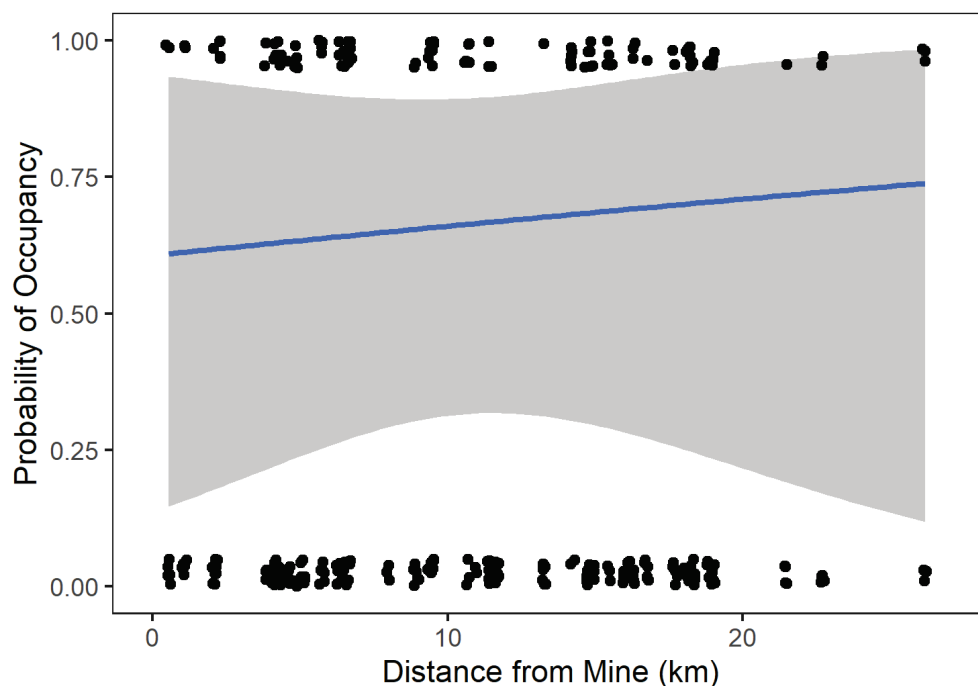
Note: intercept presented as the probability of occurrence and covariate effect is the odds ratio (OR) for every 1 unit increase in habitat quality.

The null model for occupancy yielded the best fit, and the MSOM with distance effects on occupancy was regarded as a similar fit within 2.00 AIC (Table 19). Distance had a weak positive effect on the probability of occupancy ($\beta = 0.644$, $Z = 0.267$, $P = 0.79$), suggesting that transects closer to the Mine were less likely to be occupied (Figure 27).

Table 19: Candidate MSOM Models for Occupancy

Model	AIC	Δ AIC	<i>psi</i> (occupancy)	
			Intercept	OR
null	790.90	0.00	0.666	-
distance	792.83	1.93	0.609	1.81

Note: the intercept is presented as the probability of occupancy when covariate values are set to '0', and covariate effect is presented as the odds ratio (OR) when covariate value is set to '1' (i.e., the maximum).



Note: Observed points are plotted with jitter to show all points, but always exist at 0 or 1 (observed or not observed).
 Grey Ribbon is 95% Confidence Interval.

Figure 27: The Effect of Distance from Mine on the Probability of Wolverine Occupancy

Colonization

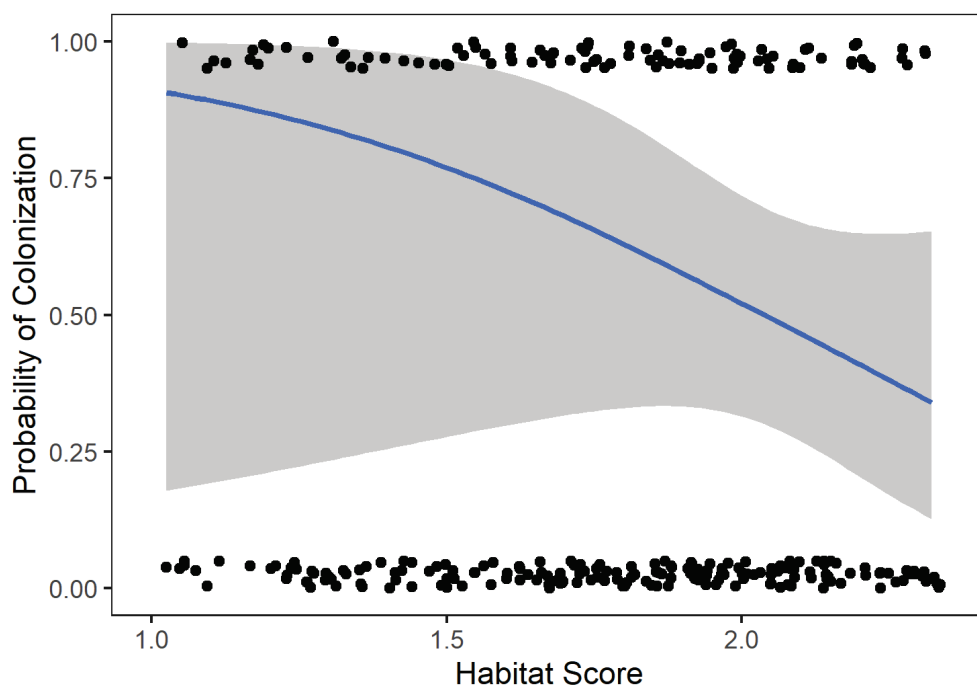
The effects of year, FTE, caribou, and habitat were tested on site colonization, or the probability that a previously unoccupied transect will become occupied in the following year. A negative colonization effect is therefore interpreted as a lower probability of colonization at higher levels of a covariate. For example, a negative mean annual temperature effect would be interpreted as wolverines are likely to colonize areas when annual temperatures are lower, but does not indicate whether wolverines would leave the area when temperatures increase (this has to be inferred by the extinction process).

Three models received equal support for the effect on colonization probability: habitat, the null model for colonization with the null process for occupancy, and habitat as a predictor of colonization with distance as a predictor for occupancy (Table 20). Habitat had a negative effect on colonization, indicating that colonization events were more likely in poorer quality habitat (Figure 28). Wolverines may be changing their habitat selection over time in response to varying environmental pressures (e.g., food availability, competition) and what is considered high quality habitat in one year may not be consistent over time.

Table 20: Candidate Multi-Season Occupancy Models for Colonization Effects

Model	Occupancy	Colonization	AIC	Δ AIC	gamma (colonization)	
					Intercept	OR
gamma.null	1	1	790.90	1.28	0.61	-
gamma.fte	1	FTE	792.03	2.41	0.70	0.24
gamma.year	1	year	792.89	3.26	0.58	1.21
gamma.caribou	1	caribou	792.74	3.12	0.53	2.06
gamma.habitat	1	habitat	789.62	0.00	0.91	0.05
gamma.d.null	distance	1	792.83	3.21	0.61	-
gamma.d.fte	distance	FTE	793.97	4.34	0.70	0.24
gamma.d.year	distance	year	794.81	5.19	0.58	1.21
gamma.d.caribou	distance	caribou	794.67	5.04	0.53	2.08
gamma.d.habitat	distance	habitat	791.62	1.99	0.91	0.05

Note: The intercept is presented as the probability of occupancy when covariate values are set to '0', and covariate effect is presented as the odds ratio (OR) when covariate value is set to '1' (i.e., the maximum). Candidate models are indicated in bold face text.



Note: Observed points are plotted with jitter to show all points, but always exist at 0 or 1 (observed or not observed). Grey Ribbon is 95% Confidence Interval.

Figure 28: Effect of Habitat Quality on Wolverine Colonization in the Study Area.

Extinction

The effects of caribou, year, and FTE were tested on site extinction, or the probability that an occupied transect becomes unoccupied in the following year. Three competing models from the colonization analysis step were tested with extinction parameters: the null model, habitat effect on colonization, and distance effect on occupancy with habitat effect on colonization. Therefore, a total of 12 candidate models were tested (Table 21). The covariate effects are presented in a separate table in the 'final models' section below for clarity.

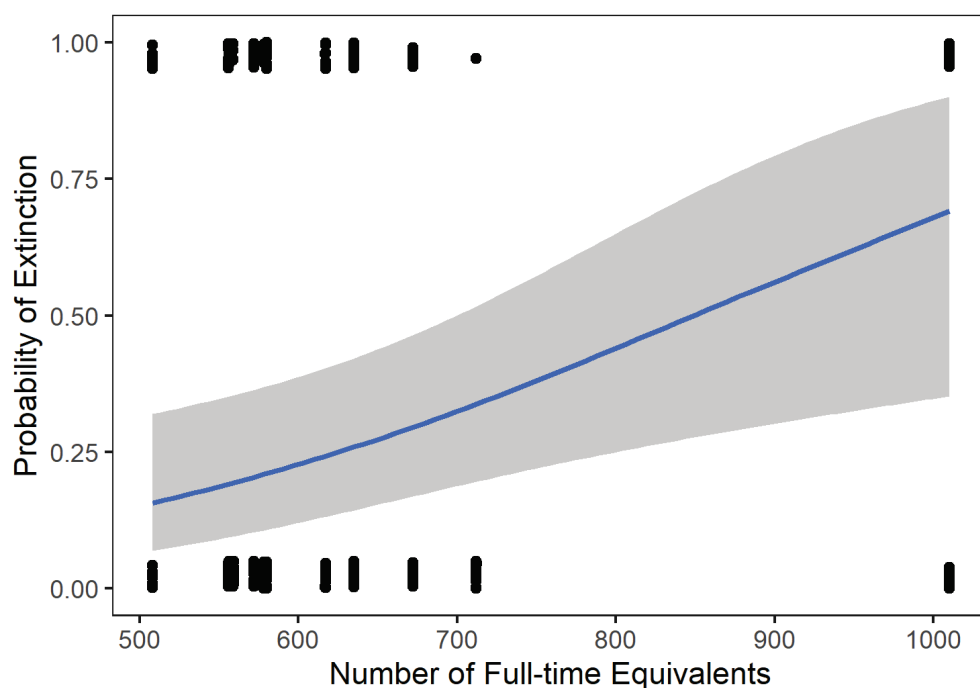
Table 21: Competing Candidate Models in Final Step of Multi-Season Occupancy Model Selection

Model Name	Occupancy	Extinction	Colonization	Detection	AIC	Δ AIC
epsilon.null	1	1	1	wind	790.90	4.45
epsilon.fte	1	FTE	1	wind	788.06	1.60
epsilon.year	1	year	1	wind	792.80	6.34
epsilon.caribou	1	caribou	1	wind	791.24	4.78
epsilon.h.null	1	1	habitat	wind	789.62	3.17
epsilon.h.fte	1	FTE	habitat	wind	786.46	0.00
epsilon.h.year	1	year	habitat	wind	791.53	5.07
epsilon.h.caribou	1	caribou	habitat	wind	789.50	3.05
epsilon.d.h.null	distance	1	habitat	wind	791.62	5.16
epsilon.d.h.fte	distance	FTE	habitat	wind	788.44	1.98
epsilon.d.h.year	distance	year	habitat	wind	793.52	7.06
epsilon.d.h.caribou	distance	caribou	habitat	wind	791.48	5.02

Notes: Final top models are those with a Δ AIC $\leq$ 2.00, of which there are six, and are indicated with **boldface text**.

'1' indicates the null process; no covariate effects were tested on this process. Candidate models are indicated in **boldface text**.

The extinction effect of FTE was retained in all three of the final models. The number of FTE had a positive effect on the probability of extinction. In years where there were more FTE at the Mine there was a higher probability that wolverines would abandon previously occupied transects (Figure 29). This result suggests that wolverines tolerate low activity levels but may reduce their use of the study area as Mine activity increases. Diavik will continue to monitor the occupancy of wolverines in the study area and the relationship with the level of Mine activity.



Note: Observed points are plotted with jitter to show all points, but always exist at 0 or 1 (observed or not observed).

Grey Ribbon is 95% Confidence Interval.

Figure 29: The Effect of the Number of Full-time Equivalents on the Probability of Site Extinction of Wolverines in the Study Area.

Final Models

Three models received equal AIC support in the final model selection (Table 22). Distance was a significant predictor of occupancy rates in one of the models, while the null predictor for occupancy was the most informative in two of the models. Habitat was a significant negative predictor of colonization in two of the models, and the null predictor of colonization was retained in one of the models. Full-time equivalents was a positive predictor of extinction in all three of the top models. Wind was the best predictor of detectability in all models.

Table 22: Final Multi-Season Occupancy Models and Associated Covariate Effects and Intercept Values for Each Process

Model	Occupancy (ψ)		Colonization (γ)		Extinction (ϵ)		Detection (p)	
	Intercept	OR	Intercept	OR	Intercept	OR	Intercept	OR
$\psi(1)\gamma(\text{habitat})\epsilon(\text{FTE})p(\text{wind})$	0.78	-	0.94	0.03	0.17	8.41	0.41	4.29
$\psi(1)\gamma(1)\epsilon(\text{FTE})p(\text{wind})$	0.69	-	0.61	-	0.17	8.76	0.42	4.11
$\psi(\text{distance})\gamma(\text{habitat})\epsilon(\text{FTE})p(\text{wind})$	0.81	0.69	0.95	0.03	0.17	8.33	0.40	4.29

Probability of Occupancy Over Time

To track changes in wolverine occupancy over the course of the study, annual site-averaged occupancy rates from the top three final MSOMs were calculated and averaged across models (Figure 30). In general, predicted occupancy rates of wolverines remained stable from 2008 through 2019 with approximately 75% of transects occupied. Models produced highly similar occupancy rates because each model contained the effect of FTE on extinction and two models contained a weak habitat effect on colonization. The wider confidence interval in 2008 is due to the effects of distance on initial occupancy rates in one model but not the other two.

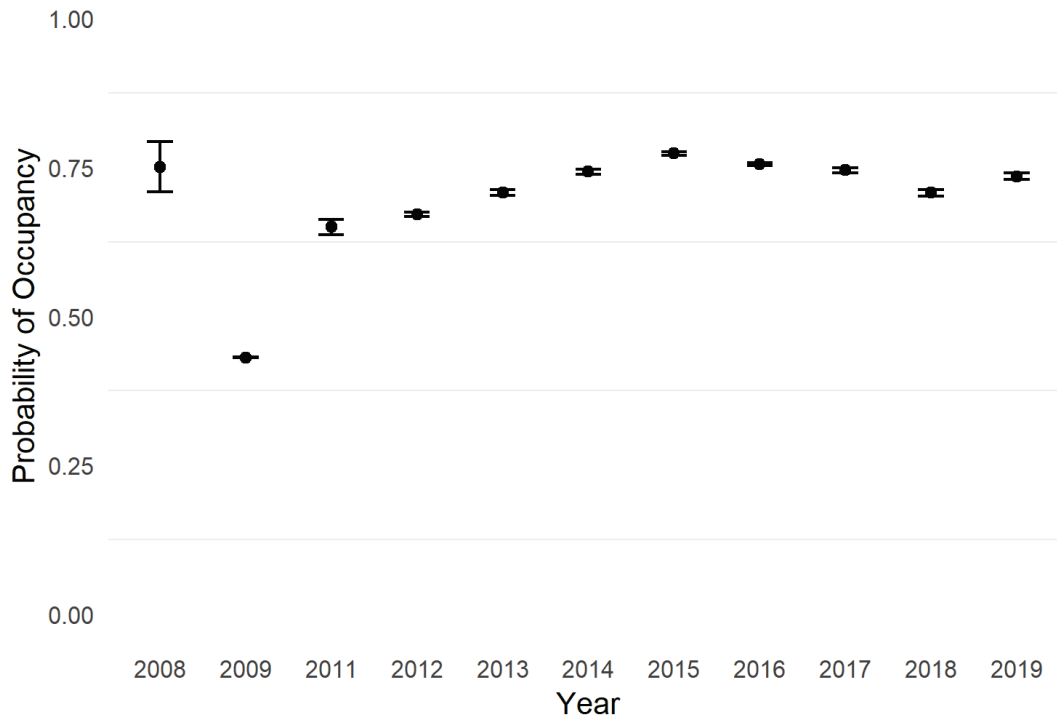


Figure 30: Average Predicted Occupancy Rates Over Time (with 95% Confidence Intervals) as Estimated from the Top 3 Candidate Multi-Season Occupancy Models (Table 22).

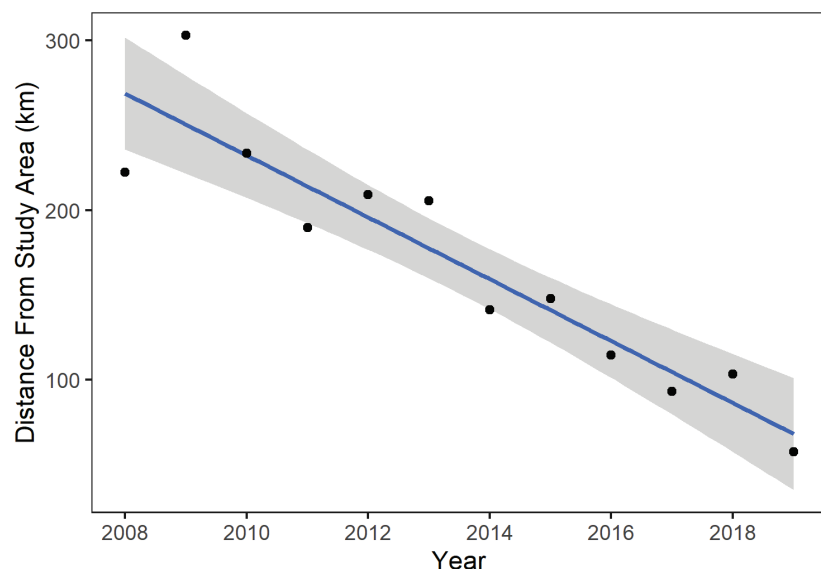
Conclusions

There are several factors contributing to wolverine site (transect) occupancy in the study area. The data shows that conducting multiple snow tracking surveys within a year is integral to correctly estimating occupancy rates, as wolverine detectability is relatively low at around 40%. This is not surprising because wind and snowfall have been variable during the surveys among years. Continued monitoring of wind and snow conditions will help make accurate and unbiased estimates of detectability, and subsequently occupancy, in future years. The data and analyses showed a small amount of variation in wolverine occupancy over time that was seldom below 70% (Figure 30). This suggests that wolverine occupancy in the study area has changed little from 2008 to 2019 despite the increased probability of extinction in response to higher Mine activity levels (i.e., FTE). In other words, annual declines in occupancy due to higher Mine activity do not have long lasting effects on wolverines, as they will reoccupy transects in the study area in years with lower Mine activity. Although there are only two years of overlap with wolverine density estimates at Diavik from 2005 to 2014, a similar stable trend was reported using DNA hair sampling data (Efford and Boulanger 2018).

Full-time equivalents was the only factor found to have a significant influence on the extinction process, suggesting no other measured external factors were associated with a decrease in wolverine occupancy in the study area. Habitat was found to have a small effect on colonization rates and transects with lower habitat quality were found to be more likely colonized. This could be due to changing habitat selection over the eleven-year period in this analysis, which would not have been captured by the original resource selection function (Johnson et al. 2005). Another possible explanation is that high quality habitat is already occupied, and less suitable habitats with lower potential for interactions with conspecifics may have higher encounter rates. Year effects were tested but did not receive strong support, suggesting that any changes in population growth were weakly correlated with annual occupancy rates. It is important to continue working with Indigenous communities to understand other factors that may influence wolverines in this region and possibly incorporate those variables into future analyses.

The distance of the Bathurst caribou winter range to the study area did not have a significant effect on colonization or extinction. Caribou carrion is a key food source for wolverines during the winter, and the Bathurst herd has been consistently spending the winter closer to the study area (Figure 31). Therefore, it might be expected that wolverine occupancy rates should increase with proximity of the study area to the caribou winter range. However, the potential opportunity of increased availability of caribou carrion could be constrained by the corresponding decline in herd size (Section 4.2.1; Figure 8). Also, if wolverine density in the study area is already at carrying capacity, any potential increase in food availability may not result in an increase in the number of wolverines using the study area.

By applying a conservative occupancy estimate of 70% to all 40 transects, approximately 28 wolverines may overlap the study area. However, given the extensive home range size of wolverine and that each transect may be intersected by one of more individuals, there are likely less than 28 individuals moving within or through the study area. Even so, the modelled occupancy estimate of wolverine abundance in the study area is similar to that derived from a spatially explicit capture-recapture method using DNA hair snagging techniques. Efford and Boulanger (2018) estimated 17 to 24 wolverines in the Diavik study area from 2005 to 2014. Using the estimated population size derived from the MSOMs (28 individuals), the study area has an estimated density of 2.2 wolverine per 100 km². Other studies have reported wolverine density to be similar or lower than that estimated in the Diavik study area. For example, Fisher et al. (2013) estimated densities of 0.2 to 0.3 wolverine per 100 km² in the Rocky Mountain range of Alberta, Persson (2005) estimated densities in the Swedish tundra (67°N) at 1.4 wolverine per 100 km², and Scraftford and Boyce (2014) estimated the Rainbow Lake area in Alberta to support a density of 2.2 wolverine per 100 km².



Grey Ribbon is 95% Confidence Interval.

Figure 31: Distance of the Centroid of the Bathurst Winter Range to the Diavik Study Area, 2008 to 2019

There are assumptions of the MSOM that may not have been met with the snow track data, which are important to acknowledge. The modelling approach requires that all parameters are constant across sites (transects) at any given time (MacKenzie et al. 2013). In general, the data meet this assumption as both temporal and site-level factors were identified and modelled directly. However, there are several potential sources of unaccounted variation, such as non-caribou prey availability, intra- and inter-specific competition, and site-specific Mine disturbance (e.g., noise may be louder at one transect than another) that can influence occupancy rates.

Another assumption is that the transect is “closed” within a primary sampling period (i.e., year). The closure assumption is important because it determines how the detection probability is calculated. If a wolverine track is detected at a transect in one visit within a primary sampling period but not the other, then occupancy is deemed a false negative. It is conceivable that during the interval between survey visits a wolverine home range either included or excluded a transect (within-year colonization and extinction). This discrepancy may cause the detection probability to be underestimated, which can subsequently inflate the occupancy estimates.

The common approach to limit this potential bias is to reduce the amount of time between survey visits as much as possible so that the closure assumption can be met (i.e., the site remains occupied or unoccupied over the duration of the primary sampling period). However, if the interval between survey visits is too short, the same tracks may be recorded and the surveys will not represent independent samples. Furthermore, wind and snow conditions and logistics can influence the ability of limiting the duration between survey visits.

Approximately two weeks between survey visits, weather permitting, is anticipated to achieve independence while meeting the closure assumption. In this analysis, intervals between visits ranged from one to four weeks, which are likely reasonable, but should be standardized to reduce potential bias of occupancy rates in future analyses. Importantly, the violations of assumptions in this dataset are likely consistent or systematic across years. In other words, the estimates may represent overestimation of the true occupancy rates in the study area, but the temporal trend is not expected to be affected (Figure 30).

6.4 Hair Snagging

6.4.1 Methods

Wolverine hair snagging is a regional research program conducted in partnership with ENR and Dominion Diamond Mines. This program is also conducted with the assistance of community members. The survey is carried out in March and April by snowmobile. A total of 134 posts constructed of 4 inch × 4 inch lumber in 5 foot lengths are erected across the DDMI study area in a 3 km by 3 km grid. Each post is spiral-wrapped in barbed wire, intended to snag hair from wolverine, and baited with a small portion of local meat and two types of commercially prepared lures (GNWT 2013b). Posts are surveyed in the order they are deployed and are removed after the second visit. Hair samples are submitted to Wildlife Genetics International for DNA fingerprinting to determine the sex and number of individuals in the study area.

6.4.2 Results

The wolverine hair snagging program was last completed in 2014. The long-term duration and frequency of this program has not been determined collaboratively at wildlife monitoring workshops hosted by ENR. Efford and Boulanger (2018) completed an analysis of wolverine individuals detected by the hair snagging programs from 2004 to 2015 among study areas associated with the Diavik, Ekati, Snap Lake and Gahcho Kué mines, and Daring Lake. A key finding of study was that wolverine across these study areas function as a single population, so there is limited utility for this type of monitoring to detect separate mine-related effects (Efford and Boulanger 2018). The authors reported that the number of individual wolverine captured in the study area has ranged from 17 to 24 wolverines from 2005 to 2014. These authors also showed that program frequency depends on the number of individuals identified and could be repeated every four to six years to detect an annual decline of 5%. The schedule for future monitoring programs will be determined after the data summary analysis report from ENR is complete and reviewed.

6.5 Incidents and Mortalities

Mortalities can occur if wolverines become habituated to mining activities resulting from efforts to locate food or shelter (DDMI 1998b). Diligent waste management, strictly enforced speed limits, and immediate reporting of wildlife sightings on East Island have limited the mortality of wolverine during the operation phase of the Mine. To date, efforts have been focused on limiting Mine-related mortalities and associated changes to wolverine population parameters.

The prediction made in the EER was:

- Mine-related mortalities, if they occur, are not expected to alter wolverine population parameters in the Lac de Gras area.

6.5.1.1 Methods

Incidental observations of wolverine by Mine staff are reported to the Environment Department. Mine-related incidents and mortalities are also reported to the Environment Department for documentation in a detailed incident investigation and through incident reports submitted by Mine staff (Appendices E and F). All wolverine mortalities are reported immediately to ENR, and ENR is consulted for follow-up mitigation and disposal procedures. If wildlife had to be deterred to reduce the risk of a wildlife-human incident, then all effort is made by the Environment staff to start with the least intrusive method available and all deterrent actions are recorded.

6.5.1.2 Results

In 2019, there were 21 reported instances when wolverines were observed on East Island (Appendix M). These sightings were reported over 19 days from 2 January to 18 December. These observations are not collected systematically, and likely contain repeated observations of the same animal. Incidental observations provide an indication of the potential for wildlife incidents or problem wildlife. Wolverine incidental observations decreased in 2019 slightly from 2018. There is no correlation between the number of incidental observations of wolverine and the number of people on site (Spearman correlation $\rho = -0.07$, $P = 0.77$); however, staff reporting incidental observations does foster an awareness of wildlife issues at the Mine (Table 23).

Table 23: Average Camp Population and Number of Incidental Wolverine Observations, 2002 to 2019

Year ^(a)	Average Camp Population	Wolverine Observation instances on East Island
2002	1100	4
2003	470	38
2004	397	14
2005	646	43
2006	716	31
2007	747	19
2008	979	46
2009	562	21
2010	579	28
2011	630	4
2012	629	11
2013	537	3
2014	484	6
2015	524	118
2016	625	105
2017	641	44
2018	578	28
2019	586	21

a) Monthly average camp population is not available for 2000 and 2001.

There were 21 observations of wolverines on East Island in 2019 and no incidents. A total of 12 deterrent actions were used during 7 of the 21 observations. The most used deterrent was an air horn. Two relocations of wolverine occurred in 2019, one on 15 January and one on 17 January. Since 2000, seven wolverines have been relocated and five mortalities have occurred at the Mine (Table 24). No wolverine mortalities occurred in 2019. Although there were two relocations in 2019, relocations and mortalities continue to be uncommon at the Mine.

Table 24: Wolverine Observations, Deterrents, Relocations and Mortalities, 2000 to 2019

Year	Days with Wolverine Visitations on East Island	Days Deterrent Actions were Utilized	Relocations	Mortalities
2000	25	9	0	0
2001	36	10	2	1
2002	4	0	0	0
2003	38	1	0	0
2004	14	1	0	0
2005	43	5	0	0
2006	31	2	0	0
2007	19	1	0	0
2008	46	17	0	1
2009	21	1	0	0
2010	28	0	0	0
2011	4	0	0	0
2012	11	1	0	2(a)
2013	3	0	0	0
2014	6	0	0	0
2015	83(b)	4	1	0
2016	73(c)	6	2	1
2017	36(d)	4	0	0
2018	23(e)	0	0	0
2019	21(f)	7	2	0

- (a) Two wolverine mortalities occurred in 2012 at an off-site fish compensation program undertaken by DDML.
- (b) Over 83 separate days, 118 independent wolverine observations were recorded. It is believed that the majority of these observations were for the same wolverine which was relocated on 23 March 2015.
- (c) Over 73 separate days, 105 independent wolverine observations were recorded.
- (d) Over 36 separate days, 44 independent wolverine observations were recorded.
- (e) Over 23 separate days, 28 independent wolverine observations were recorded.
- (f) Over 19 separate days, 21 independent wolverine observations were recorded.

6.6 Adaptive Management and Recommendations

Future monitoring of wolverine snow tracks will continue to include two rounds of surveys to determine whether detection rates of snow tracks vary over longer periods of time. Results from the analysis of long-term snow track monitoring indicate consistent occupancy of wolverine in the study area since 2008. The Environment Department will continue to encourage staff to report wolverine and other wildlife sightings as this builds awareness at site and helps to prevent and limit incidents. The Environment Department will continue to work with site departments as a reminder about the importance of waste segregation and securing waste bins to prevent wildlife access. Once given the results of the combined hair snagging programs, Diavik will discuss with other collaborators whether this program should be continued and if so, what types of monitoring changes should be implemented.

7.0 RAPTORS

Raptors (birds of prey) present in the study area include peregrine falcons, gyrfalcons, rough-legged hawks, snowy owls, and short-eared owls. The Federal *Species at Risk Act* (SARA) considers the peregrine falcon (*Falco peregrinus anatum/tundrius*) as *Special Concern*; however, they currently have no status under NWT species at risk legislation but have a general species rank of sensitive (NWT SAR 2018b). In 2017, COSEWIC re-assessed the status of the *anatum/tundrius* peregrine falcon as Not at Risk (NWT SAR 2018b). Peregrine falcon is scheduled for assessment by NWT SAR in March 2021 (NWT SAR 2018b).

Habitat loss, sensory disturbance, and changes to prey populations may influence raptors nesting in the Lac de Gras area. Mining activities may cause raptors to avoid the area and surrounding habitats. Mine-related changes in habitat quality can influence the presence and distribution of raptors. Impact predictions related to raptors (DDMI 1998a) were:

- Disturbance from the Mine and the associated zone of influence is not predicted to result in measurable impacts to the distribution of raptors in the study area.
- The Mine is not predicted to cause a measurable change in raptor presence in the study area.

Analysis of Diavik and Ekati peregrine falcon and gyrfalcon nest data from 1998 to 2010 determined that sensory disturbance was not influencing nest occupancy and success (Coulton et al. 2013). Instead, the study concluded that the patterns of use and success were associated with the spatial distribution of nest site quality and the age of nest sites, respectively, which is consistent with findings from another long-term study (Wightman and Fuller 2005). The results confirmed the decisions at the 2010 Diamond Mine Wildlife Monitoring Workshop that annual collection of raptor nest occupancy and success in the study area should be removed from the WMP, and data collection should be focused on mitigating effects to raptors nesting in open pits and on Mine infrastructure. The Workshop also suggested contributing to broader regional monitoring programs.

The revised impact predictions presented in Handley (2010) are to:

- Determine nest site occupancy and productivity of historic peregrine falcon nest sites in the study area to contribute to the Canadian Peregrine Falcon Survey (CPFS), which monitors recovery of species and long-term population trends.
- Determine if pit walls or other infrastructure are utilized as nesting sites for raptors.
- Determine nest success in areas of development and document effectiveness of deterrent efforts that may be employed for nest relocations.
- Document and determine the cause of direct Mine-related mortalities of raptors.

7.1 Nest Site Occupancy

7.1.1 Methods

The CPFS is no longer completed; however, DDMI will still contribute surveys of nest use and success in the study area for regional monitoring by ENR and other researchers. Contribution of nest monitoring data to ENR for inclusion in regional and national databases is scheduled for every five years and was last completed in 2015. The monitoring was conducted by ENR biologists and included surveys of known nest sites in early and late summer to determine nest use and the presence of hatchlings. The monitoring approach included a helicopter survey using fly-by techniques to minimize disturbance to nesting birds. The next regional survey is scheduled for 2020.

Falcons have been known to nest on Mine infrastructure and within the vertical rock faces of open pits at both the Mine and the Ekati mine. Pit wall/infrastructure inspections at the Mine are conducted twice weekly during the nesting season. Pit walls and other infrastructure are inspected for nests and falcon nesting behaviour. If nests are found, the species occupying the nest is determined along with the presence of eggs and/or chicks. Deterrent actions are considered in consultation with ENR if the nest is in an area hazardous to the birds.

Pit wall/infrastructure inspections are completed at eight locations on the Mine: A154 Pit area (Lookout #1 and #2), A418 Pit area (Lookout #1 and #2), South Tank Farm, Process Plant, Powerhouse (Lookout #1 and #2), Site Services Building, Boiler House and Backfill Plant. The survey is conducted by stopping at a clear vantage point and thoroughly scanning the area for any potential nesting locations.

7.1.2 Results

A total of 45 Pit wall/infrastructure inspections were completed from 23 March until 13 September to determine use by raptors (Appendix N). Nests were considered active if they were observed to have eggs or young. Once a nest was confirmed to no longer be active, no further inspections were undertaken. During the inspections, two peregrine falcon nesting sites were confirmed, one at the Site Services Building and one at the Process Plant. Potential peregrine falcon nesting was also observed at A418 where whitewash was observed underneath a ledge on 28 May and an adult was heard calling on 4 July. Another case of potential nesting was recorded at A21 on 30 May where unspecified nesting behaviour was noted. Potential nesting was also recorded at A154 where peregrine falcons were observed harassing a rough-legged hawk on 9 June and on 12 June. A rough-legged hawk was observed at this location on 12 July perched overlooking the pit, with another observation on 18 July. It was unknown which species was potentially nesting at this location.

Although not considered “raptors”, common ravens were confirmed nesting at the South Tank Farm and A418 (Table 25).

Table 25: Active Nests Observed on Mine Infrastructure and Open Pits in 2019

Area	Species	Date	Observations
A418	Common raven	9 June	An active common raven nest was recorded on 9 June 2019. Nest success was not recorded.
Site Services Line Up Area	Peregrine falcon	4 June to 12 July	Mating was observed on 4 June and a brooding adult was observed on a nest on 12 June. Two more observations of peregrine falcon were recorded on 4 and 7 July. No observations of fledglings were recorded, and the nest was reported as inactive on 15 July 2019.
Process Plant	Peregrine falcon	7 June, 15 June	A peregrine falcon was sighted flying over the Process Plant and Field Lab on 7 June, making calls. An occupied nest was later confirmed on 15 June.
South Tank Farm	Common raven	15 June to 21 June	An active common raven nest was recorded on 15 June and 21 June. Nest success was not recorded.

7.2 Incidents and Mortalities

7.2.1 Methods

Mine-related incidents that occur are reported to Environment Department staff through incident reports submitted by Mine staff. Environment Department staff follow up on any incident and complete the necessary documentation. ENR is consulted for mitigation and disposal procedures. This information is tabulated and provided for annual comparisons.

7.2.2 Results

No raptor incidents or mortalities were reported at the Mine in 2019.

7.3 Adaptive Management and Recommendations

DDMI will continue Pit wall/infrastructure monitoring for nesting raptors and contribute to regional nest monitoring. The next regional nest monitoring is scheduled to occur in 2020 and will be completed by ENR. As well, ENR will continue to collect these data for entry into the regional Raptor Database. Diavik will discuss options with ENR for future monitoring.

8.0 WASTE MANAGEMENT

Diavik is committed to taking the necessary steps to collect, store, transport, and dispose of all waste generated by the Mine. These procedures are being conducted in a safe, efficient and environmentally compliant manner. The Waste Management Plan is an integral part of DDMI's Environmental Management System and focuses on practical and positive management of waste.

The objectives of the Waste Management Plan include:

- creating a system for proper disposal of waste;
- minimizing potentially adverse impacts on the physical and biological environment; and
- complying with Federal and NT legislation.

Mitigation practices include food waste incineration, categorical segregation of non-food waste for storage and subsequent removal from site, and on-site disposal and monitoring. In addition to these mitigation practices, DDMI has implemented recycling and renewable energy initiatives.

8.1 Waste Inspections

The DDMI Waste Management Plan outlines practices for waste disposal and mitigation actions. The 2014 Waste Management Plan was submitted on 16 January 2015 to the Wek'èezhìi Land and Water Board (WLWB) as part of the water license renewal under water license number W2015L2-0001 (WLWB 2015). An updated version of Waste Management Plan was submitted to the WLWB on December 2017 and was implemented in 2018 (WLWB 2017). The Asset Management Department maintains the various waste collection transfer and disposal points, inventories of bulk wastes, waste management datasheets and status of protective equipment and spill kits. This assists in evaluating the capacity of waste management facilities, planning for logistics associated with backhauling and requirements for any modifications to the system.

Waste Management staff identify problem areas and work with contractors and Mine employees to resolve any issues. Numbering and inspecting waste collection bins prior to pick up is an effective method of facilitating communication between Waste Management and Environment Department staff and addressing issues within various departments. Efforts are made to identify improperly disposed waste in the large waste collection bins prior to collection; however, on occasion improperly disposed waste may end up in either the Landfill or the burn pit.

Incineration, segregation and storage of waste takes place at the WTA, which was established to provide proper handling and storage of waste on site. The facility is located on the south side of East Island. The WTA is a lined facility surrounded by a gated 3-m high chain link fence to control wind transportation of any litter and prevent most wildlife intrusion. Contained within the WTA are two incinerators for food waste, a burn pit for non-toxic/non-food contaminated burnable material, a contaminated soils containment area, a treated sewage containment area, as well as sea cans, sheds, and storage areas for drums, crates, bins and totes. Two water scrubbed incinerators were installed and operational in October 2012 and are located within the incinerator building. The majority of waste is inventoried and stored at the WTA while waiting backhaul on the winter ice road.

On-site disposal of non-burnable wastes such as steel (ground support for underground mining), vent tubing, plastics, and glass currently occurs at the inert Landfill located within the Waste Rock Storage Area – North Country Rock Pile. Waste is pushed into a large depression and a gate was installed in an effort to limit uncontrolled dumping in this area. The location of the Landfill within the rock pile and traffic in the area will

continue to discourage wildlife access to the Landfill, thereby limiting the availability of infrequently misdirected food and food packaging to animals.

8.1.1 Methods

Inspections of the WTA and the Landfill are conducted twice per week during the winter and once per week in the summer. Inspections of the A21 Area are conducted every three days and inspections of the Underground occur once per week. Following the completion of A21 construction in late 2018 there was substantially less waste production in the area and inspections were reduced to once per week. These inspections are to confirm that all waste segregation, storage and disposal procedures set out in the Waste Management Plan are being followed. Inspections consist of Environment Department staff walking the area of the WTA, Landfill, A21 Area, and Underground where safe to do so, and documenting the type and number of misdirected waste items, as well as wildlife species and sign that were present during the survey. Corrective actions at the WTA and Landfill area include notifying a WTA coordinator and transferring items to the appropriate disposal area. Corrective actions at the A21 Area and Underground include notifying the area supervisor to arrange for the transfer of items to the appropriate disposal area and additional worker education where required. All misdirected waste items found during inspections in the WTA and Landfill are sorted into the proper disposal area by Waste Management staff. For example, non-burnable material is removed from the incinerator waste stream and transferred to the designated area in the Landfill. Hazardous wastes are stored in the WTA until they can be shipped to licensed facilities off-site.

8.1.2 Results

Development of the underground Mine and the A21 open pit in 2019 yielded 7,186,655 tonnes of mined waste rock and 564,917 tonnes of overburden till and lake bottom sediment. Development also yielded 384,170 tonnes for the Underground and 2,436,689 tonnes of ore processed. The average daily population at the Mine in 2019 was 586 people, and ranged from 545 to 609 people per week (Table 12; Appendix O). During 2019, the WTA and Landfill were surveyed on 105 and 107 occasions, respectively. The A21 Area was surveyed 107 times and the Underground was surveyed 109 times. All surveys occurred between 1 January to 6 December (Table 26; Appendix P). A total of 633 misdirected waste items were found during WTA inspections, 1,255 items during Landfill inspections, 518 items at the A21 Area and 1,361 items at the waste segregation area of the Underground (Table 26). At the WTA, landfill, A21, and Underground, 59.0%, 70.1%, 66.4%, and 78.9% of the inspections had at least one item of misdirected waste, respectively.

In the WTA, the most common misdirected waste item was gloves (168 items), followed by cigarette butts (101 items) and oily rags (85 items). In the landfill, the most common misdirected item was gloves (418 items), followed by oily rags (375 items) and oil contaminated waste (92 items). In the A21 Area, the most common misdirected waste item was oily rags (179 items), followed by gloves (175 items) and drink containers (54 items). In the Underground area, the most common misdirected waste item was cigarette butts (952 items), followed by gloves (170 items) and oily rags (130 items).

Considering the total amount of waste disposed (361,746 kg incinerated and 3,402 tonnes landfilled), the amount of misdirected waste is negligible. Improperly disposed items at the WTA and Landfill were reported to Waste Management staff for immediate rectification.

Table 26: Misdirected Waste at the Waste Transfer Area, Landfill, A21 Area and Underground, 2019

Misdirected Waste Type	Waste Transfer Area (n = 105 surveys)		Landfill (n = 107 surveys)		A21 Area (n = 107 surveys)		Underground (n = 109 Surveys)	
	Total Number Found in All Inspections	Percent of Inspections	Total Number Found in All Inspections	Percent of Inspections	Total Number Found in All Inspections	Percent of Inspections	Total Number Found in All Inspections	Percent of Inspections
Aerosol Cans	5	3.8	63	24.3	16	11.2	10	4.6
Batteries	8	2.8	7	3.7	2	0.9	0	0.0
Cigarette Butts	101	1.9	83	4.7	0	0.0	952	33.9
Cigarette Packaging	32	15.2	35	17.8	11	9.3	12	10.1
Drink Containers Recyclable	69	22.9	76	28.0	54	27.1	13	7.3
Food	24	7.6	4	3.7	15	5.6	13	7.3
Food Packaging	55	24.8	57	21.5	23	9.3	35	16.5
Gloves	168	41.0	418	61.7	175	45.8	170	59.6
Oil Contaminated Waste	38	7.6	92	21.5	17	9.3	3	2.8
Oil Products and Containers	4	1.9	20	11.2	13	5.6	4	2.8
Oily Rags	85	25.7	375	50.5	179	36.4	130	45.0
Other	44	10.5	25	10.3	13	9.3	19	8.3
Total	633	66.4 ¹	1,255	70.1 ¹	518	78.9 ¹	1,361	59.0 ¹

¹ This value indicates the total percentage of inspections with at least one misdirected waste item for that particular sample location.

Wildlife were observed on 11.4% of inspections of the WTA and 2% of inspections of the Underground. Wildlife were not observed during inspections of the Landfill or the A21 Area (Table 27). Wildlife sign was observed on 27.6%, 15.0%, 9.3%, and 18.3% of inspections at the WTA, Landfill, A21 Area and Underground, respectively. The most common wildlife species observed during inspections was red fox. The most common wildlife sign observed were red fox and unspecified wildlife tracks.

Table 27: Wildlife and Wildlife Sign in the Waste Transfer Area, Landfill, A21 Area and Underground, 2019

Species	Waste Transfer Area (n = 105 surveys)			Landfill (n = 107 surveys)			A21 Area (n = 107 surveys)			Underground (n = 109 Surveys)		
	Number of Inspections with Wildlife Observations	Total Number of Individuals Observed	Number of Inspections with Wildlife Sign Observed	Number of Inspections with Wildlife Observations	Total Number of Individuals Observed	Number of Inspections with Wildlife Sign Observed	Number of Inspections with Wildlife Observations	Total Number of Individuals Observed	Number of Inspections with Wildlife Sign Observed	Number of Inspections with Wildlife Observations	Total Number of Individuals Observed	Number of Inspections with Wildlife Sign Observed
Red fox	10	11	16	0	0	15	0	0	2	1	2	9
Grey wolf	0	0	0	0	0	1	0	0	0	0	0	0
Wolverine	0	0	3	0	0	0	0	0	0	0	0	1
Grizzly bear	0	0	0	0	0	0	0	0	0	0	0	1
Arctic hare	0	0	0	0	0	0	0	0	0	1	1	0
Common raven	1	1	0	0	0	0	0	0	0	0	0	0
Gull spp.	1	1	0	0	0	0	0	0	0	0	0	0
Unspecified	0	0	10	0	0	0	0	0	8	0	0	9
Total	12	13	29	0	0	16	0	0	10	2	3	20

spp. =species.

8.2 Recycling Initiatives

During 2008, DDMI implemented an employee-driven recycling program for plastic bottles and aluminium cans generated on site. Throughout 2019, 9,295 units of aluminum containers, 11,100 units of plastic containers, and 503 juice containers were recycled and the total monetary value (\$2,445.30) donated to charity. To date, the total proceeds since the inception of the employee-driven recycling program has generated \$31,082.80. Scrap copper was also collected in 2019 and sold for \$70,000. Diavik plans to donate these proceeds.

During 2019, approximately 178,963 litres of waste oil was collected to be used in the waste oil boiler that was commissioned in the second quarter of 2014. Since the boiler was commissioned, 1,397,932 litres of waste oil was burned to create heat rather than being shipped off-site.

In addition, a number of waste materials generated on-site are shipped off-site using winter road backhauls. Diavik is committed to maximizing recycling opportunities for wastes generated from Mine operations that cannot be disposed of on site. Items shipped for recycling include:

- used oil, oil filters and grease;
- used glycol;
- aerosol cans;
- batteries (lead-acid and dry cell);
- expired/waste fuel (e.g., Jet B);
- oil-based paint; and
- absorbents.

Diavik will continue to increase recycling opportunities and reduce waste streams generated at the Mine.

8.3 Renewable Energy

The wind farm became operational on 28 September 2012 and it was predicted to reduce Mine diesel consumption by 10%, as well as greenhouse-gas emissions by 12,000 tonnes of carbon dioxide annually. During the seventh year of operation, the wind farm generated 17,326,685 kilowatt hours (kWh) of power, which represents 8.9% of the total power generated in 2019 and an approximate diesel savings of 4.0 million litres (Figure 32).

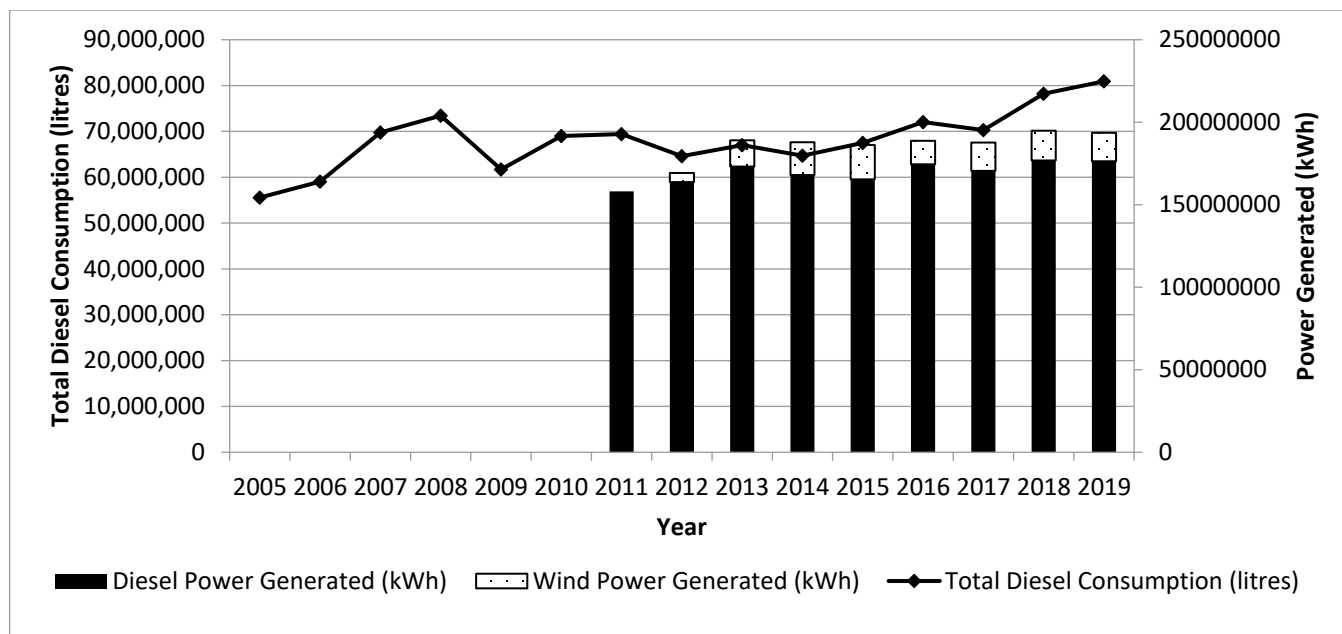


Figure 32: Annual Diavik Power Generation and Diesel Consumption

Table 28: Total Liters of Fuel \ Offset by the Wind Farm (2013-2019)

Year	2013	2014	2015	2016	2017	2018	2019
Wind Farm Energy Generated (KWh's)	15,823,543	19,747,333	20,842,138	14,297,803	17,192,885	18,001,285	17,326,685
CO ₂ Offset (tonnes)	12,000	14,068	14,403	9,030	10,478	12,063	10,798
Total CO₂ Offset by Windfarm (tonnes)							82,840

The peak amount of total power used can be as high as 60% wind power on a given day. The wind farm offset an estimated 10,798 tonnes of carbon dioxide emissions in 2019 (Table 28). From 2005 through 2019, the annual diesel fuel consumption at the Mine has ranged from 55,573,00 litres to 80,925,111 litres. In 2019, the total fuel consumption was 80,925,111 litres, which is the highest consumption during this period. The total carbon dioxide emissions (equivalents) offset since 2013 by the wind farm is 82,840 tonnes.

8.4 Adaptive Management and Recommendations

Procedures and mitigation strategies currently in place have been relatively successful at limiting wildlife interactions in the WTA and Landfill. While foxes, ravens and occasionally wolverine appear to be frequenting the WTA and Landfill, A21 Area and Underground, these animals are natural scavengers and will continue to be present throughout the life of the Mine. Diavik will continue to monitor the WTA and Landfill at the frequency of twice per week in the winter and once per week in the summer, and the A21 Area and Underground once per week during the year. Diavik remains committed to carrying out employee education programs related to waste handling.

9.0 CLOSURE

We trust the above meets your present requirements. If you have any questions or requirements, please contact the undersigned.

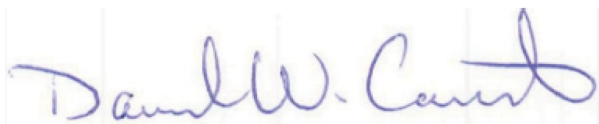
Golder Associates Ltd.



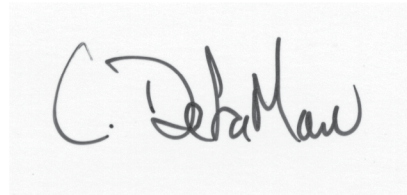
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REFERENCES

- Adamczewski A, Boulanger J, Croft B, Cluff D, Elkin B, Nishi J, Kelly A, D'Hont A, and Nicolson C. 2009. Decline of the Bathurst Caribou Herd 2006-2009: A technical evaluation of field data and modeling. Department of Environment and Natural Resources, December, 2009.
- Arnold TW. 2010. Uninformative parameters and model selection using Akaike's Information Criterion. *Journal of Wildlife Management* 76:1175-1178.
- Bates D, Maechler M, Bolker B, Walker S. 2015. Fitting linear mixed-effects models using lme4. *Journal of Statistical Software* 67(1):1-48.<doi:10.18637/jss.v067.i01>.
- Bayne E, Moses R, Boutin S. 2005. Evaluation of winter tracking protocols as a method for monitoring mammals in the Alberta Biodiversity Monitoring Program. Integrated Landscape Management Group. Edmonton, AB: University of Alberta.
- Benitez-Lopez A, Alkemade R, Verweij PA. 2010. The impacts of roads and other infrastructure on mammal and bird populations: A meta-analysis. *Biological Conservation* 143:1307-1316.
- Bergerud AT, Luttich SN, Camps L. 2008. The return of caribou to Ungava. Montreal and Kingston, ON: McGill-Queen's University Press.
- BHPB (BHP Billiton Diamonds Inc.). 2002. Wildlife Effects Monitoring Program, Ekati Diamond Mine. Prepared by Golder Associates Ltd. for BHP Billiton Diamonds Inc.
- BHPB. 2007. Ekati Diamond Mine 2006 Wildlife Effects Monitoring Program Summary Report. Prepared by Rescan Environmental Services Ltd for BHP Billiton Diamonds Inc.
- Bolker BM, Brooks ME, Clark CJ, Geange SW, Poulsen JR, Stevens MHH, White JSS. (2009). Generalized linear mixed models: a practical guide for ecology and evolution. *Trends in ecology & evolution* 24(3):127-135.
- Boulanger J, Poole K, Fournier B, Wierzchowski J, Gaines T, Gunn A. 2004. Assessment of Bathurst Caribou Movements and Distribution in the Slave Geological Province. Manuscript Report No. 158. Department of Resources, Wildlife and Economic Development, Government of the Northwest Territories. Yellowknife, NT.
- Boulanger J, Poole KG, Gunn A, Wierzchowski J. 2012. Estimating the zone of influence of industrial developments on wildlife: a migratory caribou and diamond mine case study. *Wildlife Biology* 18:164-179.
- Burnham KP, Anderson DR. 2002. Model selection and multimodel inference: A practical information-theoretic approach, 2nd edition. New York, NY: Springer Verlag.
- Burt PM. 1997. Diavik Diamond Project Vegetation Baseline Studies - Plant Associations and Habitat Types and Plant Species List.
- Canty A, Ripley BD. 2019. Boot: Bootstrap R (S-Plus) Functions. R package version 1.3-24.

- Case R, Buckland J, Williams M. 1996. The Status and Management of the Bathurst Caribou Herd, Northwest Territories, Canada. Yellowknife, NT: Government of the Northwest Territories File Report 116:34-34.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2018. [accessed February 2018]. <http://cosewic.ca/index.php/en-ca/>
- Coulton DW, Virgl JA, English C. 2013. Falcon nest occupancy and hatch success near two diamond mines in the Southern Arctic, Northwest Territories. *Avian Conservation and Ecology* 8:14, <http://dx.doi.org/10.5751/ACE-00621-080214>.
- DDMI (Diavik Diamond Mines [2012] Inc.). 1998a. Environmental Effects Report, Vegetation and Terrain. Yellowknife, NT.
- DDMI. 1998b. Environmental Effects Report, Wildlife. Yellowknife, NT.
- DDMI. 1998c. Environmental Assessment Overview. Yellowknife, NT.
- DDMI. 2002. 2002 Wildlife Monitoring Program Ver.2. Yellowknife, NT.
- DDMI. 2007. A comparison of methods for monitoring abundance and distribution of wolverine at the Diavik Diamond Mine. Prepared for Diavik Diamond Mines Inc. by Golder Associates Ltd.
- DDMI. 2011. 2010 Wildlife Monitoring Report. Prepared by Diavik Diamond Mines Inc., April 2011.
- Dominion Diamond (Dominion Diamond Ekati Corporation). 2014. Developer's Assessment Report for the Jay Project. Yellowknife, NT.
- Dominion Diamond. 2017. Caribou Road Mitigation Plan for the Jay Project. Prepared for Dominion Diamond Ekati Corporation by Golder Associates Ltd. Yellowknife, NT.
- EC (Environment and Climate Change Canada). 2013. Letter to Diavik agreeing to discontinuation of water bird monitoring. 21 March 2013.
- Efford, M. and J. Boulange J. 2018. Analyses of Wolverine DNA Mark-Recapture Sampling in the Northwest Territories 2004–2015. Prepared for the Department of Environment and Natural Resources, Government of the Northwest Territories. EMAB (Environmental Monitoring Advisory Board). 2004. Comments by EMAB on the 2004 Wildlife Monitoring Report. 18 October 2004.
- EMAB (Environmental Monitoring Advisory Board). 2004. Comments by EMAB on the 2004 Wildlife Monitoring Report. 18 October 2004.
- EMAB (Environmental Monitoring Advisory Board). 2017. Review of Diavik's 2016 Wildlife Monitoring Report and 2014-2016 Comprehensive Analysis Report. 21 August 2017. Prepared for the Environmental Monitoring Advisory Board by Management and Solutions Environmental Science. Calgary, AB.
- EMAB. 2018. Review of Diavik's 2017 Wildlife Monitoring Report. May 2018. Prepared for the Environmental Monitoring Advisory Board by Management and Solutions Environmental Science. Calgary, AB.

- EMAB. 2019 Review of Diavik's 2018 Wildlife Monitoring Report. May 2019. Prepared for the Environmental Monitoring Advisory Board by Management and Solutions Environmental Science. Calgary, AB.
- ENR (Department of Environment and Natural Resources). 2004. Comments by RWED on the 2004 Wildlife Monitoring Report. 14 June 2004.
- ENR. 2018a. Bathurst caribou herd. Government of the Northwest Territories, Department of Environment and Natural Resources. [accessed March 2018]. <https://www.enr.gov.nt.ca/en/services/barren-ground-caribou/bathurst-herd>.
- ENR. 2018b. Ahiak, Beverly and Qamanirjuaq Herds. Government of the Northwest Territories, Department of Environment and Natural Resources. [accessed March 2018]. <https://www.enr.gov.nt.ca/en/services/barren-ground-caribou/ahiak-beverly-and-qamanirjuaq-herds>.
- ENR. 2018c. Barren-ground Caribou – NWT Management Strategy. Government of the Northwest Territories, Department of Environment and Natural Resources. [accessed March 2018]. https://www.enr.gov.nt.ca/sites/enr/files/strategies/caribou_forever_our_heritage_our_responsibility.pdf
- ERM (ERM Rescan). 2014. Ekati and Diavik Diamond Mines: 2014 Final Lac de Gras Regional Grizzly Bear DNA Report. Prepared for Dominion Diamond Ekati Corporation and Diavik Diamond Mine (2012) Inc. Yellowknife, NT: ERM Rescan Consultants Canada Ltd.
- ERM. 2018. Ekati Diamond Mine and Diavik Diamond Mine: Grizzly Bear Population Assessment in the Lac de Gras Region, Northwest Territories – Final Report. Prepared for Dominion Diamond Ekati ULC and Diavik Diamond Mine (2012) Inc. Vancouver, BC: ERM Consultants Canada Ltd.
- Festa-Bianchet M, Ray JC, Boutin S, Côté SD, Gunn A. 2011. Conservation of caribou (*Rangifer tarandus*) in Canada: an uncertain future. *Canadian Journal of Zoology* 89:419-434.
- Fisher, J. T., Bradbury, S., Anholt, B., Nolan, L., Roy, L., Volpe, J. P., & Wheatley, M. (2013). Wolverines (*Gulo gulo luscus*) on the Rocky Mountain slopes: natural heterogeneity and landscape alteration as predictors of distribution. *Canadian Journal of Zoology*, 91(10), 706-716.
- Fiske I, Chandler R. 2011. Unmarked: an R package for fitting hierarchical models of wildlife occurrence and abundance. *Journal of Statistical Software*, 43(10), 1-23.
- Florianm H. 2020. DHARMA: Residual diagnostics for hierarchical (multi-level / mixed) regression models. R package version 0.2.7. <https://CRAN.R-project.org/package=DHARMA>
- Fretwell SD, Lucas HLJ. 1970. On territorial behaviour and other factors influencing habitat distribution in birds. *Acta Biotheoretica* 19:16-36.
- Gau R, Case R. 1999. Evaluating nutritional condition of grizzly bears via 15N signatures and insulin-like growth factor-1. *Ursus* 13:285-291.

- GNWT (Government of the Northwest Territories). 2011. Caribou Forever – Our Heritage, Our Responsibility: A Barren-ground Caribou Management Strategy for the Northwest Territories 2011-2015. Yellowknife, NT: Department of Environment and Natural Resources.
- GNWT. 2013a. Final Minutes from March 6th 2013 Grizzly Bear Workshop. Yellowknife, NT: Department of Environment and Natural Resources.
- GNWT. 2013b. Monitoring Protocol: Wolverine DNA Hair Snagging. Yellowknife, NT: Department of Environment and Natural Resources.
- GNWT. 2019. Bathurst Caribou Range Plan. Department of Environment and Natural Resources. Yellowknife, NT. 90 pp.
- GOC (Government of Canada). 2019. Canadian Wildlife Species at Risk. [accessed December 2019]. Available at: <https://www.registrelep-sararegistry.gc.ca/default.asp?lang=en>.
- Golder (Golder Associates Ltd.). 2011. Analysis of environmental effects from the Diavik Diamond Mine on wildlife in the Lac de Gras Region. Prepared for Diavik Diamond Mines Inc. Yellowknife, NT: Golder Associates Ltd.
- Golder. 2014. Analysis of environmental effects from the Diavik Diamond Mine on wildlife in the Lac de Gras Region. Prepared for Diavik Diamond Mines Inc. Yellowknife, NT: Golder Associates Ltd.
- Golder. 2017a. Analysis of environmental effects from the Diavik Diamond Mine on wildlife in the Lac de Gras Region. Prepared for Diavik Diamond Mines Inc. Yellowknife, NT: Golder Associates Ltd.
- Golder. 2017b. Diavik Diamond Mine 2016 wildlife monitoring report. Prepared for Diavik Diamond Mines (2012) Inc. by Golder Associates Ltd., Yellowknife, NT: Golder Associates Ltd.
- Golder. 2018a. Analyses requested by the environmental monitoring and advisory board. Prepared for Diavik Diamond Mines Inc. Yellowknife, NT: Golder Associates Ltd.
- Golder. 2018b. Responses to EMAB comments on the 2017 WMP report. Prepared for Diavik Diamond Mines (2012) Inc. by Golder Associates Ltd., Vancouver, BC: Golder Associates Ltd.
- Golder. 2018c. Diavik Diamond Mine 2017 Wildlife Monitoring Report. Prepared for Diavik Diamond Mines (2012) Inc. by Golder Associates Ltd. Vancouver, BC: Golder Associates Ltd.
- Golder. 2019. Diavik Diamond Mines 2018 Wildlife Monitoring Report. Prepared for Diavik Diamond Mines (2012) Inc. By Golder Associates Ltd. Vancouver, BC: Golder Associates Ltd.
- Gunn A, Dragon J, Boulanger J. 2002. Seasonal movements of satellite-collared caribou from the Bathurst Herd. Final report to the West Kitikmeot Slave Study Society. Yellowknife, NT.

- Gunn A, Dragon J, Nishi J. 1997. Bathurst Calving Ground Survey, 1996. Yellowknife, NT: Government of Northwest Territories, Department of Resources, Wildlife and Economic Development. File Report No. 119.
- Gunn A, Russell D, Eamer J. 2011. Northern caribou population trends in Canada. Canadian Biodiversity: Ecosystem Status and Trends 201, Technical Thematic Report No. 10. Ottawa, ON: Canadian Councils of Resource Ministers. 77 pp.
- Hagemoen RIM, Reimers E. 2002. Reindeer summer activity pattern in relation to weather and insect harassment. *Journal of Animal Ecology* 71:883-892.
- Handley, J. 2010. Diamond Mine Wildlife Monitoring Workshop Report. Yellowknife, NT.
- Jessen, T, Diepstraten R, Musiani M, Massolo A, Galpern P, McDermid G. 2014. Summary report 2014: Joint regional grizzly bear DNA project, Snap Lake Mine and Gahcho Kué Project. Calgary, AB: University of Calgary.
- Johnson CJ, Boyce MS, Case RL, Cluff HD, Gau RJ, Gunn A, Mulders R. 2005. Cumulative effects of human developments on Arctic wildlife. *Wildlife Monographs* 160:1-36.
- Johnson CJ, Russell DE. 2014. Long-term responses of a migratory caribou herd to human disturbance. *Biological Conservation* 177: 52-63.
- Kéry M, Chandler R. 2012. Dynamic occupancy models in unmarked. R Project for Statistical Computing, Vienna, Austria. <http://cran.r-project.org/web/packages/unmarked/vignettes/coext.pdf>.
- Kuznetsova A, Brockhoff PB, Christensen RHB. 2017. lmerTest Package: Tests in Linear Mixed Effects Models. *Journal of Statistical Software* 82(13):1–26. doi: 10.18637/jss.v082.i13.
- Li L, Pomeroy JW. 1997. Estimates of threshold wind speeds for snow transport using meteorological data. *Journal of Applied Meteorology* 36:205-213.
- MacKenzie DI, Nichols JD, Lachman GB, Droege S, Andrew Royle J, Langtimm CA. 2002. Estimating site occupancy rates when detection probabilities are less than one. *Ecology* 83(8):2248-2255.
- MacKenzie DI, Nichols JD, Hines JE, Knutson MG, Franklin AB. 2003. Estimating site occupancy, colonization, and local extinction when a species is detected imperfectly. *Ecology*, 84(8):2200-2207.
- Magoun AJ. 1987. Summer and winter diets of Wolverines, *Gulo gulo*, in arctic Alaska. *Canadian Field-Naturalist* 101(3):392-397.
- Manly BFJ, McDonald LL, Thomas DL, Erickson WP. 2002. Resource selection by animals: Statistical analysis and design for field studies. 2nd edition. Boston, MA: Kluwer Press.
- Marshall R. 2009. Diamond Mine Wildlife Monitoring Workshop. Prepared for Environment and Natural Resources. Yellowknife NT: Rob Marshall and Associates.

- Matthews S, Epp H, Smith G. 2001. Vegetation Classification for the West Kitikmeot/Slave Study Region. Final Report to the West Kitikmeot/Slave Study Society. Yellowknife, NT.
- Mattisson J, Rauset GR, Odden J, Andrén H, Linnell JD, Persson J. 2016. Predation or scavenging? Prey body condition influences decision-making in a facultative predator, the wolverine. *Ecosphere* 7(8):e01407.
- McLoughlin PD, Case RL, Gau RJ, Messier F. 1999. Annual and seasonal pattern of barren-ground grizzly bears in the central Northwest Territories. *Ursa* 11:79-86.
- McLoughlin PD, Case RL, Gau RJ, Cluff HD, Mulders R, Messier F. 2002. Hierarchical habitat selection by Barren-ground grizzly bears in the central Northwest Territories. *Oecologia* 132:102-108.
- McLoughlin PD, Messier F. 2001. The Demography of Barren-ground grizzly bears (*Ursus arctos*) in Nunavut and the Northwest Territories. Prepared for the Government of the Northwest Territories Department of Resources, Wildlife, and Economic Development. Yellowknife, NT: University of Saskatchewan, Department of Biology. 93 p.
- McLoughlin PD, Boyce MS, Coulson T, Clutton-Brock T. 2006. Lifetime reproductive success and density-dependent, multi-variable resource selection. *Proceedings of the Royal Society B* 273:1449-1454.
- Miller FL, Gunn A. 1979. Responses of Peary Caribou and Muskoxen to Helicopter Harassment. Occasional Paper, Number 40, Canadian Wildlife Service.
- Mulders R. 2000. Wolverine ecology, distribution, and productivity in the Slave Geological Province. Final Report to the West Kitikmeot/Slave Study Society. Yellowknife, NT.
- Murphy SM, Curatolo JA. 1987. Activity budgets and movement rates of caribou encountering pipelines, roads, and traffic in Northern Alaska. *Canadian Journal of Zoology* 65:2483-2490.
- NWT SAR (Northwest Territories Species At Risk). 2018a. Northwest Territories Gazette – Notice – Species at Risk (NWT) Act – Notice of Listed Species Barren-ground caribou. Volume 39, No. 7. https://www.nwt-species-at-risk.ca/sites/default/files/nwt_gazette_august_2018_0.pdf.
- NWT SAR. 2018b. NWT Species at Risk [accessed January 2018]. <http://nwt-species-at-risk.ca/>.
- Penner (Penner and Associates Ltd.). 1998. Wildlife baseline report, Diavik Diamonds Project, Lac de Gras, Northwest Territories. Prepared for Diavik Diamond Mines Inc.
- Persson, J. (2005). Female wolverine (*Gulo gulo*) reproduction: reproductive costs and winter food availability. *Canadian Journal of Zoology*, 83(11), 1453-1459.
- RCT (R Core Team). 2019. J. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>.

- Rescan (Rescan Environmental Services Ltd.). 2013a. Joint regional Grizzly bear DNA proposal, 2012. Developed by Rescan Environmental Services Ltd. In cooperation with the Government of the Northwest Territories Department of Environment and Natural Resources.
- Rescan. 2013b. Memorandum: Response to regulator and monitoring agency comments regarding the joint regional grizzly bear DNA monitoring program. Rescan Environmental Services Ltd. and Golder Associates Ltd.
- Rescan. 2014. Ekati and Diavik Diamond Mines 2014 final Lac de Gras regional grizzly bear DNA report. Rescan Environmental Services Ltd.
- Scrafford, M., & Boyce, M. (2014). Effects of industrial development on wolverine (*Gulo gulo*) ecology in the boreal forest of northern Alberta. *Wolverine Project Progress Report–Winter, 2015*.
- Species at Risk Committee. 2014. Species status report for wolverine (*Gulo gulo*) in the Northwest Territories. Yellowknife, NT: Species at Risk Committee.
- Squires JR, Olson LE, Turner DL, DeCesare NJ, Kolbe JA. (2012). Estimating detection probability for Canada lynx *Lynx canadensis* using snow-track surveys in the northern Rocky Mountains, Montana, USA. *Wildlife Biology* 18(2):215-225.
- The *Canadian Environmental Assessment Act*. 1999. Comprehensive Study Report, Diavik Diamonds Project.
- Tłıchq Government. 2013. Traditional Knowledge Study for Diavik Soil and Lichen Sampling Program. Prepared for the Tłıchq Government. Behchokò, NWT: Tłıchq Research and Training Institute. Virgl JA, Rettie WJ, Coulton DW. 2017. Spatial and temporal changes in seasonal range attributes in a declining Barren-ground caribou herd. *Rangifer Report* 37:31-46.
- Vistnes I, Nellemann C. 2008. The Matter of Spatial and Temporal Scales: A Review of Reindeer and Caribou Response to Human Activity. *Polar Biology* 31:399-407.
- Weir JN, Mahoney SP, McLaren B, Ferguson SH. 2007. Effects of Mine Development on Woodland Caribou *Rangifer tarandus* Distribution. *Wildlife Biology* 13:66-74.
- Weladji RB, Holand O, Almoy A. 2003. Use of climatic data to assess the effect of insect harassment on the autumn weight of reindeer (*Rangifer tarandus*) calves. *Journal of Zoology* 260:79-85.
- Whittington J, Heuer K, Hunt B, Hebblewhite M, Lukacs PM. (2015). Estimating occupancy using spatially and temporally replicated snow surveys. *Animal Conservation* 18(1):92-101.
- Wightman, C.S., and M.R. Fuller. 2005. Spacing and Physical Selection Patterns of Peregrine Falcons in Central West Greenland. *Wilson Bulletin* 117:226-236.

- WLWB (Wek'èezhìi Land and Water Board). 2015. WLWB Public Registry Online Review System. [accessed February 2016].
<http://www.mvlwb.ca/Boards/WLWB/SitePages/search.aspx?Company=Diavik+Diamond+Mines+%282012%29+Inc.&doctype=4.+Renewal+-+Extension/>.
- WLWB. 2017. WLWB Public Registry Online Review System. [accessed December 2017].
<http://www.mvlwb.ca/Boards/WLWB/SitePages/search.aspx?Company=Diavik+Diamond+Mines+%282012%29+Inc.&doctype=4.+Renewal+-+Extension/>.
- Zar JH. 1999. Biostatistical analysis. 3rd ed. . Upper Saddle River, NJ: Prentice Hall.
- Zuur AF, Leno EN, Elphick CS. 2010. A protocol for data exploration to avoid common statistical problems. *Methods in Ecology and Evolution* 1:3-14. doi: 10.1111/j.2401-210X.209.00001.x.

APPENDIX A

Responses to EMAB Comments on the 2018 Wildlife Monitoring Report

TECHNICAL MEMORANDUM**DATE** 31 October 2019**GOLDER REFERENCE No.** 19115664-1827-TM-Rev1-2000**DIAVIK WORK PLAN No.** 599 Rev.0**DIAVIK PO No.** D04331**TO** Sean Sinclair
Diavik Diamond Mines (2012) Inc.**FROM** Dan Coulton and John Virgl**EMAIL** Daniel_Coulton@golder.com;
John_Virgl@golder.com**RESPONSE TO EMAB COMMENTS ON THE 2018 WMP REPORT**

On 26 August 2019, the Environmental Monitoring Advisory Board (EMAB) issued comments on the 2018 Wildlife Monitoring Program (WMP) report to Diavik Diamond Mines (2012) Inc. (DDMI). The comments provided by EMAB included the review by Management and Solutions in Environmental Science (MSES). As per your request and in review of the comments by EMAB and MSES, Golder Associates Ltd. (Golder) has prepared the following responses for your consideration in Tables 1, 2, and 3.

The comments provided in Table 1 were enumerated in MSES (2019) and directed to EMAB. The comments provided in Table 2 included only those in which MSES indicated do not have a “satisfactory” designation. All comments with a satisfied status are assumed complete and would require no further response by DDMI. Comments provided in Table 3 are those that appeared in MSES (2019) body text in bold font. The preceding text was included to provide context of bolded text.

Table 1: Recommended Issues by MSES (2019) Directed to EMAB

2019 Comment Identifier	EMAB Recommendations/Questions in 2019	Response by DDMI
WMP-2019-1	1) Please continue to discuss how the information gained from various caribou datasets could be used in terms of mitigation and adaptive management for the Diavik Mine in particular and for other future projects in the region in general. When more information on potential mechanisms for the 14 km ZOI, for deflections around Diavik for the southern migration, or for any observed changes in caribou behaviour becomes available, we anticipate discussions regarding the implementation of new mitigation measures to manage any project-related effects.	DDMI responded about how information gained could be used to inform mitigation and adaptive management on 19 October 2016 (Golder 2016). The potential mechanisms of indirect effects (i.e., a zone of influence [ZOI]) include all sources of sensory disturbance such as anthropogenic lighting, fugitive dust, smells, noise and the presence of people. Until the individual sources of sensory disturbance can be experimentally manipulated, cause-and-effect relationships cannot be established that would make adaptive management effective at reducing a ZOI through either new mitigation or altering the intensity of existing mitigation. This would also require the ZOI to be measured with enough precision to detect a reduction. Experimental manipulation would require a significant change in how Diavik Mine currently operates. The patterns of both caribou deflections relative to predictions during the southern migration and the extent of the estimate 14 km ZOI represent cumulative changes from the Diavik and Ekati mines. While these represent statistical changes no corresponding ecological effect has been demonstrated through research although research indicates there has been no corresponding reduction in Bathurst caribou using the same southern ranges from year-to-year (Virgl et al. 2017).
WMP-2019-2	2) In the 2018 SGP Wildlife Monitoring Workshop, an approach to ZOI analysis was presented which evaluates ZOI on an annual basis using GPS collar data. We recommend that EMAB review this approach once more information is available, as it may offer new insight or opportunity into uncovering a mechanism for the ZOI, which could lead to improvement of effect mitigation (adaptive management). Given that aboveground mining in the A21 pit was planned to begin in 2018, Diavik should resume ZOI monitoring in 2019. Diavik has committed to confirm and discuss the appropriate methods of ZOI monitoring with EMAB.	To uncover a mechanism causing a ZOI will require experimental manipulation as noted in the previous response. Otherwise it can only be correlated (associated), and therefore not certain to achieve the intended result of adaptive management (i.e., mitigation effectiveness). The precision of annual ZOI estimates shown at the workshop indicate it will not be a robust approach for assessing mitigation effectiveness, which was pointed out by ENR.
WMP-2019-3	3) There is now a six-year gap in caribou behavioural data analysis (2012-2018) due to insufficient data. Ekati and Diavik are cooperating on data collection. We emphasize the importance of these data in understanding the influence of the Mine on caribou and the mechanism that lead to the avoidance of the Mine vicinity. To gain a better understanding of where sample sizes are most limiting, we ask DDMI to reconcile caribou behaviour data sample size information into a single format (it has been provided in multiple formats in the past) that can be updated annually and easily referenced for future discussions. This should include information on: i. Mine operator (Ekati vs Diavik) ii. Type of scan (focal vs group) iii. Season iv. Distance from mine v. Year	It should be noted by EMAB that Diavik has already provided a table in Appendix B of the 2018 WMP (Golder 2019) that summarized behaviour data by mine operator (Diavik versus Ekati), scan type, season, distance from mine and year. Diavik has also provided more detailed information on the frequency of distances sampled by year (Appendix A, Figure 2) in Golder (2019). This information demonstrates that very few behaviour observations have been collected at varying distances annually since the last analysis of these data and also show there are numerous gaps in the distance from mine distribution across time (Golder 2011). In their review of the 2018 WMP, MSES has provided additional information, which requests a summary by distance strata (i.e., within and beyond 15 km from mines). Summarizing by distance strata was not explicitly requested previously. The requested summary will be provided as an appendix to the 2019 WMP report.
WMP-2019-4	4) In future detailed analysis of caribou occurrence and behavioural data, we recommend DDMI provide a discussion regarding patterns in behaviour and how they do or do not change with distance to the mine (i.e., does behaviour change with distance as occurrence does?). We also recommend that the information gained from caribou analyses be used to adjust or develop mitigation measures, as necessary.	We refer to the last comprehensive analysis of occurrence and behaviour data (Golder 2011) where this type of discussion was provided. This would also be discussed should future analyses occur. Using this information to adjust mitigation would require that results demonstrate strong linkage to changes in mitigation. To date there have been no strong linkages demonstrated to variation in indices of mining activity (Golder 2011, 2014, 2017). The index of full-time-equivalents was demonstrated to be significantly associated with variation in mining activity (Golder 2017) .

Table 1: Recommended Issues by MSES (2019) Directed to EMAB

2019 Comment Identifier	EMAB Recommendations/Questions in 2019	Response by DDMI
WMP-2019-5	5) Please explore opportunities and options to mitigate dust deposition, which may be influencing caribou migration patterns according to the TK. This could include a coordination of best management practices for all mining operations in the vicinity.	Mitigation for fugitive dust deposition at Diavik includes keeping the footprint small, use of low speed limits on roads and watering of roads during summer months under dry conditions. Similar methods are used to suppress dust at Ekati mine. EK-35 dust suppressant is applied to the airport taxiway and helipad. In 2019 a second water tree was installed near A21 to decrease water truck cycle times and improve road watering effectiveness. In 2020, DDMI intends to complete a study on dust suppressants in parking lots to reduce fugitive dust production.
WMP-2019-6	6) Please provide responses to the detailed questions and comments (presented in bold font) in the body of this review report.	Responses to comments presented in bold font are provided in Table 3.
WMP-2019-7	7) Except for our recommendations listed above, we are in agreement with the recommendations listed in the 2018 WMR and do not recommend any actions additional to providing the information requested above.	No response by Diavik is required.
WMP-2019-8	8) We recommend that the Board accept the 2018 WMR with the understanding that the above listed questions and recommendations will be addressed in a timely fashion via communications and workshops by DDMI in the coming year. The responses to our questions and recommendations are necessary to maintain and improve the understanding of the effects of the Mine on wildlife. Furthermore, we understand that detailed data analyses are required, as identified in our review, and that these analyses will be conducted in the near future.	No response by Diavik is required.

Table 2: Comments with an Unspecified Status in MSES (2019)

EMAB Previous Recommendations/Questions	2019 Comment Identifier	EMAB 2019 Comment	DDMI Response
The information collected through the vegetation monitoring program is used to test and evaluate the predicted effects of the Mine. One prediction is that community level richness is predicted to decrease by 14% and species diversity and richness is predicted to decrease by 44%. Vascular plant species richness was actually 54% higher on heath tundra plots and 9% higher on shrub Mine plots. The report does not suggest any strategies that could mitigate these unanticipated effects. Please discuss if and how these potential project effects could be mitigated.	WMP-2019-9	DDMI responded that the ecological relevance of the results is uncertain, and that current mitigation appears to be effective at minimizing adverse effects to vegetation (Golder 2017b). Changes in vegetation structure may be a contributing factor to the observed caribou ZOI (14km) and there may be cumulative changes over time to vegetation structure. In lieu of additional mitigation measures during operations, the topic should be addressed in the Mine closure plan and proposed reclamation activities with particular attention focused on ensuring that forage species palatable to caribou be part of the mix of species (at a natural ratio) in the reclaimed landscape. DDMI has indicated that vegetation monitoring post-closure will include reference sites to determine whether reclaimed areas provide similar ecological function to that of similar, undisturbed areas. However, we understand that reclamation will be applied to areas within the direct disturbance footprint, rather than areas indirectly affected by mine operations. It would be interesting to see how indirectly affected caribou habitat recovers post-closure. Please clarify if reclamation activities will be restricted to the project footprint.	Reclamation activities will be completed in accordance with the Closure and Reclamation Plan for Diavik Mine. The Interim Closure and Reclamation Plan includes reclamation activities for areas directly disturbed by Mine infrastructure. After the closure phase, residual indirect effects to caribou from sensory disturbances (lights, smells, dust, noise and the presence of people) will be functionally reclaimed because sources of residual indirect effects will no longer be present. Vegetation species abundance and community richness will be the measurement indicators. Ecological function represents an inference made based on the degree of similarity of measurement indicators between reference and areas of Diavik Mine that are reclaimed.
We suggest that an analysis of the indirect (in addition to the currently presented direct) footprint effect on caribou habitat may be useful for understanding the true effects on caribou and for determining future mitigation measures.	WMP-2019-10	DDMI indicated that the ZOI analysis for caribou captures the effect of indirect habitat loss (22 February 2018 conference call). In the 2018 WMR (Appendix A, Table 4), DDMI provided additional information on changes in the area of high, moderate, low, and nil suitability caribou habitat assuming that sensory disturbance reduced habitat suitability by one level. DDMI stated that the area is of marginal quality in the absence of indirect changes and that ecological impacts are likely to be limited considering the limited amount of time caribou are present in the area. Opportunities for improvement of existing mitigation measures that alleviate noise, dust, light, sounds, smell, and human presence may arise with technological advances and should be implemented to help minimize indirect impacts on caribou habitat. DDMI also stated that vegetation monitoring post-closure will include reference sites to determine whether reclaimed areas provide similar function to similar, undisturbed areas. However, we understand that reclamation will be applied to areas within the direct disturbance footprint, rather than areas indirectly affected by mine operations. It would be interesting to see how indirectly affected caribou habitat recovers post-closure and this information may be useful for other mining operations. Please clarify if reclamation activities will be restricted to the project footprint.	Diavik Mine already uses accepted best practices as part of mitigation designs and to meet regulatory guidelines. Reclamation activities will be completed in accordance with the Closure and Reclamation Plan for Diavik Mine. The Interim Closure and Reclamation Plan includes reclamation activities for areas directly disturbed by Mine infrastructure.

Table 2: Comments with an Unspecified Status in MSES (2019)

EMAB Previous Recommendations/Questions	2019 Comment Identifier	EMAB 2019 Comment	DDMI Response
Discuss the implications of a larger than expected effect on caribou (ZOI: predicted 3-7 km; observed 14 km) for future environmental management.	WMP-2019-11	DDMI responded that there was uncertainty regarding the original prediction based on the level of knowledge available at the time (1998). DDMI indicated that the mechanism that causes the pattern is unclear because all sources of sensory disturbance operate simultaneously (noise, dust, light, sounds, etc). DDMI indicated that “A larger observed effect than predicted does not necessarily mean that mitigation for sources of sensory disturbance are not effective because there was uncertainty with the prediction.” Opportunities for improvement of existing mitigation measures that alleviate noise, dust, light, sounds, smell, and human presence may arise with technological advances and should be implemented to help minimize indirect impacts on caribou habitat. In March 2019, EMAB made the recommendation that “Diavik should include a description of its adaptive management activities and an evaluation of how well they are working as a sub-section for each program component in the 2018 WMP Report and have this as a regular section in future annual WMP Reports” (EMAB 2019a). DDMI has included an “<i>Adaptive Management and Recommendations</i>” section for each species. When more information on potential mechanisms for the 14 km ZOI becomes available, we anticipate discussions regarding the implementation of new mitigation measures to manage any project-related effects and that this information appear in these report sections in the future.	Diavik Mine already uses accepted best practices as part of mitigation designs and to meet regulatory guidelines. Adaptive management has been reported annually for the WMP since operations began.
What is the actual size of the larger caribou ZOI, 14 or 28 km?	WMP-2019-12	Boulanger et al. (2012) conclude a zone of influence of 14 km. In the 2018 SGP Wildlife Monitoring Workshop, an approach to ZOI analysis was presented which evaluates ZOI on an annual basis using GPS collar data. This approach could be used to analyze ZOI for the 2018 season for the Diavik mine. DDMI indicated that the amount of variation in the results of this approach suggests that there is a high degree of uncertainty in whether a ZOI exists, that the duration of an effect is periodic, or that caribou may become habituated to mine activity. DDMI concludes that the year-to-year variation indicates there is little value in ZOI monitoring for mitigation effectiveness. We recommend that EMAB review Boulanger’s new approach once more information is available. Boulanger’s approach may offer new insight or opportunity into uncovering a mechanism for the ZOI, which could lead to improvement of effect mitigation.	This bolded comment is directed to EMAB so no response by Diavik is required.
If ENR recommends the new GPS collar analysis approach to ZOI evaluation (as presented by Boulanger during the 2018 SGP Wildlife Monitoring Workshop), we recommend Diavik consider evaluating covariates in the analysis to reflect changing mine activity over time (i.e., does mine activity influence ZOI between years?).	WMP-2019-13	DDMI responded that temporal mine activity indices were included as covariates in 2011, 2014, and 2017 analyses with no significant relationships between mine activity and indirect effects being detected (2018 WMR, Appendix A). We recommend that EMAB review Boulanger’s new approach once more information is available.	This bolded comment is directed to EMAB so no response by Diavik is required.

Table 2: Comments with an Unspecified Status in MSES (2019)

EMAB Previous Recommendations/Questions	2019 Comment Identifier	EMAB 2019 Comment	DDMI Response
What plans does DDMI have regarding adaptive management actions relating to the caribou ZOI? ■ We recommend ENR evaluate if it is possible to coordinate mitigation measures between mines and use monitoring results from other mines to help in the prioritization of future monitoring efforts? ■ Please consider the use of Traditional Knowledge (TK) to help uncover causes for unanticipated impacts on caribou and to develop adaptive mitigation measures.	WMP-2019-14	DDMI stated that the mechanism of caribou ZOIs is unknown at this time and therefore cannot be adaptively managed. DDMI indicated that it incorporates TK into the identification of effects, monitoring, and mitigation design. A TK study noted that caribou will avoid using areas close to the mine during migration because dust on forage will alter its taste or smell (Section 2.0, 2018 WMR). This suggests that a mechanism for the caribou ZOI is dust. Are there opportunities for improvement of existing mitigation measures that alleviate dust to help minimize indirect impacts on caribou? DDMI did not comment on the potential for coordination of mitigation measures between mines to improve current effect mitigation.	Analysis of dust monitoring data completed in 2018 (Golder 2018) shows that fugitive dust deposition limit is approximately 1 km from the Diavik Mine site, which is consistent with research results completed at Ekati (Chen et al. 2017). The current estimate of a cumulative caribou ZOI is 14 km (Boulanger et al. 2012). Given a 13 km gap between the extent of dust deposition and caribou ZOI estimate, Diavik disagrees that there is strong linkage of dust as a ZOI mechanism up to 14 km. Diavik does agree with Traditional Knowledge that caribou may avoid using areas close to the mine, which is also more consistent with the spatial scale of fugitive dust deposition. Mitigation for fugitive dust deposition at Diavik includes keeping the footprint small, use of low speed limits on roads and watering of roads during summer months under dry conditions. Similar methods are used to suppress dust at Ekati mine. EK-35 dust suppressant is applied to the airport taxiway and helipad. In 2019 a second water tree was installed near A21 to decrease water truck cycle times and improve road watering effectiveness. In 2020, DDMI intends to complete a study on dust suppressants in parking lots to reduce fugitive dust production. Diavik is responsible for managing its own operations. Diavik does engage with other mines including discussions of mitigation. To Diavik’s knowledge, Diavik, Ekati and Gahcho Kué mines all use similar mitigation.
What plans does DDMI have to address the caribou movement objective while they wait for guidance from ENR? Diavik should continue to monitor and verify the accuracy of the predictions in the environmental assessment and the effectiveness of mitigation measures (Article 1, 1.1(b), Diavik Environmental Agreement (2000)).	WMP-2019-15	We expect that ENR will recommend that in 2019, formal ZOI monitoring will resume given that Diavik was planning for aboveground mining in the A21 pit in 2018 (GNWT 2017). Based on the 22 February 2018 conference call, we expect that monitoring will occur using geo-fence collar data and not aerial surveys given the small number of caribou that occur within the study area in recent years and the increasing sample size from GPS collars over time (currently 50 collars – 40 female, 10 male). DDMI committed to determine and discuss the appropriate method of ZOI monitoring when required.	DDMI intends to fulfill this commitment when required.
While waiting for the ENR to determine best approaches to ZOI monitoring, will DDMI use all available caribou collar data to re-evaluate the ZOI associated with the Diavik Mine specifically?	WMP-2019-16	During the 2018 SGP Wildlife Monitoring Workshop, an approach to ZOI analysis that evaluates ZOI on an annual basis using GPS collar data was presented. Given that aboveground mining in the A21 pit was planned to begin in 2018, we anticipate that Diavik will resume ZOI monitoring in 2019. DDMI responded that they will determine whether collar, aerial survey data or an alternative method will be used for ZOI monitoring when required. DDMI committed to discuss this with EMAB at that time.	DDMI intends to fulfill this commitment when required.

Table 2: Comments with an Unspecified Status in MSES (2019)

EMAB Previous Recommendations/Questions	2019 Comment Identifier	EMAB 2019 Comment	DDMI Response
There are a number of reasons to assume that the data used in the caribou density analysis do not meet the normality assumption of linear regression. We recommend that DDMI present information on the distribution of the data and the residuals from the model. We have concerns about the use of a simple linear regression to examine the relationship between caribou density and distance from the mine footprint. Along with the background information on the data used in the analysis, we recommend that DDMI also provide additional details on why they chose the statistical methods they did so we can better understand the reasoning and justification underlying the analysis. It is highly likely that the determinants of caribou presence/absence and abundance are much more complicated than simply the distance to the mine footprints, making the detection of a ZOI more nuanced than simply linear distance from the mine. We recommend that future analyses using caribou density also include other potential confounding factors such as habitat associations, changes in mine activity over time, and the gregarious nature of caribou. We also recommend that DDMI evaluate the potential for non-linear relationships.	WMP-2019-17	DDMI indicated that a new analysis that considers habitat and population size, among other factors, is underway and will be reported when complete (Golder 2017b). DDMI responded that linear regression is robust against the violation of the normality assumption, particularly when sample sizes are large, such as in this case (n>142,000). DDMI indicated that the new analysis that is underway assumes a negative binomial distribution and DDMI agreed and intends to include additional factors such as habitat and population size in the new analysis. We look forward to seeing the new analysis.	The results of this analysis will be included in the 2019 WMP report.
Testing the changes in caribou behaviour will be critical for the new approach to testing the effects within the ZOI that was predicted in the Environmental Effects Report (EER; 3-7 km). Please provide an analysis of the behavioural data and comment on whether or not behavioural data collected previously can be used. How can the information on behaviour be used to adapt management actions at the Mine and in the region? A detailed technical side-bar discussion may be useful for us to better understand the assumptions and expectations by DDMI. Upon our review of DDMI's Response (14 June 2018) to EMAB's Letter regarding the Establishment of Wildlife Monitoring Program Terms of Reference, we recommend that DDMI provide summaries for activities other than just feeding time, particularly activities with a high energetic cost.			
	WMP-2019-18	DDMI provided a summary of behaviour data collected in the regional study area, within and beyond 15 km and relative to Bathurst caribou data collected by other researchers (Appendix D, 2018 WMR). The data included information on feeding behaviour only. The dataset provided was a summary and we cannot know the sample size for some of the categories, such as season or by year. DDMI responded that behaviours observed other than feeding time include time spent bedded, trotting, running, walking and alert and that a summary of these behavioural types is provided in annual WMP reports and in Golder (2011). Please provide a summary of rates of each caribou behavioural activity, particularly those activities with high energetic costs, also categorizing information by year and season (similar format to the information provided in Appendix D). In the 2018 WMR (Appendix A), DDMI provided references to 4 separate locations where behavioural sample sizes are provided: Golder (2018), Table 2.6-1 (Golder 2011), Figure 2 (Golder 2019), and Figure 3 (Golder 2019). Based on the multiple sources and formats of the information, it is challenging to understand exactly what the sample sizes are for the different caribou activities, seasons, years, near and far from the mine. It would be helpful to have information on samples by season, year, and distance to evaluate this claim. An annual update to such information would provide transparency and clarity on the status of behavioural data. These information sources should be reconciled into a single file that can be updated annually and easily referenced for future discussions.	Diavik is of the view that providing sample size summaries four different ways provides transparency. Diavik does not agree that it is practical to provide all the variables requested by EMAB into a single source file. For example, EMAB has requested that Diavik provide a summary of data collected by the Ekati Mine but this is not Diavik's data to report and are already provided by Ekati as part of their annual reporting. As well, EMAB has requested distances from mine be pooled into two strata in 2019, so the distance measured for each observation would not be transparent. To present measured distances for each observation since 1998 in tabular format would exceed 700 rows, so is not practical for review. As statistical practitioners, if sample size for ZOI estimation is the key interest then histograms of distances by year provide the best detail of sample sizes available for ZOI estimation, such as was provided in Appendix A, Figure 3 (Golder 2019). This provides sample sizes across the spatial gradient and identifies at which distances data are more and less abundant. Since analysis of these data would occur on a three-year cycle, there is no need to update this graphic annually. Diavik will not report Ekati Mine data.

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EMAB Previous Recommendations/Questions	2019 Comment Identifier	EMAB 2019 Comment	DDMI Response
Given that the two mines have agreed to cooperate, please provide the current sample sizes for behavioural data, perhaps in Table format, including information on: ■ Mine operator (Ekati vs Diavik) ■ Type of scan (focal vs group) ■ Season ■ Distance from mine ■ Year	WMP-2019-19	DDMI has committed to provide the requested summary table in the next WMR report. We await the table.	It should be noted by EMAB that Diavik has already provided a table in Appendix B of the 2018 WMP (Golder 2019) that summarized sample sizes of behaviour data by mine operator (Diavik versus Ekati), scan type, season, distance from mine and year. Diavik has also provided more detailed information on the frequency (quantities) of distances sampled by year (Appendix A, Figure 3) in Golder (2019). These demonstrate that very few behaviour observations have been collected annually since the last analysis of these data and also show there are numerous gaps in the distance from mine distribution (Golder 2011). In their 2019 review of the WMP, MSES has provided additional information, which requests a summary by distance strata (i.e., within and beyond 15 km from mines). Summarizing by distance strata was not requested previously. The requested summary will be provided as an appendix to the 2019 WMP report. Diavik will provide the requested information on other running and trotting activities as an appendix in the 2019 WMP report.
We request that DDMI discuss their adaptive management process and their response action in light of this unanticipated, potential effect of the Project [regarding the southern migration – caribou deflect west instead of east of East Island].	WMP-2019-20	DDMI responded that Section 1.0 of the 2017 WMP report included a discussion of the adaptive management process, including examples. DDMI reported on monitoring components that have been suspended or removed through adaptive management and the evolution of the WMP in response to changes to objectives, study designs, and methods. DDMI indicates that EMAB (MSES) committed to recommending adaptive management strategies to mitigate caribou deflections around Lac de Gras (June 2018 meeting). Given our restricted level of involvement in the mining operation itself, we can only make general recommendations that we suggest DDMI discuss with their project engineers. We recommend that DDMI explore opportunities and options to mitigate dust deposition, which may be influencing caribou migration patterns according to TK. This could include a coordination of best management practices for all mining operations in the vicinity. We have suggested some mitigation in the past as well, such as scheduling of air traffic mitigation and blasting around periods of caribou migration. In addition, the predicted maximum dust deposition rate (125 mg/dm²/y) has been exceeded (DDMI 2018). The average deposition that occurred between 2000-2016 on near-mine sites is 470 mg/dm²/y (measured > predicted). We recommend DDMI provide a list of adaptive management measures that they have put in place to mitigate the higher than anticipated dust deposition associated the mine.	As described in Appendix D, Golder (2018), the Environmental Assessment predictions for dust were designed to maximize suspension of dust in the air because air quality was a concern at the time. Maximizing the prediction of dust suspended in air means that the prediction for deposition would be underestimated. Therefore, it should not be surprising that monitoring results may exceed deposition predictions that were underestimated by design (because the concern was ambient air quality). This does not necessarily mean that mitigation is not effective at limiting fugitive dust deposition. Mitigation for fugitive dust deposition at Diavik includes keeping the footprint small, use of low speed limits on roads and watering of roads during summer months under dry conditions. Similar methods are used to suppress dust at Ekati mine. EK-35 dust suppressant is applied to the airport taxiway and helipad. In 2019 a second water tree was installed near A21 to decrease water truck cycle times and improve road watering effectiveness. In 2020, DDMI intends to complete a study on dust suppressants in parking lots to reduce fugitive dust production.

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EMAB Previous Recommendations/Questions	2019 Comment Identifier	EMAB 2019 Comment	DDMI Response
DDMI should discuss the triggers for adaptive management (e.g., 12 out 22 years without support for a prediction, with more deviations occurring in recent years, has not triggered a response action specific to the southern migration).	WMP-2019-21	DDMI responded that there is no evidence of an ecological effect of population fragmentation due to changes in the southern migration. DDMI concludes that the prediction in the ERR was inaccurate but conservative. DDMI also suggests that <i>“caribou may be more resilient to migration movements around Lac de Gras than previously assumed. Based on the principal of adaptive management, deflection monitoring is not necessary because an adverse ecological effect is not evident”</i> (Appendix A, 2018 WMR). Considering this information, the population may remain connected, but then does this mean that the prediction and test in the WMR that is intended to evaluate the change in caribou distribution is not appropriate? If the monitoring results do not follow the prediction but one can still conclude the population is connected, then it seems that an incorrect test is being applied in the WMRs. In essence, the monitoring has confirmed that there has been a shift in the southern migration, but this shift is not necessarily linked with the Mine. There is uncertainty regarding the primary driver of the observed change in caribou migration: Is it a project effect, cumulative effect, or natural phenomenon linked with the population decline (though DDMI largely attributes it to natural range contraction (Table 3, DDMI 2018))? . We recommend that the question of the influence of mining on caribou distribution remains “on the table” through the annual collection and evaluation of GPS-collar data.	At the time of the EER, Mines were new to the NT and there was uncertainty about how caribou might respond and their resilience to potential deflections. Follow-up monitoring occurs to address uncertainties and evaluate assessment predictions. Adaptive management is used to make changes to monitoring and mitigation where warranted. This includes removal of monitoring that that is ineffective or no longer warranted. The collar data included in Virgl et al. (2017) is the same collar data reported for the Diavik Mine and includes exposure to numerous operating mines within the Bathurst annual range. Thus, the presence of multiple operating mines, many that have not been reclaimed, has not influenced the ability caribou cows reaching the same seasonal ranges from year-to-year. If the cumulative change does not result in a measurable ecological effect (i.e., population fragmentation) after 17 years, then it is inconsequential whether they follow the predicted seasonal movements around Lac de Gras for Diavik Mine. Our conclusion is that there is little value to continue evaluating this prediction when the measured change does not correspond to a measurable ecological effect. The WMP includes monitoring programs that measure caribou behaviour at two levels: distribution or occurrence and scanning observations. Changes to caribou distribution can also be measured using collared caribou data.
DDMI responded that there is no need for adaptive management because there is no permanent fragmentation effect of the Bathurst caribou herd and, based on Virgl et al. (2017), the herd demonstrates high seasonal range fidelity (Golder 2017b). Monitoring data have demonstrated that for 12 of the 22 years monitored, the prediction for the southern migration was not accurate. The Virgl et al. (2017) research does not consider the presence of the diamond mines in its analyses other than to conclude that the caribou range contraction would result in fewer encounter rates with the mine. Overall, there is uncertainty regarding the primary driver of the observed change in caribou migration – is it a project effect, cumulative effect, or natural phenomenon linked to the population decline? Regardless, uncertainty should not absolve DDMI from implementing a response action to an identified deviation from a prediction. The discussion on adaptive management is still open.			
Please consider the use of TK to help uncover causes for unanticipated changes to the caribou southern migration and to develop adaptive mitigation measures. Traditional Knowledge may also provide insight into why some caribou routes may have traveled past Lac de Gras, then turned around and traveled back to the opposite side of Lac de Gras.	WMP-2019-22	DDMI responded that TK has identified the importance of Lac de Gras narrows to caribou movements. In Section 2.0 of the 2018 WMR, DDMI reported information from a 2013 TK study in which elders noted that caribou will avoid using areas close to the mine during migration because dust on forage will alter its taste or smell. Based on the principles of adaptive management, DDMI should explore any new opportunities and options to mitigate dust deposition, which in turn may be influencing caribou migration patterns. Are there any technological advancements for dust suppression or techniques being used by other mine operations in the NT that could be implemented at the Mine site?	DDMI is not aware of any technological advancements for dust suppression or techniques being used at other mines that exceed those implemented at the Diavik site. Mitigation for fugitive dust deposition at Diavik includes keeping the footprint small, use of low speed limits on roads and watering of roads during summer months under dry conditions. Similar methods are used to suppress dust at Ekati mine. EK-35 dust suppressant is applied to the airport taxiway and helipad. In 2019 a second water tree was installed near A21 to decrease water truck cycle times and improve road watering effectiveness. In 2020, DDMI intends to complete a study on dust suppressants in parking lots to reduce fugitive dust production.
We recommend that the hair sampling program be continued, even if other mines do not commit to it.	WMP-2019-23	DDMI highlighted that the objective of the grizzly bear hair snagging program is to evaluate cumulative effects of development on grizzly bear populations, rather than a mine-specific effect. Results of the 2012, 2013, and 2017 data collection were provided in Appendix J of the 2018 WMR and the population is stable or increasing. The long-term monitoring frequency will be discussed at the next wildlife monitoring workshop. We await the outcome of this future discussion. In March 2019, EMAB made the recommendation that “GNWT-ENR should continue to provide direction on the grizzly bear and wolverine hair snagging surveys to ensure regional objectives and predictions are being tested. GNWT-ENR should confirm the schedule for future hair snagging surveys for both grizzly bear and wolverine” (EMAB 2019b).	The results indicate there are no adverse cumulative effects to regional populations despite regular interaction by a few bears with the Diavik and Ekati mine sites. The results also indicate that the monitoring has met its objective, which is to provide estimates of grizzly bear abundance and distribution in the study area over time. The continuation of hair snagging studies is not solely the decision of the Government of the Northwest Territories but is determined collaboratively by the program partners.

Table 3: Comments Provided in Bold in MSES (2019)

2019 Comment Identifier	EMAB Comment	DDMI Response																												
WMP-2019-24	DDMI presented additional information regarding indirect caribou habitat loss in the 2018 WMR (Appendix A, Table 4). Changes in the area and percent of high, moderate, low, and nil suitability caribou habitat were presented under the assumption that sensory disturbance reduced habitat suitability by one level within a 14 km zone of influence around the Diavik-Ekati mines. Low/nil suitability caribou habitat increased from 62% to 71% within the 14 km ZOI. DDMI stated that the area is of marginal quality in the absence of indirect changes and that ecological impacts are likely to be limited considering the limited amount of time caribou are present in the area and their large seasonal ranges. Opportunities for improvement of existing mitigation measures that alleviate noise, dust, light, sounds, smell, and human presence may arise with technological advances and should be implemented to help minimize indirect impacts on caribou habitat.	Diavik Mine already uses accepted best practices as part of mitigation designs and to meet regulatory guidelines.																												
WMP-2019-25	Further to this point, EMAB recommended that “GNWT-ENR should also follow through on its commitment to recommend that Diavik resume ZOI monitoring, in accordance with the ZOI Guidance Document, in 2019” (EMAB 2019b) . We also expect that monitoring will occur using geo-fence collar data and not aerial surveys given the small number of caribou that occur within the study area in recent years and the increasing sample size from GPS collars over time (currently 50 collars – 40 female, 10 male) (22 February 2018 conference call). DDMI committed to determine and discuss the appropriate methods of ZOI monitoring with EMAB, when required (2018 WMR, Appendix A) . We suggest that GPS collars may be the better option, as compared to aerial surveys, to ensure timely data collection and analysis of the caribou ZOI. An approach to ZOI analysis that evaluates ZOI on an annual basis using GPS collar data is being evaluated by Boulanger (2018 SGP Wildlife Monitoring Workshop). We recommend that EMAB review this approach once more information is available . Boulanger’s approach may offer new insight or opportunity into uncovering a mechanism for the ZOI, which could lead to improvement of effect mitigation (adaptive management).	The first bold comment is directed to ENR, so no response by DDMI is required. DDMI intends to fulfill this commitment when required. The last bold comment is directed to EMAB, so not response by DDMI is required.																												
WMP-2019-26	DDMI has committed to provide a table summarizing sample sizes of caribou behavioural data including categories for mine operator, type of scan, season, distance from mine, and year in the next WMR. Please organize the information on distance from mine into categories of less than and greater than 15km from the mine (please see the example table below of a suggested format). The purpose of the table is to understand behavioural data availability and whether there are enough data to conduct analyses by specific categories or by pooling data from different categories (e.g., season, time period, etc.). In addition, EMAB recommended that “Diavik should continue to focus on conducting far-from-mine behavioural group scans to ensure data are balanced between Ekati’s near-mine scans and far-field scans, and to be in line with the original intent of this WMP component.” (EMAB 2019a). Please explain why only 4 samples were collected far-from-mine in the 2018 season. <table><tr><th rowspan="2">Year</th><th rowspan="2">Mine Operator</th><th rowspan="2">Type of Scan</th><th rowspan="2">Season</th><th colspan="2">Distance from Diavik Mine</th><th colspan="2">Distance from Diavik-Ekati Mines</th></tr><tr><th><15km</th><th>>15km</th><th><15km</th><th>>15km</th></tr><tr><td>1998</td><td>Ekati</td><td>Focal</td><td>post-calving</td><td>number of groups</td><td>number of groups</td><td>number of groups</td><td>number of groups</td></tr><tr><td>2003</td><td>Diavik /Ekati</td><td>Group</td><td>post-calving</td><td>number of groups</td><td>number of groups</td><td>number of groups</td><td>number of groups</td></tr></table>	Year	Mine Operator	Type of Scan	Season	Distance from Diavik Mine		Distance from Diavik-Ekati Mines		<15km	>15km	<15km	>15km	1998	Ekati	Focal	post-calving	number of groups	number of groups	number of groups	number of groups	2003	Diavik /Ekati	Group	post-calving	number of groups	number of groups	number of groups	number of groups	DDMI will provide the summary as an appendix to the 2019 WMP report. DDMI will continue to collect caribou behaviour data when caribou are present in the study area and when it is safe for staff to do so. As DDMI has stated previously, caribou are now most common in the study area during winter when the ability to implement far field data collection is constrained by extreme environmental conditions.
Year	Mine Operator					Type of Scan	Season	Distance from Diavik Mine		Distance from Diavik-Ekati Mines																				
		<15km	>15km	<15km	>15km																									
1998	Ekati	Focal	post-calving	number of groups	number of groups	number of groups	number of groups																							
2003	Diavik /Ekati	Group	post-calving	number of groups	number of groups	number of groups	number of groups																							

Table 3: Comments Provided in Bold in MSES (2019)

2019 Comment Identifier	EMAB Comment	DDMI Response
WMP-2019-27	DDMI provided a summary of caribou behavioural data sample sizes inside and outside of the Diavik study area from 1998-2017 and provided information on distance to mine and percent of time feeding (Table 1, Appendix D). DDMI concluded that feeding behaviour is generally consistent across spatial and temporal strata (Percent Time Feeding ranged between 40.2-46.6), but no statistical analysis was completed. The table includes information on feeding behaviour only. We recommend that DDMI provide summaries for other activities, particularly activities with a high energetic cost. We emphasize the importance of these data in understanding the influence of the Mine on caribou and await future detailed analyses of behaviour data.	A summary of behaviour activities recorded will be included as an appendix in the 2019 WMP report.
WMP-2019-28	In previous years, we requested that DDMI discuss potential causes for this departure from predictions and whether or not any response action is warranted for this departure from predictions. DDMI responded that, based on recent research (Virgl et al. 2017), there is no evidence of an ecological effect of population fragmentation due to changes in the southern migration. DDMI concludes that the prediction in the EER was inaccurate but conservative. DDMI also suggests that “ <i>caribou may be more resilient to migration movements around Lac de Gras than previously assumed. Based on the principal of adaptive management, deflection monitoring is not necessary because an adverse ecological effect is not evident</i> ” (Appendix A, 2018 WMR). DDMI recommended that analysis of collared caribou deflections during the northern and southern migrations be discontinued. Please provide a discussion regarding the original intent behind the predictions regarding the northern and southern migrations (i.e., please clarify if the original prediction related to the connectedness of the herd, change in the movement (and thus energetics) of the herd, or any other concepts). Please explain why a deflection test was selected to test predictions regarding caribou distribution since predictions were not followed but DDMI can still conclude no effect of the Mine.	The predictions were based on a least-cost path (friction) analysis completed in the EER (Diavik 1998). The movement cost for different factors (e.g., terrain type and ruggedness, predation cover, forage availability) was based on expert opinion. Out of 10 simulated paths for baseline for fall migration, five (50%) paths moved around the eastern side of Lac de Gras, one (10%) path traversed Lac de Gras via East Island and four (40%) paths moved around the western side of Lac de Gras (Appendix A). Thus, there were generally more paths expected east of Lac de Gras than west during the fall migration, but the difference is small. The path associated with East Island was predicted to be lost due to the development of Diavik Mine, which monitoring has verified (collared caribou have not used this path since construction but have apparently moved across Lac de Gras). Baseline studies from 1995 and 1996 also mapped caribou movements for fall around Lac de Gras (Appendix A). The results from collared caribou do not show a strong overall departure from the patterns predicted for baseline. More importantly, they do not support that deviation from EER predictions leads to population-level consequences such as fragmentation of the herd.
WMP-2019-29	Considering this information, the population may remain connected, but then does this mean that the prediction and test in the WMR that is intended to evaluate the change in caribou distribution is not appropriate? If the monitoring results do not follow the prediction but one can still conclude the population is connected, then it seems that an incorrect test is being applied in the WMRs. In essence, the monitoring has confirmed that there has been a shift in the southern migration, but this shift is not necessarily linked with the Mine. There is uncertainty regarding the primary driver of the observed change in caribou migration: Is it a project effect, cumulative effect, or natural phenomenon linked with the population decline (though DDMI largely attributes it to natural range contraction (Table 3, DDMI 2018))? We recommend that the question of the influence of mining on caribou distribution remains “on the table” through the annual collection and evaluation of GPS-collar data. Please provide ideas on how DDMI can continue to monitor changes in herd distribution specifically in relation to the Diavik mine using collar data, if DDMI is proposing to remove the deflection test.	Environmental assessment is focussed on whether effects have ecological significance, which may not always be easily measurable (like energy expenditure of free-ranging caribou). East-west movements by collared caribou were used as a measurement indicator for EER predictions from a least-cost path analysis that was based on expert opinion. The availability of collared caribou allow for examination of whether the pattern of change in movements results in a ecological effect, such as population fragmentation (which it does not). The EER predictions indicated 60% (6 of 10 paths) of caribou post-development would move east around Lac de Gras and monitoring results indicate overall 43% do. DDMI believes there is little value in continuing this monitoring if the long-term results do not indicate a strong departure from predictions and or an ecological consequence. As well in this case, the monitoring does not directly inform on Mine operation. Instead of continuing to measure collared caribou deflections, DDMI will report seasonal spring and autumn range attributes (area, centroid and fidelity) for the Bathurst caribou herd based on collar data. It is important to note that due to the proximity of the Ekati Mine (e.g., Misery pit and haul road and Jay haul road, Diavik Mine is on East Island), it is problematic to separate the incremental changes in caribou distribution for the two mines.

Table 3: Comments Provided in Bold in MSES (2019)

2019 Comment Identifier	EMAB Comment	DDMI Response
WMP-2019-30	DDMI indicated that Section 1.0 of the 2017 WMR report included a discussion of their adaptive management process, including examples. DDMI reported on monitoring components that have been suspended or removed through adaptive management and the evolution of the WMP in response to changes to objectives, study designs, and methods. DDMI indicates that EMAB (MSES) committed to recommending adaptive management strategies to mitigate caribou deflections around Lac De Gras (June 2018 meeting). Given our restricted level of involvement in the mining operation itself, we can only make general recommendations that we suggest DDMI discuss with their project engineers. We recommend that DDMI explore opportunities and options to mitigate dust deposition, which may be influencing caribou migration patterns according to TK. This could include a coordination of best management practices for all mining operations in the vicinity. Are there any technological advancements for dust suppression or techniques being used by other mine operations in the NT that could be implemented at the Mine site? We have suggested some other mitigation options in the past as well, such as scheduling of air traffic and blasting around periods of caribou migration.	DDMI is not aware of any technological advancements for dust suppression or techniques being used at other mines that exceed those implemented at the Diavik site. Mitigation for fugitive dust deposition at Diavik includes keeping the footprint small, use of low speed limits on roads and watering of roads during summer months under dry conditions. Similar methods are used to suppress dust at Ekati mine. EK-35 dust suppressant is applied to the airport taxiway and helipad. In 2019 a second water tree was installed near A21 to decrease water truck cycle times and improve road watering effectiveness. In 2020, DDMI intends to complete a study on dust suppressants in parking lots to reduce fugitive dust production.
WMP-2019-31	Essentially, the hair snagging program is intended to provide a baseline to support the management of grizzly bears in the NT. The 2012, 2013, and 2017 data analysis indicated a stable or increasing abundance of grizzly bears around the Ekati and Diavik mines, as compared to monitoring information from the late 1990s2. We support DDMI's involvement in the grizzly bear hair-snagging program which is designed to address the new, regional scale question about the bear population and distribution. In March 2019, EMAB made the recommendation that "GNWT-ENR should continue to provide direction on the grizzly bear and wolverine hair snagging surveys to ensure regional objectives and predictions are being tested. GNWT-ENR should confirm the schedule for future hair snagging surveys for both grizzly bear and wolverine" (EMAB 2019b). We await the outcome of future discussions regarding long-term grizzly bear monitoring frequency.	Neither the grizzly bear or the wolverine hair snagging monitoring indicates there are adverse cumulative effects to regional populations despite regular interaction by a few bears and wolverines with the Diavik and Ekati mine sites. The results also indicate that the monitoring has met its objective, which is to provide estimates of grizzly bear and wolverine abundance and distribution in the study areas over time. The continuation of hair snagging studies is not solely the decision of the Government of the Northwest Territories but is determined collaboratively by the program partners.
WMP-2019-32	An analysis of data from 2004 – 2015 from the wolverine DNA hair snagging program (mark-recapture sampling) was completed in 2018 (Efford and Boulanger 2018). The previous analysis was completed in 2014. The long-term frequency of this program has not been determined. Decisions regarding program frequency are anticipated to be determined collaboratively once a data summary analysis report from ENR is complete and reviewed. In March 2019, EMAB made the recommendation that "GNWT-ENR should continue to provide direction on the grizzly bear and wolverine hair snagging surveys to ensure regional objectives and predictions are being tested. GNWT-ENR should confirm the schedule for future hair snagging surveys for both grizzly bear and wolverine" (EMAB 2019b).	The continuation of hair snagging studies is not solely the decision of the Government of the Northwest Territories but is determined collaboratively by the program partners.

CLOSURE

We trust the above meets your present requirements. If you have any questions or requirements, please contact the undersigned.

Golder Associates Ltd.

ORIGINAL SIGNED

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DWC/JAV/cmm/et

ORIGINAL SIGNED

John Virgl
Principal, Senior Ecologist

Attachment 1: Pages 1007 to 1009 from the Diavik 1998 Environmental Impact Statement

[https://golderassociates.sharepoint.com/sites/102648/06-deliverables/issued/1827-tm-rev1-2000-response to 2018 wmp report emab comments/19115664-1827-tm-rev1-2000-response_to_emab_comments_on_2018_wmp_report_31oct_19.docx](https://golderassociates.sharepoint.com/sites/102648/06-deliverables/issued/1827-tm-rev1-2000-response%20to%2018%20wmp%20report%20emab%20comments/19115664-1827-tm-rev1-2000-response_to_emab_comments_on_2018_wmp_report_31oct_19.docx)

REFERENCES

- Boulanger J, Poole KG, Gunn A, Wierzchowski J. 2012. Estimating the Zone of Influence of Industrial Developments on Wildlife: A Migratory Caribou *Rangifer tarandus groenlandicus* and Diamond Mine Case Study. *Wildlife Biology*. 18:164-179.
- Chen W, Leblanc SG, White HP, Prevost C, Rock C., Sharam G, O'Keefe H, Corey L, Croft B, Gunn A, van der Wielen S, Football A, Tracz B, Pellissey, S and Boulanger J. Does Dust from Arctic Mines Affect Caribou Forage. *Journal of Environmental Protection* 8:258-276.
- Diavik (Diavik Diamond Mines (2012) Inc.). 1998. Environmental Effects Report, Wildlife. Yellowknife, NWT.
- Golder (Golder Associates Ltd.). 2011. Analysis of Environmental Effects from the Diavik Diamond Mine on Wildlife in the Lac de Gras Region. Prepared for Diavik Diamond Mines (2012) Inc. by Golder Associates Ltd., Yellowknife, NWT, Canada.
- Golder. 2014. Analysis of Environmental Effects from the Diavik Diamond Mine on Wildlife in the Lac de Gras Region. Prepared for Diavik Diamond Mines (2012) Inc. by Golder Associates Ltd., Yellowknife, NWT.
- Golder. 2016. Responses to EMAB's 2015 WMP Report Comments. Prepared for Diavik Diamond Mines (2012) Inc., by Golder Associates Ltd., Yellowknife, NWT.
- Golder. 2017. Analysis of Environmental Effects from the Diavik Diamond Mine on Wildlife in the Lac de Gras Region. Prepared for Diavik Diamond Mines (2012) Inc. by Golder Associates Ltd., Yellowknife, NWT.
- Golder. 2018. Analyses requested by EMAB, 22 February 2018. Prepared for Diavik Diamond Mines (2012) Inc. by Golder Associates Ltd., Yellowknife, NWT.
- Golder. 2019. Diavik Diamond Mines (2012) Inc. 2018 Wildlife Monitoring Report. Prepared for Diavik Diamond Mines (2012) Inc. by Golder Associates Ltd., Yellowknife, NWT.
- MSES (Management and Solutions in Environmental Science). 2019. A Review of the 2018 Diavik Diamond Mine Wildlife Monitoring Report. Prepared for the Environmental Monitoring and Advisory Board by Management and Solutions in Environmental Science, Calgary, AB.
- Virgl JA., Rettie WJ, Coulton DW. 2017. Spatial and Temporal Changes in Seasonal Range Attributes in a Declining Barren-ground Caribou Herd. *Rangifer Report* 37:31-46.

ATTACHMENT 1

Pages 1007 to 1009 from the Diavik
1998 Environmental Impact Statement

Effects Classification	Level III Regional Level I Beyond-regional	Level I Regional

¹Refers to duration of effects at the specified magnitude.

Likelihood of injury and mortality	Mortality at Baseline There were no reported incidents of injury or death of caribou related to development activities in the Regional Study Area under baseline conditions in 1996. Hunting was conducted based from outfitter's camps on MacKay Lake, Courageous Lake and Desteffany Lake, accounting for approximately 170 caribou annually. In addition, some resident N.W.T. hunters hunt caribou in the area independently of outfitters, killing <200 caribou in and near the Regional Study Area annually (Axys and UMA 1998).
Selection of baseline route, and changes in cost of movement relative to predevelopment conditions	Energetics at Baseline Three of five similar paths of least resistance routed through the east island were randomly chosen to assess changes in the cost-of-movement index related to development. The path calculated under baseline conditions, diverted around all development areas, passing around the east end of Las de Gras through the Lac du Sauvage water crossing area (Figure 6.3.3-5). Hence, the incremental cost relative to predevelopment conditions was similar for each path and scenario, ranging from 5.2 to 5.4% (Table 6.3.3-3).

Figure 6.3.3-1 Computer simulation of paths of least resistance for caribou migrating through the Regional Study Area during fall migration under no development conditions

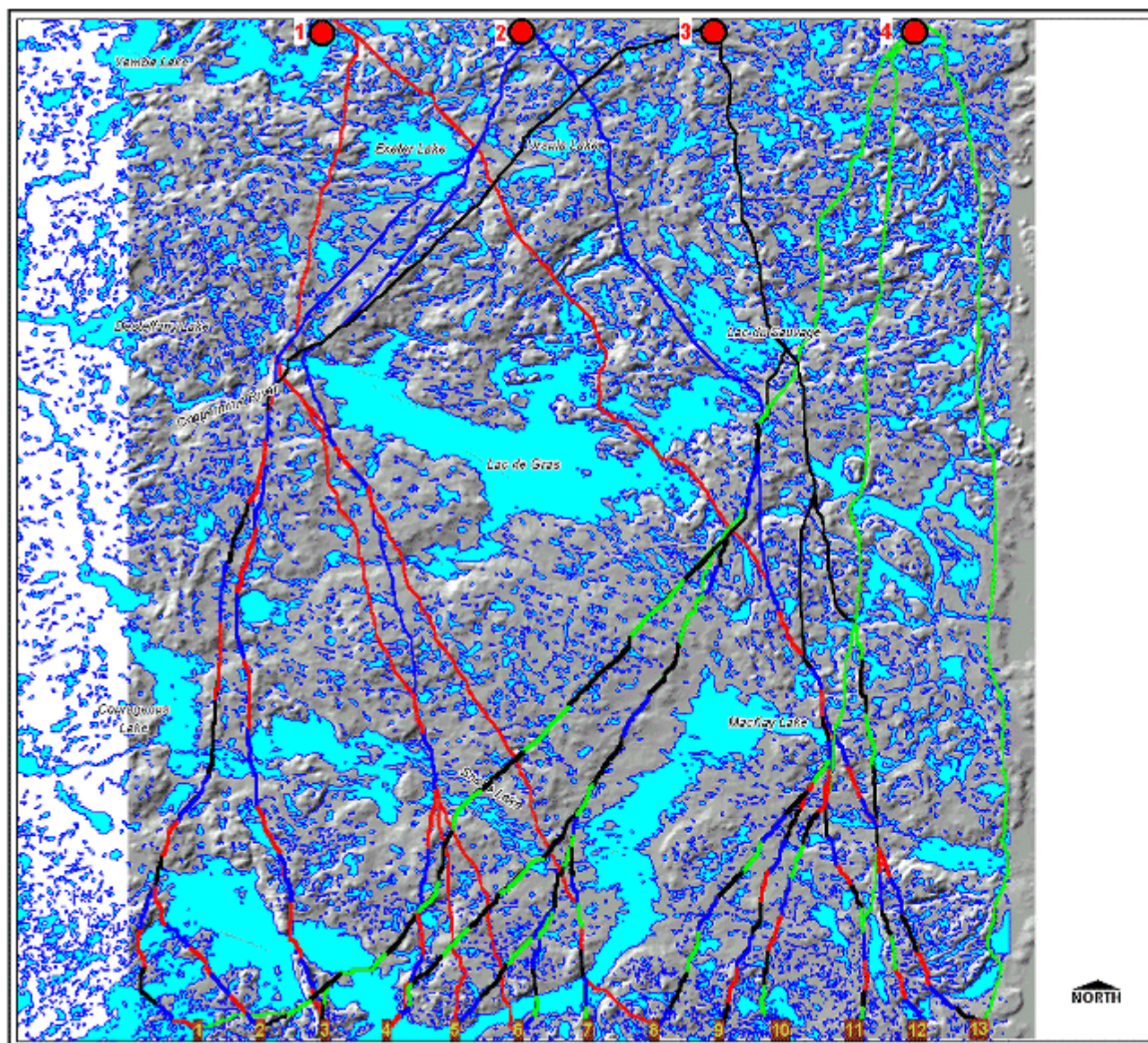


Figure 6.3.3-2 Fall movement patterns of caribou observed during baseline studies in the Regional Study Area in 1995 and 1996

APPENDIX B

**Caribou Observation Summary
(1998 – 2019)**

Table 1: Caribou Behaviour Group Scan Data Collected by the Diavik and Ekati Mines, 1998 to 2019

Year	Mine	Season	Distance from Diavik Mine		Distance from Ekati Mine	
			≤ 15 km	> 15 km	≤ 15 km	> 15 km
1998	Ekati	Post-calving / winter	-	-	150	18
1999	Ekati	Post-calving	-	-	74	16
2000	-	-	-	-	-	-
2001	Ekati	Post-calving / winter	-	-	93	4
2002	Ekati	Post-calving / winter	-	-	120	7
2003	Diavik / Ekati	Post-calving / Winter	1	4	21	1
2004	Diavik / Ekati	Post-calving / Winter	2	-	26	11
2005	Diavik / Ekati	post-calving / Winter	1	3	44	5
2006	Diavik / Ekati	Winter	1	-	2	-
2007	Diavik / Ekati	Winter	1	-	1	-
2008	Diavik / Ekati	Post-calving	-	1	-	-
2009	Diavik / Ekati	Post-calving / winter	19	30	28	15

Table 1: Caribou Behaviour Group Scan Data Collected by the Diavik and Ekati Mines, 1998 to 2019

Year	Mine	Season	Distance from Diavik Mine		Distance from Ekati Mine	
			≤ 15 km	> 15 km	≤ 15 km	> 15 km
2010	Diavik / Ekati	Post-calving / winter	26	17	28	4
2011	Ekati	-	-	-	-	-
2012	Diavik / Ekati	Post-calving	22	19	11	34
2013	Diavik / Ekati	Post-calving	1	-	-	89
2014	Diavik / Ekati	Post-calving	1	-	-	8
2015	Diavik	Post-calving	-	-	-	38
2016	Diavik	Post-calving	-	-	2	-
2017	Diavik	Winter	32	-	-	-
2018	Diavik	Winter	55	5	-	-
2019 ¹	Diavik	Winter	33	3	-	-

¹ A total of 13 groups observed over 1 km from mine infrastructure were incidentally surveyed in 2019. Incidental observations are not considered in data analysis.

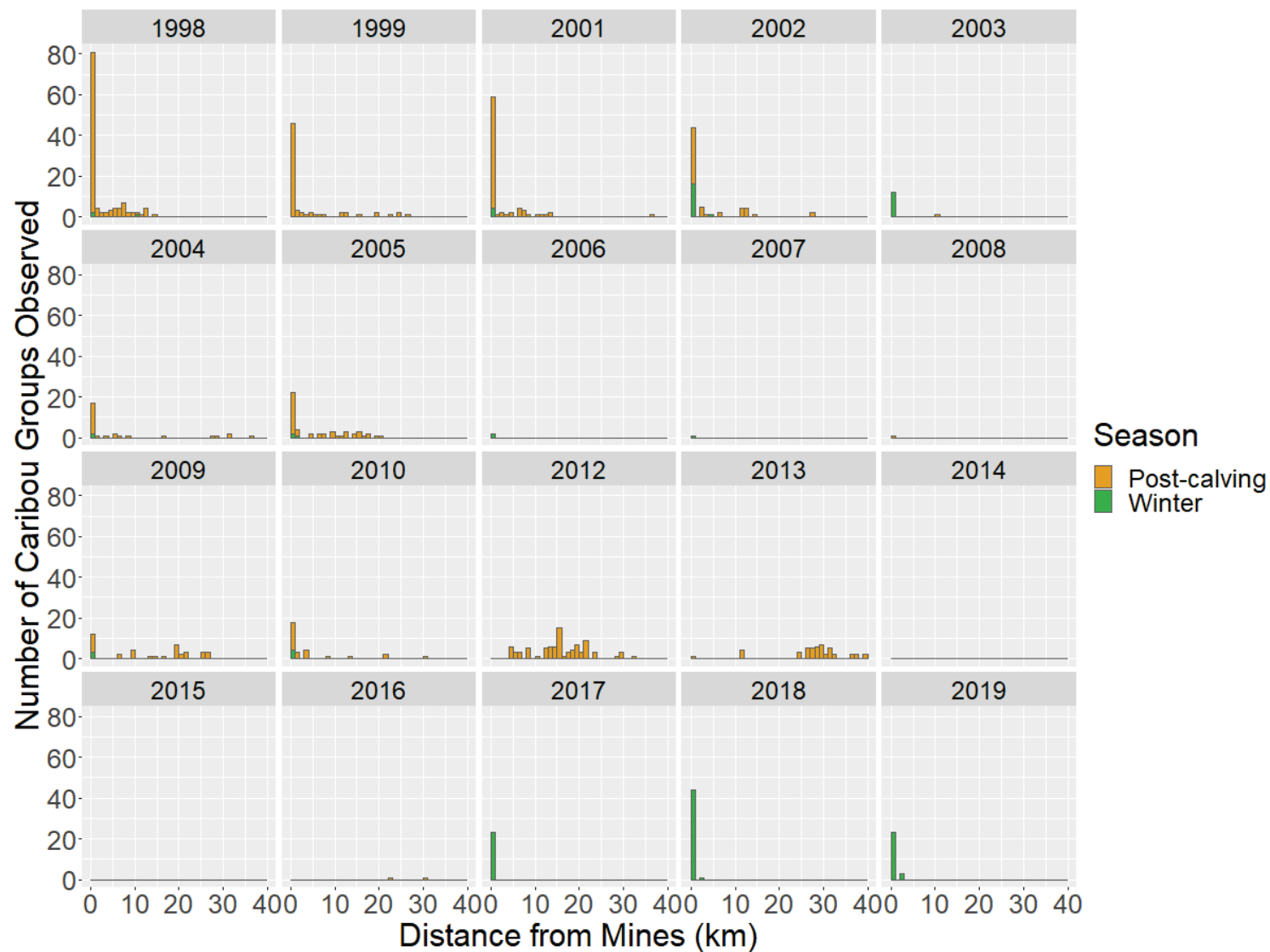


Figure 1: Distances Sampled of Caribou Behaviour Group Scans Collected by the Diavik and Ekati Mines, 1998-2019

APPENDIX C

**Caribou Range Attributes
(1996 – 2019)**

Table 1: Annual Bathurst Female Caribou Spring Range Attributes

Year	Range Area (km ²)	Range Overlap with Previous Year (km ²)	Year-to-Year Range Fidelity (%)	Spring Range Distance to Treeline (km)
1996	62,469.6	n/a	n/a	153.7
1997	85,693.1	53,961.7	57.3	97.1
1998	87,572.9	33,395.4	23.9	229.7
1999	120,886.4	40,218.1	23.9	59.9
2000	202,670.5	99,610.8	44.5	151.9
2001	213,686.1	110,680.5	36.2	40.4
2002	106,699.1	62,321.7	24.1	106.1
2003	101,926.2	63,828.2	44.1	61.9
2004	82,330.1	65,870.1	55.6	69.1
2005	241,267.9	78,831.6	32.2	4.7
2006	131,041.2	72,026.4	24.0	119.9
2007	109,885.4	38,771.4	19.2	31.6
2008	213,693.2	103,325.1	46.9	45.8
2009	133,566.3	117,112.2	50.9	12.6
2010	147,237.0	81,190.0	40.7	94.6
2011	78,018.9	60,603.8	36.8	39.7
2012	113,120.7	56,333.5	41.8	71.7
2013	127,746.0	95,194.5	65.3	45.9
2014	82,046.2	76,809.6	57.8	97.5
2015	68,051.5	65,158.9	76.7	119.6
2016	78,207.2	58,856.2	67.3	100.3
2017	136,603.8	62,472.0	41.0	140.4
2018	93,557.0	73,477.7	46.9	259.9
2019	108,561.8	75,053.6	59.1	179.9

Table 2: Annual Collared Bathurst Female Caribou Autumn Range Attributes

Year	Range Area (km ²)	Range Overlap with Previous Year (km ²)	Year-to-Year Range Fidelity (%)	Autumn Range Distance to Treeline (km)
1996	84,951.8	n/a	n/a	56.0
1997	132,045.0	57,271.4	35.9	0.2
1998	106,273.1	54,334.2	29.5	91.5
1999	229,726.5	98,307.2	41.4	51.2
2000	106,555.5	96,412.6	40.2	76.6
2001	104,977.3	76,961.1	57.2	85.4
2002	97,560.2	61,621.6	43.7	11.0
2003	73,181.9	35,417.0	26.2	76.9
2004	73,428.8	39,223.6	36.5	1.8
2005	81,995.6	39,734.0	34.3	83.7
2006	57,203.5	37,699.1	37.1	100.2
2007	124,654.2	36,416.4	25.0	16.4
2008	97,918.4	54,379.5	32.3	121.7
2009	78,585.7	63,933.5	56.8	92.8
2010	43,638.5	34,090.4	38.7	147.0
2011	53,328.5	17,291.6	21.7	72.5
2012	56,830.5	34,251.6	45.1	123.3
2013	36,124.5	18,826.3	25.4	182.2
2014	56,670.2	30,176.0	48.2	145.6
2015	40,059.2	29,574.9	44.0	132.6
2016	27,760.8	27,696.7	69.0	136.8
2017	25,210.0	18,040.7	51.6	156.6
2018	52,191.4	10,478.1	15.7	49.7
2019	27,560.1	17,926.0	29.0	159.3

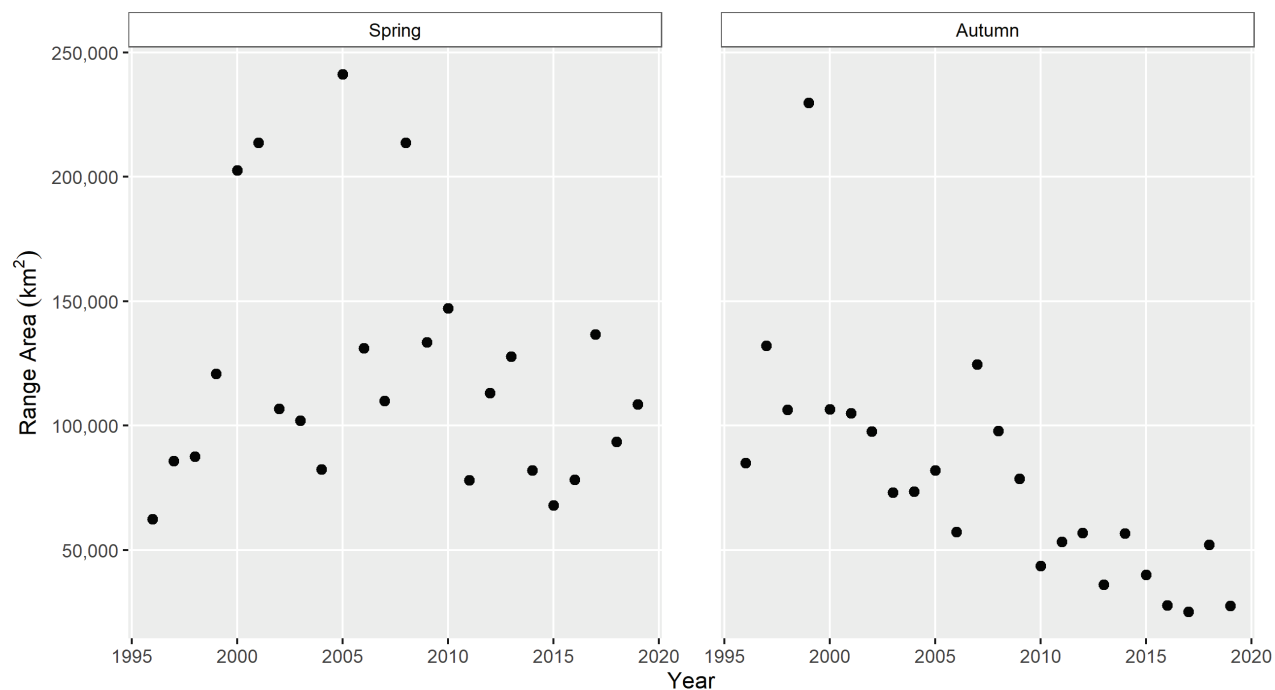


Figure 1: Trends in Seasonal Range Area (km²)

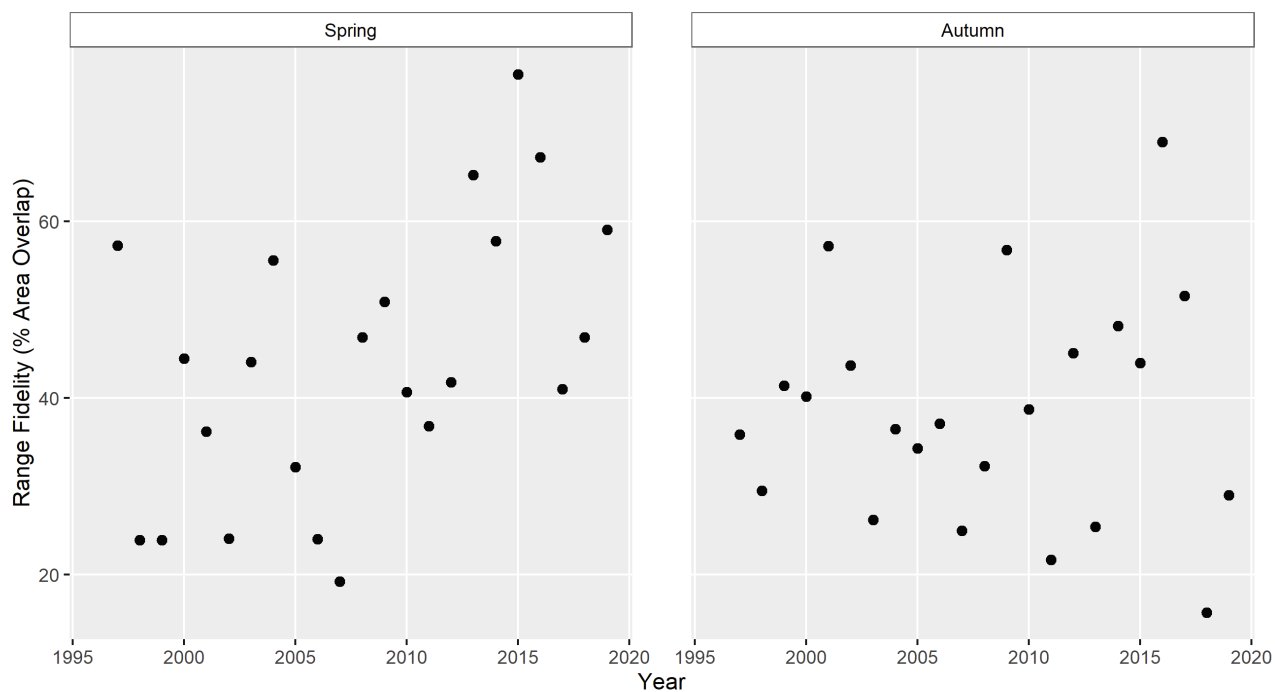


Figure 2: Trends in Range Fidelity (% Range Area Overlap)

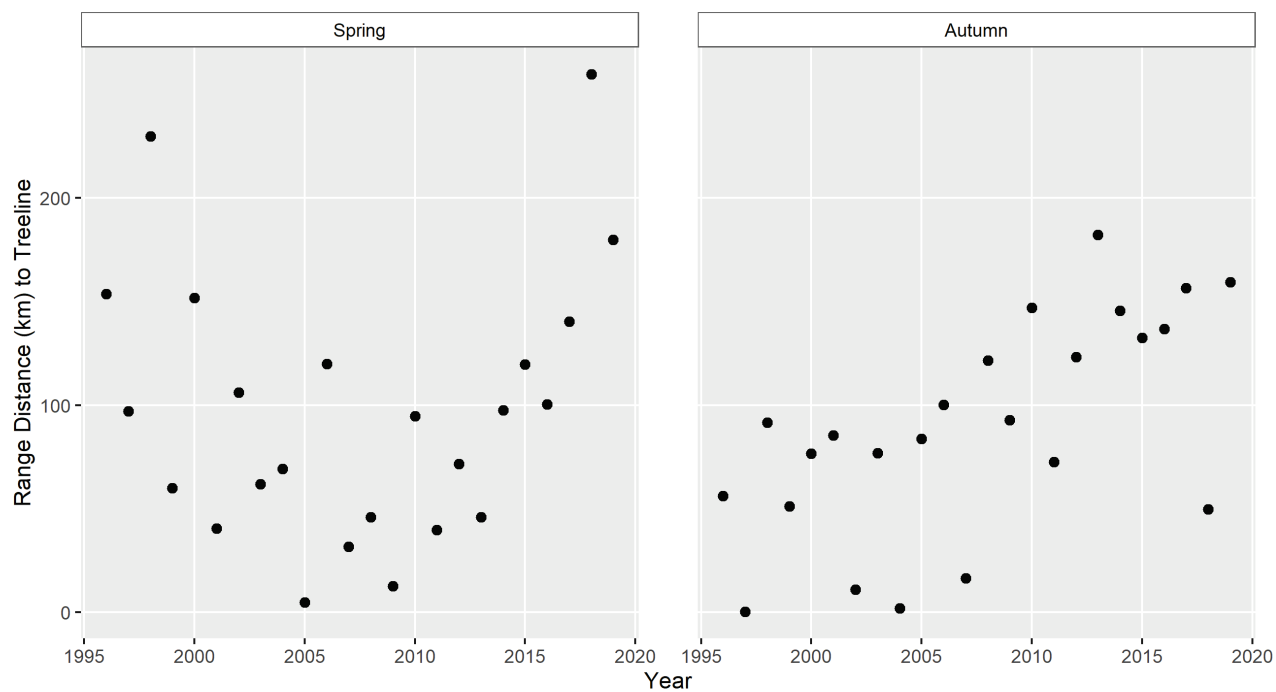


Figure 3: Trends in Range Distance (km) to Treeline

APPENDIX D

**Year-to-Year Caribou Behavioural
Summary (1998-2019)**

Table 1: Annual Caribou Behaviour Activities by Distance Strata

		Behaviour	Bedded Average (SE)		Feeding Average (SE)		Standing Average (SE)		Alert Average (SE)		Walking Average (SE)		Trotting Average (SE)		Running Average (SE)	
Year	Mine	Number of Groups Scanned ¹	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km
1998	Ekati	168	19.9% (3.1%)	16.5% (2.9%)	42.0% (3.8%)	49.1% (3.9%)	13.7% (2.7%)	10.0% (2.3%)	1.6% (1.0%)	-	19.4% (3.1%)	21.6% (3.2%)	2.1% (1.1%)	2.3% (1.2%)	1.3% (0.9%)	0.5% (0.5%)
1999		90	8.5% (2.9%)	8.6% (3.0%)	35.9% (5.1%)	41.1% (5.2%)	17.0% (4.0%)	11.6% (3.4%)	1.8% (1.4%)	0.3% (0.6%)	34.1% (5.0%)	32.6% (4.9%)	1.9% (1.4%)	5.2% (2.3%)	0.8% (1.0%)	0.6% (0.8%)
2001		97	16.0% (3.7%)	2.7% (1.6%)	57.2% (5.0%)	61.4% (4.9%)	8.1% (2.8%)	3.4% (1.9%)	0.2% (0.4%)	-	14.9% (3.6%)	29.8% (4.6%)	3.2% (1.8%)	2.7% (1.6%)	0.4% (0.6%)	-
2002		127	19.0% (3.5%)	27.8% (4.0%)	55.2% (4.4%)	54.7% (4.4%)	4.3% (1.8%)	0.7% (0.7%)	1.0% (0.9%)	-	18.7% (3.5%)	16.6% (3.3%)	0.6% (0.7%)	0.2% (0.4%)	1.2% (1.0%)	-
2003	Diavik	5	-	-	60.0% (21.9%)	43.6% (22.2%)	-	-	-	-	40.0% (21.9%)	49.8% (22.4%)	-	6.6% (11.1%)	-	-
	Ekati	22	22.9% (9.0%)	-	48.1% (10.7%)	37.3% (10.3%)	7.2% (5.5%)	-	-	-	20.4% (8.6%)	62.7% (10.3%)	1.2% (2.3%)	-	0.2% (1.0%)	-
2004	Diavik	2	3.7% (13.4%)	-	-	-	-	-	7.4% (18.5%)	-	46.1% (35.2%)	-	5.0% (15.4%)	-	-	-
	Ekati	37	19.8% (6.6%)	21.3% (6.7%)	41.5% (8.1%)	48.1% (8.2%)	3.1% (2.9%)	2.6% (2.6%)	2.1% (2.3%)	0.5% (1.2%)	29.6% (7.5%)	26.3% (7.2%)	3.8% (3.2%)	1.2% (1.8%)	-	-
2005	Diavik	4	-	7.4% (13.1%)	10.0% (15.0%)	50.9% (25.0%)	65.7% (23.7%)	9.1% (14.4%)	4.3% (10.1%)	3.0% (8.5%)	18.6% (19.4%)	29.6% (22.8%)	1.4% (5.9%)	-	-	-
	Ekati	49	17.0% (5.4%)	6.9% (3.6%)	54.7% (7.1%)	55.1% (7.1%)	9.3% (4.2%)	11.0% (4.5%)	2.5% (2.2%)	2.8% (2.4%)	13.9% (4.9%)	23.2% (6.0%)	1.4% (1.7%)	1.0% (1.4%)	1.3% (1.6%)	-
2006	Diavik	1	1.1% (10.6%)	-	55.1% (49.7%)	-	6.0% (23.7%)	-	-	-	37.8% (48.5%)	-	-	-	-	-
	Ekati	2	-	-	51.4% (35.3%)	-	17.5% (26.9%)	-	-	-	31.1% (32.7%)	-	-	-	-	-

¹ Group scans in 2017-2019 were completed in winter.

Table 1: Annual Caribou Behaviour Activities by Distance Strata

Year	Mine	Behaviour	Bedded Average (SE)		Feeding Average (SE)		Standing Average (SE)		Alert Average (SE)		Walking Average (SE)		Trotting Average (SE)		Running Average (SE)	
		Number of Groups Scanned ¹	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km
2007	Diavik	1	-	-	32.8% (46.9%)	-	30.3% (45.9%)	-	-	-	35.3% (47.8%)	-	1.7% (12.9%)	-	-	-
	Ekati	1	50.6% (50.0%)	-	38.9% (48.7%)	-	3.9% (19.3%)	-	-	-	6.7% (24.9%)	-	-	-	-	-
2008	Diavik	1	-	-	-	53.6% (49.9%)	-	-	-	10.4% (30.5%)	-	11.1% (31.4%)	-	25.0% (43.3%)	-	-
2009	Diavik	49	48.9% (7.1%)	37.1% (6.9%)	34.3% (6.8%)	41.8% (7.0%)	2.9% (2.4%)	7.9% (3.8%)	1.7% (1.9%)	2.7% (2.3%)	12.0% (4.6%)	9.5% (4.2%)	-	0.5% (1.0%)	0.2% (0.6%)	0.6% (1.1%)
	Ekati	43	17.8% (5.8%)	28.8% (6.9%)	46.8% (7.6%)	43.9% (7.6%)	7.9% (4.1%)	3.1% (2.7%)	4.1% (3.0%)	2.7% (2.5%)	21.4% (6.3%)	20.9% (6.2%)	2.0% (2.1%)	0.2% (0.7%)	0.1% (0.4%)	0.3% (0.8%)
2010	Diavik	43	28.4% (6.9%)	26.0% (6.7%)	40.5% (7.5%)	45.9% (7.6%)	5.1% (3.4%)	4.0% (3.0%)	2.4% (2.3%)	1.2% (1.7%)	21.9% (6.3%)	20.6% (6.2%)	0.9% (1.4%)	0.8% (1.4%)	0.7% (1.3%)	1.4% (1.8%)
	Ekati	32	21.4% (7.2%)	53.6% (8.8%)	32.8% (8.3%)	29.4% (8.1%)	6.3% (4.3%)	0.9% (1.6%)	2.3% (2.7%)	1.2% (1.9%)	34.6% (8.4%)	14.9% (6.3%)	2.5% (2.8%)	-	0.1% (0.5%)	-
2012	Diavik	41	9.8% (4.6%)	27.2% (7.0%)	58.0% (7.7%)	46.4% (7.8%)	8.5% (4.3%)	5.7% (3.6%)	2.0% (2.2%)	0.1% (0.4%)	20.6% (6.3%)	20.4% (6.3%)	-	0.3% (0.9%)	1.1% (1.7%)	-
	Ekati	45	8.3% (4.1%)	40.6% (7.3%)	56.2% (7.4%)	41.8% (7.4%)	4.3% (3.0%)	3.9% (2.9%)	2.1% (2.1%)	0.1% (0.5%)	29.1% (6.8%)	13.0% (5.0%)	-	0.5% (1.1%)	0.0% (0.0%)	-
2013	Diavik	1	19.4% (39.5%)	-	64.5% (47.8%)	-	12.9% (33.5%)	-	-	-	3.2% (17.7%)	-	-	-	-	-
	Ekati	89	-	14.4% (3.7%)	-	49.1% (5.3%)	-	4.7% (2.2%)	-	1.0% (1.1%)	-	29.3% (4.8%)	-	0.9% (1.0%)	-	0.2% (0.4%)
2014	Diavik	1	-	-	87.5% (33.1%)	-	12.5% (33.1%)	-	-	-	-	-	-	-	-	-
	Ekati	8	-	26.9% (15.7%)	-	33.4% (16.7%)	-	3.4% (6.4%)	-	0.4% (2.2%)	-	35.9% (17.0%)	-	-	-	-
2015		38	-	29.2% (7.4%)	-	47.3% (8.1%)	-	9.5% (4.8%)	-	0.8% (1.5%)	-	12.5% (5.4%)	-	0.0% (0.3%)	-	0.5% (1.2%)
2016		2	42.6% (35.0%)	-	51.4% (35.3%)	-	6.0% (16.7%)	-	-	-	-	-	-	-	-	-

Table 1: Annual Caribou Behaviour Activities by Distance Strata

		Behaviour	Bedded Average (SE)		Feeding Average (SE)		Standing Average (SE)		Alert Average (SE)		Walking Average (SE)		Trotting Average (SE)		Running Average (SE)	
Year	Mine	Number of Groups Scanned ¹	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km	≤15 km	>15km
2017	Diavik	32	30.4% (8.1%)	-	47.4% (8.8%)	-	3.2% (3.1%)	-	2.2% (2.6%)	-	16.2% (6.5%)	-	0.1% (0.7%)	-	0.5% (1.2%)	-
2018		60	28.4% (5.8%)	6.9% (3.3%)	51.8% (6.5%)	45.4% (6.4%)	2.7% (2.1%)	6.6% (3.2%)	3.1% (2.2%)	-	10.9% (4.0%)	38.5% (6.3%)	2.7% (2.1%)	2.5% (2.0%)	0.5% (0.9%)	-
2019		36	23.2% (7.0%)	9.1% (4.8%)	40.4% (8.2%)	37.3% (8.1%)	7.8% (4.5%)	9.8% (5.0%)	1.8% (2.2%)	11.2% (5.3%)	23.1% (7.0%)	32.5% (7.8%)	2.8% (2.7%)	-	0.9% (1.6%)	-

APPENDIX E

Wildlife Mortality Incident Reports 2019

Caribou - 2019-04-11 - A21 Ramp

Wildlife Report - 2019 Conducted on 11th Apr, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2019-04-11 - A21 Ramp
Document No.
WildlifeReport000293

Completed On

📅 11th Apr, 2019

Wildlife Report

Type of Wildlife Report	General sighting / Other
Report Type	Mortality

Wildlife Mortality

Enter Initial Time of Report 📅 11th Apr, 2019 ⌚ 11:30 PM MDT
Department/Individual Who Reported Mortality: Clayton - Pit Ops

Environment On Scene

Environment at Call-out Location 📅 11th Apr, 2019 ⌚ 11:52 PM MDT	
Location A21 Ramp	
Animal Type	Caribou
Description of Animal/Scene 1 caribou with hind quarter eaten. No Haul traffic in the area since 2019-04-09 due to stand down. Wolf and caribou tracks seen coming down the N side of the ramp. Spoke with witness (Martin) who said wolf took caribou down on the ramp and the wolf watched it until the caribou stopped moving. When environment arrived there was no sign of the wolf but there was a red fox scavenging. Carcass was taken to tundra on south side of AN road just past the magazine storage turnoff.	

Photo of Scene

Photos



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7

Estimated Time of Death

Hours

Environment Off Scene

End of Environment Call-out

📅 12th Apr, 2019 ⌚ 12:57 AM MDT

Final Location of Carcass

Tundra off South side of AN road

Closure & Sign-off

Wildlife Report Complete

On

Signature

A handwritten signature in black ink that reads "Shelby Skinner". The signature is written in a cursive, flowing style.

Shelby Skinner

12th Apr, 2019 12:58 AM MDT

Photos

7 Photos



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7

Dead Hare 2019-04-29 N Haul Road near backfill

Wildlife Report - 2019 Conducted on 29th Apr, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Dead Hare 2019-04-29 N Haul Road near backfill
Document No.
WildlifeReport000294

Completed On

📅 29th Apr, 2019

Audit

100.00%

Wildlife Report

Type of Wildlife Report	General sighting / Other
Report Type	Mortality

Wildlife Mortality

Enter Initial Time of Report 📅 29th Apr, 2019 ⌚ 8:45 AM MDT
Department/Individual Who Reported Mortality: Surface ops, haul truck

Environment On Scene

Environment at Call-out Location 📅 29th Apr, 2019 ⌚ 8:55 AM MDT	
Location Side of haul road between backfill and till pile	
Animal Type	Other
Description of Animal/Scene Arctic hare likely hit by truck on side of haul road between backfill plant and till pile. Partially squashed, ravens feeding on it, blood and internal organs exposed to ground. Contaminated soil scraped up and placed in bag with carcass.	
Photo of Scene Unanswered	
Estimated Time of Death	Hours

Environment Off Scene

End of Environment Call-out 📅 29th Apr, 2019 ⌚ 9:03 AM MDT
Final Location of Carcass Given to waste transfer to incinerate within a couple hours

Closure & Sign-off

Wildlife Report Complete	
On	
Signature	
	Gordon Cumming 29th Apr, 2019 9:48 AM MDT

APPENDIX F

General Wildlife Reports 2019

Grizzly - 2019-05-17 - A21

Wildlife Report - 2019 Conducted on 17th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-17 - A21
Document No.
WildlifeReport000298

Completed On

📅 17th May, 2019

Wildlife Report

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Grizzly Bear
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	1 grizzly, sandy coloured - could be resident bear but difficult to determine
Photo (If Possible)	Unanswered
Enter Initial Time of Wildlife Sighting	📅 17th May, 2019 ⌚ 8:45 AM MDT
Department/Individual Who Reported Wildlife:	Surface Mining - Frank

Environment On Scene

Environment at Call-out Location
📅 17th May, 2019 ⌚ 8:49 AM MDT

Chronological Events

0845 ENV receives call of bear near South Ramp of A21, issues Announcement 0849 ENV arrives on scene and has eyes on Bear crossing to Lake headed South 0900 Bear headed in good direction, ENV leaves area to deal with Wolf 0925 ENV spots Bear across the Lake, headed in a good direction away from site, ENV leaves area
Movement Map (Import NotePlus Site Map)
Unanswered

Environment Off Scene

End of Environment Call-out
📅 17th May, 2019 ⌚ 9:25 AM MDT
Final Location of Wildlife
Walking south from A21

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gordon Cumming 18th May, 2019 1:41 PM MDT	

Grizzly - 2019-05-26 - Airport

Wildlife Report - 2019 Conducted on 26th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
1.59%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-26 - Airport
Document No.
WildlifeReport000307

Completed On

 26th May, 2019
--

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 26th May, 2019 ⌚ 1:50 PM MDT

Department/Individual Who Reported Wildlife:

Karen at airport

Environment On Scene

Environment at Call-out Location

📅 26th May, 2019 ⌚ 1:55 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Dark coated sow and two cubs, one larger light cub, one smaller dark one

Photo (If Possible):

Unanswered

Chronological Events

13:50 bear called in by airport apron heading to n17.
14:40, atikin switches with gord,
15:05 ENVspots bears cresting till pile
15:20 ENV approaches bears in Turcos, fires 4 pen bangers in succession and persuades bear family down north side of till pile.
15:25 ENV goes around, waits for bears to climb down till pile then herds them across road back into north inlet.
16:30 ENV watches bears head west down north inlet, leaves to finish other tasks
17:30 ENV returns to heck for bears, no visual gained, ENV leaves scene.

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	4 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out Unanswered
Final Location of Wildlife Unanswered

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gord C 26th May, 2019 6:09 PM MDT	



Photo 1

Grizzly bear-2019-0607

Wildlife Report - 2019 Conducted on 7th Jun, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly bear-2019-0607
Document No.
WildlifeReport000311

Completed On

 7th Jun, 2019

Wildlife Report

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Grizzly Bear
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Unknown	
Photo (If Possible) Unanswered	
Enter Initial Time of Wildlife Sighting 📅 7th Jun, 2019 ⌚ 9:04 PM MDT	
Department/Individual Who Reported Wildlife: Jessica Klinkenberg	

Environment On Scene

Environment at Call-out Location 📅 7th Jun, 2019 ⌚ 9:20 PM MDT

Chronological Events

21:15 announce, shut down walking path 21:20 arrive at pump station to scan shore 21:25 drive to south 21:30 drive south haul and Lakeshore 22:05 return to office
Movement Map (Import NotePlus Site Map) Unanswered

Environment Off Scene

End of Environment Call-out 📅 8th Jun, 2019 ⌚ 6:54 AM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Liam Case 9th Jun, 2019 9:54 AM MDT	

Grizzly - 2019-06-21

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

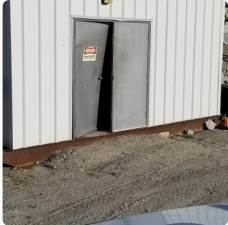
Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-06-21
Document No.
WildlifeReport000322

Completed On

 24th Jun, 2019
--

Wildlife Report

Type of Wildlife Report	General sighting / Other
Photos	
	
Photo 1	Photo 2
Report Type	Sighting

General Wildlife Sighting

Animal Type	Grizzly Bear
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Unknown	
Photo (If Possible) Unanswered	
Enter Initial Time of Wildlife Sighting 📅 21st Jun, 2019 ⌚ 3:00 PM MDT	
Department/Individual Who Reported Wildlife: Shane Pollet,	

Environment On Scene

Environment at Call-out Location Unanswered
--

Chronological Events

Door of pond 4 pump shack pushed in by grizzly. The bear bent the bottom of the door in and left paw prints on the exterior.
--

Movement Map (Import NotePlus Site Map)
Unanswered

Environment Off Scene

End of Environment Call-out
Unanswered

Final Location of Wildlife
Unanswered

Closure & Sign-off

Wildlife Report Complete

On

Signature
GC

Photos

2 Photos



Photo 1



Photo 2

Grizzly - 2019-06-24 n8 Laydown

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-06-24 n8 Laydown
Document No.
WildlifeReport000321

Completed On

 24th Jun, 2019
--

Wildlife Report

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Grizzly Bear
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) No individual, damage from bear	
Photo (If Possible)	
Photos  Photo 1	
Enter Initial Time of Wildlife Sighting 📅 24th Jun, 2019 ⌚ 9:43 AM MDT	
Department/Individual Who Reported Wildlife: NA	

Environment On Scene

Environment at Call-out Location 📅 24th Jun, 2019 ⌚ 9:43 AM MDT
--

Chronological Events

ENV found a wrapped pallet that a bear had torn open and spilled steel nuts on the ground in the n8 laydown
Movement Map (Import NotePlus Site Map) Unanswered

Environment Off Scene

End of Environment Call-out Unanswered
Final Location of Wildlife NA

Closure & Sign-off

Wildlife Report Complete	On
Signature	
	GC 24th Jun, 2019 9:45 AM MDT

Photos

1 Photos



Photo 1

Grizzly - 2019-06-25 - Batch Plant

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.23%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-06-25 - Batch Plant
Document No.
WildlifeReport000030

Completed On

 25th Jun, 2019
--

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 25th Jun, 2019 ⌚ 8:40 PM MDT

Department/Individual Who Reported Wildlife:

Batch Plant / James

Environment at Call-out Location

📅 25th Jun, 2019 ⌚ 8:40 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Unknown

Photo (If Possible):

Unanswered

Chronological Events

20:40 ENV received call in office of bear at Batch Plant heading for Zone 1. Issued bear alert
20:55 ENV on scene, no visual of bear. Inspected Zone 1, Fab Shop, Batch Plant, Shallow Bays and ponds along S Haul Road. Still no sign on bear.
21:30 ENV headed back to office

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

0

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger

0

From 0 to 40

C/F Pen Whistle

0

From 0 to 40

12GA Bear Banger

0

From 0 to 40

12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 25th Jun, 2019 ⌚ 9:30 PM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete	On
Signature  Shelby Skinner 28th Jun, 2019 8:39 AM MDT	

Grizzly - 2019-06-26

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-06-26
Document No.
WildlifeReport000031

Completed On

 26th Jun, 2019
--

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Grizzly Bear
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Unanswered	
Photo (If Possible) Unanswered	
Enter Initial Time of Wildlife Sighting 📅 26th Jun, 2019 ⌚ 8:00 AM MDT	
Department/Individual Who Reported Wildlife: Mike /Unknown	

Environment at Call-out Location Unanswered
--

Chronological Events

20:30 Security called SS2 and said the bear was spotted near the Backfill Crusher Loadout area. Issued bear alert 20:50 SS2 on scene but no visual of bear. Inspected Till Pile, SCAP yard, Batch Plant, Ponds 13/10/5 before heading back to office 22:30 Security called SS2 and said bear was spotted at Backfill heading for SCAP Warehouse. Updated bear alert 22:40 Batch Plant called SS2 and said the bear was walking through the yard headed North 23:00 SS2 on the scene, no visual of bear. Inspected A418 dike and possibly spotted bear in grassy patch below Batch Plant. When I got to the Laydown below Batch Plant I did not see the bear 0:00 SS2 headed back to office
Movement Map (Import NotePlus Site Map) Unanswered

End of Environment Call-out 📅 27th Jun, 2019 ⌚ 12:00 AM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete	On
Signature	
	Shelby Skinner 28th Jun, 2019 8:37 AM MDT

Grizzly - 2019-07-04 - A154

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.23%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-07-04 - A154
Document No.
WildlifeReport000034

Completed On

 4th Jul, 2019

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 4th Jul, 2019 ⌚ 4:45 PM MDT

Department/Individual Who Reported Wildlife:

Site Maintenance

Environment at Call-out Location

📅 4th Jul, 2019 ⌚ 5:00 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear

Photo (If Possible):

Unanswered

Chronological Events

1645 Bear called in at the A154 Pit Bench 390
1700 SS2 and DB2 on scene, bear grazing on bench.
1705 Bear sleeping

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

0

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger

0

From 0 to 40

C/F Pen Whistle

0

From 0 to 40

12GA Bear Banger

0

From 0 to 40

12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 4th Jul, 2019 ⌚ 5:05 PM MDT
Final Location of Wildlife A154 390 Bench

Closure & Sign-off

Wildlife Report Complete	On
Signature  Shelby Skinner 5th Jul, 2019 10:21 AM MDT	

Grizzly 2019-09-21 airport

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
100.00%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly 2019-09-21 airport		
Document No.		
WildlifeReport000336		
📅 22nd Sep, 2019		

Audit

100.00%

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Grizzly Bear
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Airport personnel	
Photo (If Possible) Unanswered	
Enter Initial Time of Wildlife Sighting 📅 21st Sep, 2019 ⌚ 5:00 PM MDT	
Department/Individual Who Reported Wildlife: Unknown	
Environment at Call-out Location 📅 21st Sep, 2019 ⌚ 5:20 PM MDT	

Chronological Events

17:00 received call 17:20 LC arrived at location, airport staff said bear was next to generator shed 17:30 searched for bear, no sight 17:40 left airport
Movement Map (Import NotePlus Site Map) Unanswered
End of Environment Call-out 📅 22nd Sep, 2019 ⌚ 6:00 AM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete	On
Signature  Liam Case 22nd Sep, 2019 6:48 AM MDT	

Grizzly - 2019-10-26 - North Haul Road

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.23%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-10-26 - North Haul Road		
Document No.		
WildlifeReport000048		
📅 26th Oct, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 26th Oct, 2019 ⌚ 10:15 AM MDT

Department/Individual Who Reported Wildlife:

PKC

Environment at Call-out Location

📅 26th Oct, 2019 ⌚ 10:35 AM MDT

Animal Type

Unanswered

Description (eg. number of individuals, colour, age, size, etc.):

Sow and two cubs

Photo (If Possible):

Unanswered

Chronological Events

1015 sow and two cubs called in at North Haul Road intersection heading towards Backfill Crusher. ENV issued bear alert
10:30 ENV on scene and have eyes on bears in Shallow Bays.
1045 Bears walking along orange cable, turn around and head back towards lake. They then head over towards suspected den and start digging
1050 head back to orange cable then back to suspected den
1110 Sow sitting at entrance of suspected den watching cubs
1130 ENV out

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40

12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	
End of Environment Call-out 📅 26th Oct, 2019 ⌚ 11:32 AM MDT	
Final Location of Wildlife West Shallow Bays	

Closure & Sign-off

Wildlife Report Complete	On
Signature  Shelby Skinner 27th Oct, 2019 9:33 AM MDT	

Moose - 2019-02-13 - North of Runway Wildlife Report - 2019 Conducted on 13th Feb, 2019 By Environment Department		
Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Moose - 2019-02-13 - North of Runway
Document No.
WildlifeReport000292

Completed On

13th Feb, 2019

Wildlife Report

Type of Wildlife Report
General sighting / Other
Report Type
Sighting

General Wildlife Sighting

Animal Type Other
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Juvenile male moose
Photo (If Possible) Unanswered
Enter Initial Time of Wildlife Sighting 📅 13th Feb, 2019 ⌚ 11:50 AM MST
Department/Individual Who Reported Wildlife: Site Services / Lorne

Environment On Scene

Environment at Call-out Location 📅 13th Feb, 2019 ⌚ 12:00 PM MST

Chronological Events

1150 Lorne from airport called in moose on runway 1200 ENV on scene with visual of juvenile male moose N or runway 1215 moose travelling NW on LaC de Gras
Movement Map (Import NotePlus Site Map) Photos  Photo 1

Environment Off Scene

End of Environment Call-out 📅 13th Feb, 2019 ⌚ 12:16 PM MST
Final Location of Wildlife Lac de Gras

Closure & Sign-off

Wildlife Report Complete

Off

Signature



Shelby Skinner

13th Feb, 2019 12:18 PM MST



Photo 1

Moose - 2019-07-29 - A418 Pit

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
3.63%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Moose - 2019-07-29 - A418 Pit		
Document No.		
WildlifeReport000039		
📅 29th Jul, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 29th Jul, 2019 ⌚ 12:20 PM MDT

Department/Individual Who Reported Wildlife:

Site Survives - Dwayne

Environment at Call-out Location

📅 29th Jul, 2019 ⌚ 1:00 PM MDT

Animal Type

Other

Description (eg. number of individuals, colour, age, size, etc.):

Cow and calf

Photo (If Possible):

— Photos

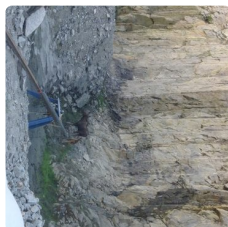


Photo 1

Chronological Events

12:20 Cow and calf moose reported in A418 Pit near Portal
13:10 ENV has eyes on moose in open sump just past tag in shack. Cow grazing and calf resting.
1320 Both slowly moving up out of the Pit
1350 Started moving back down along the pit wall
1443 Moose still in same spot. Clapped, threw rocks and shouted but no response from either cow or calf
1500 Stated banging shovels on rocks and moose starting moving up towards the tag in shack.
15:03 Moose on ramp. Notified UG dispatch and Pit Supervisor that moose were moving up ramp. Used TRUCK to direct Moose up ramp
15:20 Cow darted towards tires and went up on bench to rest.
17:00 Moose still resting on bench.
17:50 SS2 and KB swap out with LC
22:30 pair left pit near FAR
23:10 pair push into Pond between FAR and core shack using rocks. Hit cow in rump with one rock.

Movement Map (Import NotePlus Site Map)

— Photos

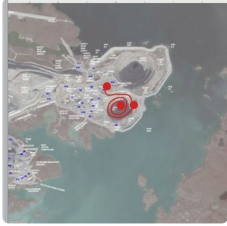


Photo 2

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	14 From 0 to 40
Specify Rocks, clapping, banging shovel on rocks	

End of Environment Call-out

📅 30th Jul, 2019 ⌚ 12:55 AM MDT

Final Location of Wildlife

D1 Laydown

Closure & Sign-off

Wildlife Report Complete	On
Signature	
	Shelby Skinner 2nd Aug, 2019 11:56 AM MDT

Photos

2 Photos



Photo 1



Photo 2

Moose - 2019-07-31 - 31

Wildlife Report - 2019

Incomplete

Inspection score	Failed items	Created actions
0.00%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Moose - 2019-07-31 - 31		
Document No.		
WildlifeReport000041		
📅 31st Jul, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 31st Jul, 2019 ⌚ 8:54 AM MDT

Department/Individual Who Reported Wildlife:

Site Services - Walter

Environment at Call-out Location

📅 31st Jul, 2019 ⌚ 8:55 AM MDT

Animal Type

Other

Description (eg. number of individuals, colour, age, size, etc.):

Cow and calf moose

Photo (If Possible):

Unanswered

Chronological Events

0850 Walter called in Moose at Pond between D1 and FAR

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

0

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger

0

From 0 to 40

C/F Pen Whistle

0

From 0 to 40

12GA Bear Banger

0

From 0 to 40

12GA Explosive

0

From 0 to 40

12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out Unanswered
Final Location of Wildlife Unanswered

Closure & Sign-off

Wildlife Report Complete	Unanswered
--------------------------	------------

Moose and Calf- 2019-07-26

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
100.00%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Moose and Calf- 2019-07-26		
Document No.		
WildlifeReport000038		
📅 26th Jul, 2019		

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Other
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Cow Moose and Calf (less than yo)	
Photo (If Possible) Unanswered	
Enter Initial Time of Wildlife Sighting 📅 26th Jul, 2019 ⌚ 8:55 AM MDT	
Department/Individual Who Reported Wildlife: Dan Noel, Site Services	

Environment at Call-out Location 📅 26th Jul, 2019 ⌚ 8:05 AM MDT
--

Chronological Events

07:55 Dan report pair near NI/Annouce 08:00 Dan reported pair near ERT grounds 08:08 LC AND JK arrive, pair grazing 08:22 still grazin 08:44 still grazin 10:22 ENV observes moose and Calf bedding down, ENV leaves scene 23.03 LC called out by Clayton, pair entered 418 first bench 2330 arrive, pair bedded 01:30 pair still bedded, LC left 2019-07-27 05:30 pair found left of Lookout 1 at 418 pit, grazing 09:30 bedded
Movement Map (Import NotePlus Site Map) Unanswered

End of Environment Call-out 📅 27th Jul, 2019 ⌚ 12:51 PM MDT
--

Final Location of Wildlife

Unknown, 418 pit

Closure & Sign-off

Wildlife Report Complete

On

Signature



Liam Case

28th Jul, 2019 7:52 AM MDT

Moose Cow and Calf-2019-07-28-A418 Dike

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
100.00%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Moose Cow and Calf-2019-07-28-A418 Dike		
Document No.		
WildlifeReport000330		
📅 28th Jul, 2019		

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Other
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Moose Cow and Calf, calf born this spring	
Photo (If Possible) Unanswered	
Enter Initial Time of Wildlife Sighting 📅 28th Jul, 2019 ⌚ 9:20 AM MDT	
Department/Individual Who Reported Wildlife: NA	

Environment at Call-out Location 📅 28th Jul, 2019 ⌚ 9:20 AM MDT
--

Chronological Events

9:20 LC and JK spotted pair in grassed area near well shacks Bedded down 15:30 LC JK SS2 spotted pair in same area prior Bedded down. 2100 pair down A418 ramp near 2nd pump shack, clayton in truck preventing further ascent into pit 21:10 LC arrive at site, pushes pair onto bench 21:20 pair Bedded 22:00 grazing/suckling 22:35 moving
Movement Map (Import NotePlus Site Map) Unanswered

End of Environment Call-out 📅 28th Jul, 2019 ⌚ 10:35 PM MDT
Final Location of Wildlife Grassed area near shack near A418 Dike south entrance

Closure & Sign-off

Wildlife Report Complete

On

Signature

A handwritten signature in black ink, appearing to read 'Liam Case', enclosed within a light gray rounded rectangular border.

Liam Case

28th Jul, 2019 4:31 PM MDT

Wolf - 2019-05-17 - A21

Wildlife Report - 2019 Conducted on 17th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
2.27%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf - 2019-05-17 - A21
Document No.
WildlifeReport000297

Completed On

📅 17th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 17th May, 2019 ⌚ 8:45 AM MDT

Department/Individual Who Reported Wildlife:

Truck Shop - Austin

Environment On Scene

Environment at Call-out Location

📅 17th May, 2019 ⌚ 9:05 AM MDT

Animal Type

Wolf

Description (eg. number of individuals, colour, age, size, etc.):

1 wolf - grey in colour, looking healthy

Photo (If Possible):

Unanswered

Chronological Events

0845 ENV receives call of wolf near equipment and trucks in Zone 2 at A21. ENV issues announcement then immediately receives a call of a bear near the South Ramp of A21. NV heads to South Ramp to deal with bear

0900 Wolf is near the ramp to SCRP and not scared by vehicles or equipment

0906 ENV uses TRUCK to move wolf, no reaction. ENV uses TRUCK, no reaction. Wolf appears to be eating something on the ground, Wolf moves along and ENV picks up hot sauce packet from ground. Wolf left area

0918 Wolf headed toward A21 Pit Shop, ENV updates announcement

0922 ENV loses eyes on Wolf, headed in direction of PKC, ENV leaves area

1002 ENV receives call of Wolf headed toward East PKC, ENV updates announcement

1019 ENV receives call of Wolf near Backfill, ENV mobilizes,

10:24 ENV receives call of Wolf near batch plant, ENV arrives shortly after

10:30 ENV follows wolf, blocks from turning towards building.

10:35 wolf beds down to nap

11:05 Wolf still asleep, ENV off scene.

16:20 ENV receives call of Wolf near steel laydown.

16:30 ENV attempts to block wolf several times from heading to south camp

16:45 wolf passes through winter road parking area, ENV blocks with truck and pushes towards comm shack road.

16:47 wolf attempts to move from road towards cafeteria deck, ENV blocks and pushes towards shallow bays

16:50 wolf attempts to turn back toward cafeteria along BB dorm, ENV blocks several times

15:25 wolf travels across berm toward megadome and truck shop, ENV has to go around due to road flooding near Truck Shop intersection, lost sight of Wolf after that.

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	9 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 17th May, 2019 ⌚ 3:25 PM MDT
Final Location of Wildlife Last spotted beside megadome

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gordon C 18th May, 2019 2:41 PM MDT	

Wolf 2019-05-18

Wildlife Report - 2019 Conducted on 18th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
2.72%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf 2019-05-18
Document No.
WildlifeReport000300

Completed On

📅 18th May, 2019

Wildlife Report

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 18th May, 2019 ⌚ 7:40 AM MDT
Department/Individual Who Reported Wildlife: Delphis at site Services

Environment On Scene

Environment at Call-out Location 📅 18th May, 2019 ⌚ 8:15 AM MDT	
Animal Type	Wolf
Description (eg. number of individuals, colour, age, size, etc.): 1 grey and silver wolf, on the smaller side, slightly emaciated.	
Photo (If Possible): Unanswered	

Chronological Events

07:40 wolf called in near batch plant
08:15 ENV on scene, told that Wolf headed in direction of SCAP fabrication shop
08:25 wolf seen sniffing around fuel tank at SCAP fab shop.
08:30 ENV blocks wolf from SCAP, pushes him towards SCAP warehouse yard
08:35 ENV goes around to SCAP warehouse, wolf called in in Zone 1,
08:37 ENV finds wolf in Zone one refuelling bay, pushes across Haul Road with truck, follows wolf into Laydown and watches it go over berm onto a154 pit haul road
08:42 ENV pushes wolf across Haul Road onto 154 infield, watches wolf continue along infield to edge of Dike.
09:02 wolf finds a hawk-killed ptarmigan on the snow, lies down to eat ptarmigan. Rough legged hawk watches from a telephone pole, squawking.
09:07 wolf in a good place, ENV off scene

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	10 From 0 to 40
Air Horn	1 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 18th May, 2019 ⌚ 9:07 AM MDT
Final Location of Wildlife North side of 154 pit infield

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gore Cumming 21st May, 2019 7:26 AM MDT	



Photo 1

Wolf 2019-05-19

Wildlife Report - 2019 Conducted on 19th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.68%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location) Wolf 2019-05-19
Document No. WildlifeReport000301

Completed On

📅 19th May, 2019

Wildlife Report

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 19th May, 2019 ⌚ 6:40 AM MDT
Department/Individual Who Reported Wildlife: Paul Kettlewell

Environment On Scene

Environment at Call-out Location 📅 19th May, 2019 ⌚ 7:10 AM MDT
Animal Type Unanswered
Description (eg. number of individuals, colour, age, size, etc.): Unanswered
Photo (If Possible): Unanswered

Chronological Events

7:10 ENV arrives at batch plant, sees wolf sniffing around parked cement trucks,
7:12 pushed wolf with truck away from vehicles towards east side of Batch yard
7:20 shot rubber buckshot at wolf in batch plant yard, wolf ran away a short distance
7:23 wolf walked towards Zone 1, ENV moved around, lost visual and could not regain site of Wolf. No more calls that day

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	1 From 0 to 40
Specify 12GA rubber buckshot	

Environment Off Scene

End of Environment Call-out 📅 19th May, 2019 ⌚ 7:35 AM MDT
Final Location of Wildlife Unknown, last spotted heading to Zone one from batch plant

Closure & Sign-off

Wildlife Report Complete	On
Signature	
Unanswered	



Photo 1

Wolf - 2019-05-22

Wildlife Report - 2019 Conducted on 23rd May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
1.36%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf - 2019-05-22
Document No.
WildlifeReport000304

Completed On

📅 23rd May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 22nd May, 2019 ⌚ 5:50 PM MDT

Department/Individual Who Reported Wildlife:

UG dispatch

Environment On Scene

Environment at Call-out Location

📅 23rd May, 2019 ⌚ 6:05 PM MDT

Animal Type

Unanswered

Description (eg. number of individuals, colour, age, size, etc.):

Small grey wolf, round ears, smiley face, reddish brown eyes

Photo (If Possible):

Unanswered

Chronological Events

17:50 wolf spotted hanging around C portal, ENV makes announcement

18:05 ENV on scene, finds wolf at top of ramp from C portal not far from UG refuelling station. Wolf looked like it had gotten into something, near the white sprung at top of c portal ramp, licking its chops.

18:07 ENV pushes wolf down ramp and then north towards SCAP fab shop. Wolf climbs berm onto road, ENV god around

18:12 ENV finds wolf inside batch plant yard, enters yard and pushes wolf South out of batch plant

18:22 ENV watches wolf cross Laydown by batch plant and continue over rock pile, headed south

18:30 ENV attempts to regain visual, waits for wolf to cross 418 Dike access road, no visual, environment leaves area.

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	5 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 22nd May, 2019 ⌚ 6:30 PM MDT
Final Location of Wildlife South of batch plant

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gord C 23rd May, 2019 8:00 AM MDT	



Photo 1

Wolf-2019-05-29-mine dry

Wildlife Report - 2019 Conducted on 30th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
2.04%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf-2019-05-29-mine dry
Document No.
WildlifeReport000026

Completed On

📅 30th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 29th May, 2019 ⌚ 9:20 PM MDT

Department/Individual Who Reported Wildlife:

Underground

Environment On Scene

Environment at Call-out Location

📅 29th May, 2019 ⌚ 9:45 AM MDT

Animal Type

Wolf

Description (eg. number of individuals, colour, age, size, etc.):

One, grey, mature

Photo (If Possible):

Unanswered

Chronological Events

21:20 all announce
21:45 arrive at mine dry, no visual
22:08 receive report from Alan penny that the wolf is in front of dinning hall
22:15 spotted in process plant yard, visual
22:30 wolf moves towards power plant/ metcon
22:33 truck and horn
22:40 tank farm, truck, announce
22:44 seacan alley gun cycle
22:45 rubber bullet, no flee
22:55 WTA truck no flee
23:00 3 Rocks, pushed to AN Road
23:10 lost visual from AN Road

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	3 From 0 to 40
Air Horn	1 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	1 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	3 From 0 to 40
Specify Rocks	

Environment Off Scene

End of Environment Call-out 📅 30th May, 2019 ⌚ 6:30 AM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Liam Case 30th May, 2019 6:59 AM MDT	

Wolf - 2019-06-04 - Batch Plant

Wildlife Report - 2019 Conducted on 4th Jun, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.23%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf - 2019-06-04 - Batch Plant
Document No.
WildlifeReport000310

Completed On

 4th Jun, 2019

Wildlife Report

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 4th Jun, 2019 ⌚ 4:15 PM MDT
Department/Individual Who Reported Wildlife: Dwayne, Site Services

Environment On Scene

Environment at Call-out Location 📅 4th Jun, 2019 ⌚ 4:30 PM MDT	
Animal Type	Wolf
Description (eg. number of individuals, colour, age, size, etc.): Different wolf from last time, grey, large, healthy, clean	
Photo (If Possible): Unanswered	

Chronological Events

16:15 wolf sighted north of SCAP wear house. Issued wildlife alert
16:25 wolf sighted crossing berm to Shallow Bays Area
16:40 wolf located by LC Bedded in Shallow Bays near dust station and veg plots. Updated wildlife alert. Wolf appeared to be scoping out red fox den to raid, red fox female was making alarm calls and pacing near den site
17:00 LC left location as wolf was behaving
21:40 SS2 received call from Security that a wolf was spotted at the Batch Plant. Issued wildlife alert
22:00 ENV on scene and no visual of Wolf. Scanned Shallow Bays, SCAP, Fabrication
23:00 ENV out

Movement Map (Import NotePlus Site Map)

Photos

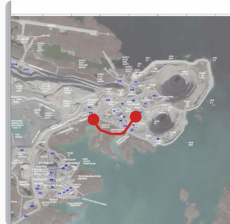


Photo 1

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 4th Jun, 2019 ⌚ 11:00 PM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Shelby Skinner 5th Jun, 2019 8:14 AM MDT	

Photos

1 Photos



Photo 1

Wolf-2019-06-06

Wildlife Report - 2019 Conducted on 6th Jun, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf-2019-06-06
Document No.
WildlifeReport000027

Completed On

 6th Jun, 2019

Wildlife Report

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Wolf
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Single wolf, healthy, grey	
Photo (If Possible) Unanswered	
Enter Initial Time of Wildlife Sighting 📅 6th Jun, 2019 ⌚ 9:57 AM MDT	
Department/Individual Who Reported Wildlife: Unknown	

Environment On Scene

Environment at Call-out Location 📅 6th Jun, 2019 ⌚ 10:26 AM MDT
--

Chronological Events

Unanswered
Movement Map (Import NotePlus Site Map) Unanswered

Environment Off Scene

End of Environment Call-out 📅 7th Jun, 2019 ⌚ 6:30 AM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Liam Case 9th Jun, 2019 9:59 AM MDT	

Wolf-2019-06-09

Wildlife Report - 2019 Conducted on 10th Jun, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf-2019-06-09
Document No.
WildlifeReport000312

Completed On

 10th Jun, 2019
--

Wildlife Report

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Wolf
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Healthy, grey, large, same wolf as the 4th	
Photo (If Possible) Unanswered	
Enter Initial Time of Wildlife Sighting 📅 9th Jun, 2019 ⌚ 12:01 PM MDT	
Department/Individual Who Reported Wildlife: Vincent, Backfill	

Environment On Scene

Environment at Call-out Location 📅 9th Jun, 2019 ⌚ 12:20 PM MDT
--

Chronological Events

12:04 Announce 12:20 arrive at Backfill 12:30 locate at shallow bays walking along beach 12:50 last seen Bedded near fox den 2019-06-10 01:00 sighted by Site Services near walkway between DOC and Southcamp, Annouce 01:20 arrive at walkway 01:31 sighted crossing ice towards shallow bays 01:40 end of callout
Movement Map (Import NotePlus Site Map) Unanswered

Environment Off Scene

End of Environment Call-out 📅 10th Jun, 2019 ⌚ 6:30 AM MDT
Final Location of Wildlife Shallow bays

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Liam Case 10th Jun, 2019 6:57 AM MDT	

Wolf - 2019-06-11

Wildlife Report - 2019 Conducted on 11th Jun, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
1.13%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf - 2019-06-11
Document No.
WildlifeReport000021

Completed On

 11th Jun, 2019
--

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 10th Jun, 2019 ⌚ 6:00 PM MDT

Department/Individual Who Reported Wildlife:

Site services

Environment On Scene

Environment at Call-out Location

📅 10th Jun, 2019 ⌚ 6:30 PM MDT

Animal Type

Wolf

Description (eg. number of individuals, colour, age, size, etc.):

Single large wolf (photo for reference, taken several weeks ago)

Photo (If Possible):

Photos

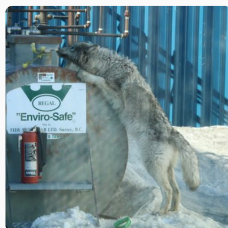


Photo 1

Chronological Events

1800 wolf called in near South Camp, advisory called
1820 environment on scene (NG)
1825 rubber bullet fired, wolf runs towards potable water intake
1830 wolf on ice near potable water intake, explosive cartridge fired, wolf runs across ice towards shallow bays
1850 seen coming up from shallow bays towards fresh air raises, advisory updated
1853 wolf runs into C-portal. Mutt drives in to open gate, alerted by radio by env. Wolf runs out of C-portal
1910 wolf called in near SCAP warehouse
1912 environment on scene, TRUCK used, wolf runs back towards C portal
1915 wolf seen crossing road back into shallow bay area, lose sight of it in bays
1925 update advisory, environment leaves scene

Movement Map (Import NotePlus Site Map)

Photos



Photo 2

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	1 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	2 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 10th Jun, 2019 ⌚ 7:30 PM MDT
Final Location of Wildlife Shallow bays

Closure & Sign-off

Wildlife Report Complete	On
Signature Nicole Goodman	

Photos

2 Photos



Photo 1



Photo 2

Wolf-2019-06-14 pkc to south winter road approach

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
1.59%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf-2019-06-14 pkc to south winter road approach
Document No.
WildlifeReport000027

Completed On

 6th Jun, 2019

Wildlife Report

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 15th Jun, 2019 ⌚ 3:02 AM MDT
Department/Individual Who Reported Wildlife: Dave with Geotechnical

Environment On Scene

Environment at Call-out Location 📅 15th Jun, 2019 ⌚ 3:20 PM MDT	
Animal Type	Unanswered
Description (eg. number of individuals, colour, age, size, etc.): Grey wolf, small, scraggly coat,	
Photo (If Possible): Unanswered	

Chronological Events

15:02 wolf called in on PKC barge road, ENV mobilized
 15:20 ENV sees wolf coming down pkc to test piles area, ENV goEs around from pkc access road to test piles
 15:22-16:15 ENV blocks wolf from going to waste transfer with truck.
 Wolf goes around waste transfer past snow dump area, enters light vehicle road
 ENV blocks wolf from crossing Haul Road by Light vehicle road intersection
 Wolf crosses Haul road further down into Tundra between lakeshore boulevard and Haul Road.
 ENV attempts to block wolf as it tries to cross road north towards south tank farm.
 ENV attempts to hit wolf with rubber bullet, gun jams and can not cycle, no deterrents fired
 16:15 - 17:40 wolf passes through winter road staging area, moves around pond to end of peninsula,
 Wolf walks across peninsula, spotted by ENV on other side near raw water intake.
 Wolf heads onto the ice, begins crossing Shallow bays towards underground and Batch Plant
 ENV heads around to north side of shallow Bays, checks for wolf from multiple angles
 17:42 ENV goes to end of veg plots road, sees wolf at head of shallow bay, closer to the dust gauge, heads there.
 17:43 ENV places truck between wolf and underground area, gets rubber bullets ready, wolf hides below edge of hill, out of site, far enough away from truck to make it unsafe to pursue.
 17:50 fired 2 bangers toward edge of hill to get the wolf to move
 Wolf heads east, beds down on edge of hill beside east Shallow bay.
 1854 ENV off scene.

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	4 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	2 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40

Specify

Unanswered

Environment Off Scene

End of Environment Call-out

📅 14th Jun, 2019 ⌚ 7:00 PM MDT

Final Location of Wildlife

In east Shallow bay

Closure & Sign-off

Wildlife Report Complete

On

Signature

A handwritten signature in black ink, appearing to be 'GC', enclosed in a rounded rectangular box.

GC

15th Jun, 2019 8:01 AM MDT

Grey Wolf -2019-06-15

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
1.59%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grey Wolf -2019-06-15
Document No.
WildlifeReport000315

Completed On

 16th Jun, 2019
--

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 16th Jun, 2019 ⌚ 8:10 AM MDT

Department/Individual Who Reported Wildlife:

606 underground haul truck operator female

Environment On Scene

Environment at Call-out Location

📅 16th Jun, 2019 ⌚ 8:12 AM MDT

Animal Type

Wolf

Description (eg. number of individuals, colour, age, size, etc.):

Single small grey wolf, same one that has been on site before.

Photo (If Possible):

Unanswered

Chronological Events

Wolf was called out by underground haul truck 606 near shallow bays, ENV was in the location and used 1 c/f bear banger to deter the wolf.

Wolf headed to PKC, blocked wolf from people on barge road, and blocked 3 times on south PKC, pushed down the PKC hill.

then located heading to south tank farm. Was deterred to raw water intake with truck and across shallow bays. Headed towards the north winter entrance/East Bay to SCAP. Last known location was that the wolf was heading towards the ROM and PCK area.

Wildlife report closed several days after occurrence, notes taken on day of report.

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	4 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	2 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 15th Jun, 2019 ⌚ 11:39 AM MDT
Final Location of Wildlife ROM and PKC area

Closure & Sign-off

Wildlife Report Complete	On
Signature  Gord C 23rd Jun, 2019 9:10 AM MDT	

Wolf - 2019-06-19 shallow bays

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.45%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf - 2019-06-19 shallow bays
Document No.
WildlifeReport000318

Completed On

 19th Jun, 2019
--

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 19th Jun, 2019 ⌚ 1:52 PM MDT

Department/Individual Who Reported Wildlife:

Mike Peterson

Environment On Scene

Environment at Call-out Location

📅 19th Jun, 2019 ⌚ 1:54 PM MDT

Animal Type

Wolf

Description (eg. number of individuals, colour, age, size, etc.):

Smallish grey wolf,

Photo (If Possible):

Unanswered

Chronological Events

13:52 ENV receives call of Wolf heading up the airport road.
13:58 ENV fires rubber bullet at wolf on end of in veg plots, narrowly misses, wolf sprints away east
13:58-14:32 ENV follows wolf as it heads east, then crosses ice
14:32 wolf gets to land on other side of lake, east of 418 pit

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

0

From 0 to 40

Air Horn

0

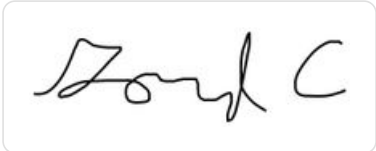
From 0 to 40

C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	1 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 19th Jun, 2019 ⌚ 2:35 PM MDT
Final Location of Wildlife Mainland east of 418 pit

Closure & Sign-off

Wildlife Report Complete	On
Signature  Gord C 23rd Jun, 2019 9:07 AM MDT	

Wolf-2019-07-01- North Haul and ROM

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.23%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf-2019-07-01- North Haul and ROM
Document No.
WildlifeReport000324

Completed On

 1st Jul, 2019

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 1st Jul, 2019 ⌚ 12:09 PM MDT

Department/Individual Who Reported Wildlife:

Clayton

Environment at Call-out Location

📅 1st Jul, 2019 ⌚ 12:25 PM MDT

Animal Type

Wolf

Description (eg. number of individuals, colour, age, size, etc.):

Unanswered

Photo (If Possible):

Unanswered

Chronological Events

12:14 Annouce

12:25 LC arrive at North Haul and ROM intersection, no visual

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

0

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger

0

From 0 to 40

C/F Pen Whistle

0

From 0 to 40

12GA Bear Banger

0

From 0 to 40

12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 1st Jul, 2019 ⌚ 1:00 PM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete	On
Signature Gord C	

Wolf - 2019-07-16 - shallow bays

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
1.13%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolf - 2019-07-16 - shallow bays
Document No.
WildlifeReport000329

Completed On

 16th Jul, 2019
--

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 16th Jul, 2019 ⌚ 7:35 PM MDT

Department/Individual Who Reported Wildlife:

Sarah with geotech

Environment at Call-out Location

📅 16th Jul, 2019 ⌚ 7:40 PM MDT

Animal Type

Wolf

Description (eg. number of individuals, colour, age, size, etc.):

Small white wolf

Photo (If Possible):

Unanswered

Chronological Events

7:35pm wolf called in at Backfill crossing road to Shallow Bays, ENV mobilizes

7:45 ENV on scene, no visual on wolf

8:25 wolf called in at PKC muster station heading to rom hill.

8:30 wolf spotted at base of rom hill, ENV chased wolf across S haul road

8:36 threw rock, wolf ran north along veg plots

8:55 attempted to block wolf from going east across veg plots road and persuade it north. Failed eventually, Wolf headed east

9:50 ENV off scene

July 17, 00:00 wolf called in at truck shop heading north along road. Brad follows it all the way to hanging tree.

12:20 ENV on scene, wolf has gone into 154 infield chasing foxs, no visual,

12:45 lightning approaching, ENV retreats to office

12:50 end of callout

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	2 From 0 to 40
Specify Threw rocks	

End of Environment Call-out

📅 17th Jul, 2019 ⌚ 1:00 AM MDT

Final Location of Wildlife

Unknown

Closure & Sign-off

Wildlife Report Complete	On
Signature	
	Gordon C 17th Jul, 2019 10:25 AM MDT



Photo 1

Wolf - 2019-07-18 - ERT Training Grounds

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
100.00%	0	0

Wildlife Report

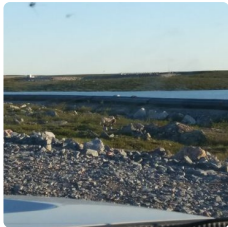
Audit Title (Animal - yyyy-mm-dd - Location)
Wolf - 2019-07-18 - ERT Training Grounds
Document No.
WildlifeReport000023

Completed On

 18th Jul, 2019
--

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Wolf
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) White/Grey wolf that has been hanging around the island	
Photo (If Possible)	
— Photos  Photo 1	
Enter Initial Time of Wildlife Sighting 📅 18th Jul, 2019 ⌚ 5:13 AM MDT	
Department/Individual Who Reported Wildlife: Brad - Site Services	

Environment at Call-out Location 📅 18th Jul, 2019 ⌚ 5:35 AM MDT
--

Chronological Events

05:13 ENV receives call of wolf near ERT training grounds, ENV issues announcement 05:35 ENV arrives on scene at the North Inlet, sees wolf chasing a fox 05:37 Wolf catches fox and appears in sight again 05:38 Wolf moves toward North Inlet Containment Facility with the fox in its mouth, goes over the pipe toward the water edge and disappears from sight 05:50 ENV cannot locate wolf, likely bedded down eating 05:52 ENV updates announcement and leaves area
Movement Map (Import NotePlus Site Map) Unanswered

End of Environment Call-out

📅 18th Jul, 2019 ⌚ 5:52 AM MDT

Final Location of Wildlife

North Inlet

Closure & Sign-off

Wildlife Report Complete

On

Signature

GC

Photos

1 Photos



Photo 1

APPENDIX G

Site Wildlife Photos 2019



Photograph 1: Caribou



Photograph 2: Grizzly Bear



Photograph 3: Grizzly Sow and Cub



Photograph 4: Moose Cow and Calf



Photograph 5: Grey Wolf



Photograph 6: Red Fox



Photograph 7: Peregrine Falcon

APPENDIX H

Caribou Incidental Observations Summary 2019

Date	Number	Location	Comments
2019/01/11	5	On tundra next to Emulsion Plant road	-
2019/01/12	5	On tundra next to SCRP	-
2019/01/17	6	On tundra between A21 Pit muster station and SCRP	Wolverine relocation
2019/01/18	2	On tundra between A21 Pit muster station and SCRP	Could not find a good spot to complete observations.
2019/01/23	5	On tundra between A21 Pit muster station and SCRP	-
2019/01/25	5	On tundra near Emulsion Plant	-
2019/01/28	5	On tundra near AN building	No daylight to observe
2019/01/29	5	On tundra near Windfarm Tower 4	-
2019/01/30	5	On tundra near Pond 7	-
2019/02/02	5	On tundra near Pond 7	-
2019/02/03	5	On tundra near Pond 7	-
2019/02/04	5	On tundra near Pond 7	-
2019/02/06	6	On tundra near Windfarm Tower 4	Conducting samples on other side of island
2019/02/13	158	North of Emulsion plant	-
2019/02/14	57	West of A21	-
2019/02/15	9	South of Emulsion plant road	-
2019/02/16	2	South of Emulsion plant road	-
2019/02/16	7	north of explosives magazine	-
2019/02/17	5	Wind Farm	-
2019/02/20	10	Wind farm	-
2019/02/21	200	SW of Emulsion Plant	-
2019/02/21	7	Tundra between Tower 1 and 2 of Wind farm	-
2019/02/22	100	On shore across lake from A154 Dike	Poor visibility/too far to get scan
2019/02/22	9	Tundra between Tower 1 and 2 of Wind farm	-
2019/02/22	2000	Large herd followed by a couple wolves	Spoke to someone after shift
2019/02/27	9	Small herd lakeside across from Pond 3 and 4	Too far to scan
2019/03/04	7	Windfarm Building	-
2019/03/13	9	Unspecified	-
2019/03/15	9	On lake/tundra near Pond 4	-
2019/03/23	14	12km Offsite, At WT08-1 near crest of hill at other end of small lake	only two scans because caribou left area
2019/03/25	220	28km Offsite, Not far from WT18-2 beginning transect, on small hill in protected area beside inlet of small lake.	-
2019/03/25	120	17.5km Offsite, on hill west of ice road between WT37-2 and WT37-1	-
2019/03/27	44	4km Offsite, On 2 large islands on south side of Lac de gras near WT04-2	-
2019/03/27	4	6km Offsite, Leaving island north of WT15-2	-
2019/03/28	2	15km Offsite, crossing ice heading north beside WT17-1	-
2019/03/28	11	5km Offsite between WT33-2 and WT33-1	-
2019/03/29	7	13.8km Offsite, not far from WT02-2, at the edge of the lake	-
2019/03/29	2	On/near AN road	Team in field
2019/04/12	2	Off site near WT 14-1	-
2019/04/18	8	Off site approximately 17 KM during Wolverine Track Survey	-
2019/04/21	4	Off of airport runway	Other tasks
2019/04/28	10	10 caribou moving east away from the airport area on the lake north of the airstrip	Team in field for AEMP
2019/11/24	6	N of A154 pit between Diavik and Misery	-

APPENDIX I

Caribou Behavioural Observations Summary 2019

Date	Time	Distance to Mine Component (km)	UTM (12W NAD 83)		Group Size	Composition
			Easting	Northing		
11/01/2019	11:00	0.0	532351	7150977	5	Males / Females
12/01/2019	14:55	0.0	532406	7150787	5	Males / Females
23/01/2019	16:06	0.0	532959	7150034	5	Males / Females
25/01/2019	14:42	0.0	531930	7150788	5	Males / Females
29/01/2019	15:48	0.0	532117	7151150	5	Males / Females
30/01/2019	13:43	0.1	532203	7151319	5	Males / Females
02/02/2019	14:13	0.1	532279	7151422	5	Males / Females
03/02/2019	15:03	0.0	532346	7151502	5	Males / Females
04/02/2019	14:52	0.0	532320	7151522	5	Males / Females
13/02/2019	9:00	0.3	531682	7151224	18	Males / Females
13/02/2019	14:32	0.5	531415	7150854	10	Males / Females
14/02/2019	13:40	1.4	530868	7149813	20	Males / Females
14/02/2019	14:39	3.5	528292	7150431	6	Males / Females
14/02/2019	14:40	4.4	527780	7149420	13	Males / Females
15/02/2019	15:58	0.0	532328	7150981	9	Males / Females
16/02/2019	10:10	<0.1	531954	7151004	2	Females
16/02/2019	10:30	0.1	532225	7151416	7	Males / Females
17/02/2019	14:55	<0.1	531911	7151406	5	Females
20/02/2019	15:42	<0.1	531580	7151788	10	Males / Females
21/02/2019	15:54	<0.1	531731	7152132	7	Males / Females
21/02/2019	16:46	0.6	531683	7150238	10	Males / Females
22/02/2019	16:32	0.1	531755	7152144	9	Males / Females
04/03/2019	8:50	<0.1	531722	7151973	7	Males / Females
13/03/2019	13:40	0.1	532374	7151417	9	Females
15/03/2019	15:31	0.2	532430	7153162	13	Females
23/03/2019	14:15	11.0	548102	7155815	14	Males / Females
25/03/2019	10:45	26.3	555387	7133156	13	Males / Females
25/03/2019	12:34	21.7	548190	7132295	13	Males / Females
27/03/2019	10:10	3.3	532990	7145579	30	Males / Females
27/03/2019	12:05	6.4	539292	7145017	4	Males / Females / Calves
28/03/2019	10:22	11.9	520769	7157250	2	Females
28/03/2019	11:23	3.8	536362	7157706	11	Males / Females
29/03/2019	9:41	9.0	525905	7143286	7	Males / Females / Calves
03/04/2019	9:17	<0.1	532757	7153060	7	Females
12/04/2019	11:55	4.5	541990	7153701	2	Females
18/04/2019	12:28	11.6	521069	7157052	8	Males / Females

APPENDIX J

Grizzly Bear Incidental Observation Summary 2019

Date	Number of Animals	Characteristics of Animals	Location	Deterrents Used?
2019/04/16	1	-	Spotted in the North Inlet - no visual obtained	No
2019/05/09	1	-	Tundra near emulsion plant	No
2019/05/12	1	-	South of Emulsion plant on tundra	No
2019/05/13	1	-	West PKC dam wall, AN road, tundra near magazine storage	No
2019/05/15	2	Initially one bear in morning near A21, at about 1600 was spotted by South Camp and moved toward -Rose Gardens when a second bear was spotted, both moved toward NCRP and were lost	A21, South Camp, Rose Gardens, NCRP	Yes
2019/05/16	1	-	Till pile, Airport road, NI	Yes
2019/05/17	1	-	on Ice near A21 South Dike	No
2019/05/18	1	-	A21 muster point to Lakeshore boulevard	No
2019/05/20	1	-	Reported in D1 laydown area.	No
2019/05/21	1	-	Shallow bays near south haul road	Yes
2019/05/22	1	-	BB dorm and shallow bays	Yes
2019/05/23	1	-	Till pile, North Inlet	Yes
2019/05/25	1	-	Crusher plant, Rose Garden	Yes
2019/05/26	1	-	Rose Garden	Yes
2019/05/26	3	-	Airport, Airport Road, Till Piles, North Inlet	Yes
2019/05/29	2	-	Shallow Bays, A21 Haul Road	Yes
2019/05/29	1	-	On Ice South of A21, Tundra near Emulsion plant	Yes
2019/05/31	1	-	NI, S Haul Road/Airport Road intersection, SCAP, N18, tundra near A418	Yes
2019/06/01	1	-	Heading N on airstrip	No
2019/06/03	1	-	Pond near Backfill, moved toward Shallow Bays	No
2019/06/07	1	-	S Haul Road near Process Plant Crsuher, WTA	No
2019/06/07	1	-	Near comm station along shoreline. Unable to confirm sighting; skeptic of initial report.	No
2019/06/11	1	-	North Inlet to batch plant, underground to shallow bays, to A21	Yes
2019/06/16	1	-	In batch plant, travelled to backfill, then over NCRP to pkc, ended near test piles	Yes
2019/06/17	1	-	PKC, Pond 5, Backfill, North Inlet	Yes
2019/06/19	1	-	Called in in front of truck shop at 430am, no visual ever gotten	No
2019/06/19	3	-	Till Pile, Backfill, North Inlet, A154 Fish Habitat, FAR, D1, Tundra near N Winter Road Approach	Yes
2019/06/20	3	-	Shallow Bays, Pond 5, Landfill, NCRP, NI, Hanging Tree, 154 Fish Habitat	Yes
2019/06/22	1	-	PP ROM, Pond 11, Lakeshore Blvd, Pond12, 10, 5, 1, Till Pile	Yes
2019/06/21	1	-	Pond 4 pump shack (damage)	No
2019/06/25	1	resident grizzly bear	Spotted by helicopter near Dust 2A	No
2019/06/26	1	-	Backfill Plant	No
2019/06/27	1	-	Airport road heading to Hanging Tree	No
2019/06/28	1	resident grizzly bear	Spotted in future fish habitat north side of A154	No
2019/06/29	1	-	spotted near Truck Shop @0645, Pond 5	Yes
2019/07/01	1	-	Airport road	No
2019/07/03	1	-	SCAP, Pond 13, Shallow Bays, Pond 1, Pond 5, PKC, Pond 4	Yes
2019/07/04	1	-	A154 pit Bench 390,	No
2019/07/05	4	Sow and two cubs; resident grizzly bear	In close vicinity by airport	No
2019/07/06	3	Sow and two cubs	On haul road near crusher rom heading towards airport	No
2019/07/07	1	-	S haul road, backfill, shallow bays, pond 5, pond 1	Yes
2019/07/08	3	-	Backfill to till pile	Yes
2019/07/15	1	-	Pond 13	Yes

Date	Number of Animals	Characteristics of Animals	Location	Deterrents Used?
2019/07/15	1	-	Pond 13	Yes
2019/07/15	1	-	Zone 1 to UG to Shallow bays, to north inlet via pond 13, backfill, till pile.	Yes
2019/07/31	1	-	Process Plant Rom, Pond 5, Backfill, Unknown	Yes
2019/08/08	1	-	154 Infield area	Yes
2019/08/09	1	-	south haul road near scrap warehouse	No
2019/08/09	4	Sow and two cubs; resident grizzly bear	North Inlet	Yes
2019/08/10	4	Sow and two cubs; resident grizzly bear	Hanging Tree	Yes
2019/08/11	4	Sow and two cubs; resident grizzly bear	Batch plant	Yes
2019/08/12	4	Sow and two cubs; resident grizzly bear	Batch plant	Yes
2019/08/13	4	-	Process Plant, Pond 5, Shallow Bays, MAC, PKC Muster, AN Road Tundra	Yes
2019/08/17	1	-	North Winter Road Approach	Yes
2019/08/18	1	-	Rose Garden, Pond 5, Pond 11, shallow Bays	Yes
2019/08/19	3	-	Lakeshore Boulevard, winter road approach, Pond 11	Yes
2019/08/20	3	Sow and two cubs	Old Mine Dry to NI, to N17 Laydown	Yes
2019/08/23	1	-	On tundra near Lakeshore Blvd onto tundra near winter road approach	Yes
2019/08/24	4	Sow and two cubs	Single grizzly on tundra near Dailies, Sow and 2 cubs in Shallow Bays	Yes
2019/08/24	1	-	In Pond 10, pushed into Shallow Bays	Yes
2019/08/27	3	Sow and two cubs	Between runway and helipad	No
2019/08/28	3	Sow and two cubs	C Portal	No
2019/08/29	3	Sow and two cubs	NI, water tree at A154	No
2019/08/30	1	-	S Haul Road near backfill	No
2019/09/02	1	-	On tundra between AN sign in shack and A21 portal	No
2019/09/02	1	-	Pond 10 headed to PKC and then windfarm	No
2019/09/04	1	-	At Steel Yard, moved to A418	Yes
2019/09/06	1	-	AN Road, MET CON, ROM, Pond 5, Shallow Bays, 418 Dike Entrance	Yes
2019/09/07	1	-	Batch Plant, Zone 1, ERT Training Grounds, North Inlet, Airport runway	Yes
2019/09/09	1	-	North of Approach 10	No
2019/09/13	1	-	Airport, N of the Runway	No
2019/10/04	1	-	Grazing on Tundra near West Dam	No
2019/10/07	1	-	PKC, Pond 1 Backfill, Till Pile, NI	Yes
2019/10/10	1	-	Tundra near East Dam of NI	No
2019/10/11	1	-	Spotted Lakeshore Blvd A21 Zone 3	Yes
2019/10/17	1	-	East Bay/ North Winter road approach	Yes
2019/10/19	1	-	West Shallow Bay	No
2019/10/26	3	-	West Shallow Bay, suspected bear den now actual bear den	No
2019/10/26	1	-	West Shallow Bay, suspected bear den now actual bear den, ROM hill road, PKC muster, Test Piles	Yes
2019/10/30	1	-	Observed by Tour Bus below Winter Road Staging Area/Lakeahore Blvd - not reported to ENV	No

APPENDIX K

Wildlife Deterrent Action Incident Reports 2019

Grizzlies - 2019-08-09 - North Inlet

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
100.00%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzlies - 2019-08-09 - North Inlet		
Document No.		
WildlifeReport000024		
📅 9th Aug, 2019		

Type of Wildlife Report	General sighting / Other
Report Type	Sighting

General Wildlife Sighting

Animal Type	Unanswered
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.) Mother and two cubs, same ones that have been on site before	
Photo (If Possible) Unanswered	
Enter Initial Time of Wildlife Sighting 📅 9th Aug, 2019 ⌚ 12:00 PM MDT	
Department/Individual Who Reported Wildlife: Mike at the Airport	

Environment at Call-out Location 📅 9th Aug, 2019 ⌚ 12:20 PM MDT
--

Chronological Events

13:30 Mike called in mother, two cubs and single male grizzly together at the airport road
13:45 Environment on scene, got visual on mother and 2 cubs, no visual on single male
14:20 nothing happens, bears in good place, env off scene
15:30 Bears called in heading towards water treatment plant, Env mobilizes to airport road
15:40 Env on scene, no bears anywhere.
15:45 bears called in entering Backfill, env mobilizes
15:47 Env arrives at backfill, no visual, spends the next hour and a half looking for bears,, never gets visual.
16:35 Env off scene

Movement Map (Import NotePlus Site Map)

– Photos



Photo 1

End of Environment Call-out

Unanswered

Final Location of Wildlife

Unanswered

Closure & Sign-off

Wildlife Report Complete

On

Signature

Gordon Cumming (For the report writer)



Photo 1

Grizzly - 2019-05-13 - AN Road

Wildlife Report - 2019 Conducted on By Environment Department

Complete

Inspection score	Failed items	Created actions
0.23%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-13 - AN Road
Document No.
WildlifeReport000021

Completed On

Unanswered

Wildlife Report

Type of Wildlife Report	Deterrent Reporting
-------------------------	---------------------

Deterrent Report

Enter Initial Time of Wildlife Sighting
📅 13th May, 2019 ⌚ 3:30 PM MDT
Department/Individual Who Reported Wildlife:
Western explosives

Environment On Scene

Environment at Call-out Location	
📅 13th May, 2019 ⌚ 3:45 PM MDT	
Animal Type	Grizzly Bear
Description (eg. number of individuals, colour, age, size, etc.):	
Resident bear. Blond with dark stripe down back	
Photo (If Possible):	
Photos  Photo 1  Photo 2  Photo 3	

Chronological Events

15:30 Bear reported on AN Road headed up west dam of PKC. ENV issue bear alert.
15:35 Bear reported backing Tundra near Emulsion Plant
15:45 ENV has eyes on bear grazing on Tundra
16:03 Bear cross emulsion plant Road
16:07 ENV updated bear alert
16:15 Bear dug hole in snow and bedded down to avoid wind
16:40 Bear still bedded down, napping
16:41 explosives passes overhead, bear becomes alert, sits upright
16:48 truck left

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 13th May, 2019 ⌚ 4:49 PM MDT
Final Location of Wildlife Bedded in snow pile at Magazine Storage

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	13th May, 2019 4:50 PM MDT	

Photos

3 Photos



Photo 1



Photo 2



Photo 3

Grizzly - 2019-05-15 - PKC

Wildlife Report - 2019 Conducted on 15th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
1.81%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-15 - PKC
Document No.
WildlifeReport000295

Completed On

📅 15th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 15th May, 2019 ⌚ 9:19 AM MDT

Department/Individual Who Reported Wildlife:

Waste management

Environment On Scene

Environment at Call-out Location

📅 15th May, 2019 ⌚ 9:45 AM MDT

Animal Type

Unanswered

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear. Blond with dark stripe down back and dark fur on bottom

Photo (If Possible):

Unanswered

Chronological Events

09:19 Bear called in at S entrance to PKC. ENV issued bear alert

09:40 Bear called in at Mecon Yard by tires

09:45 ENV on scene with visual of bear. Updated bear alert.

09:50 used TRUCK 6x to keep bear away from South Tank Farm. Bear went up over berm onto A21 Haul Road, entered new road accessing WTA, use TRUCK to move bear onto tundra off of Lakeshore Boulevard.

10:20 Updated bear alert and left bear grazing on tundra.

16:00 bear spotted at South Camp, moved onto Shallow Bays toward Rose Garden, ENV issued bear alert

16:30 2nd bear spotted in Rose Garden, both bears run off toward Pond 5 and then uphill to NCRP, ENV issue bear alert

16:45 cannot find bears around NCRP, no further calls

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	7 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 15th May, 2019 ⌚ 5:00 PM MDT
Final Location of Wildlife NCRP

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	GC	17th May, 2019 7:31 AM MDT

Grizzly - 2019-05-16 - Scrp

Wildlife Report - 2019 Conducted on 16th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.45%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-16 - Scrp
Document No.
WildlifeReport000022

Completed On

📅 16th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 16th May, 2019 ⌚ 8:20 AM MDT

Department/Individual Who Reported Wildlife:

Billy - Site Services

Environment On Scene

Environment at Call-out Location

📅 16th May, 2019 ⌚ 9:35 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear. Blonde with dark stripe down back and bottom

Photo (If Possible):

Unanswered

Chronological Events

08:20 Bear reported just off North Haul Road heading to Till Pile.

2:00 Bear reported at Backfill heading toward white sprung. ENV updated bear alert.

12:20 ENV at Backfill no sign of bear.

12:40 Bear called i at Old Mine Dry refuelling pad. Updated bear alert.

12:45 Bear crossed road over to Batch Plant. ENV used Truck to move bear out of yard. Bear in Laydown just below Batch Plant heading towards 418 Pit. Digging and eating roots.

13:13 Bear crossed road into Shallow Bays by 418 Pit.

14:55 Bear began walking southeast across ice, ENV left

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 16th May, 2019 ⌚ 2:55 PM MDT
Final Location of Wildlife Heading across ice from Shallow Bays

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gord Cumming 17th May, 2019 7:35 AM MDT	

Grizzly - 2019-05-18 - A21 Lakeshore Blvd

Wildlife Report - 2019 Conducted on 18th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.23%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-18 - A21 Lakeshore Blvd
Document No.
WildlifeReport000299

Completed On

📅 18th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 18th May, 2019 ⌚ 12:25 PM MDT

Department/Individual Who Reported Wildlife:

Frank - Surface Mining

Environment On Scene

Environment at Call-out Location

📅 17th May, 2019 ⌚ 12:44 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

1 bear - sandy coloured with stripe down back and darker legs - could be resident bear

Photo (If Possible):

Unanswered

Chronological Events

1225 ENV receives call of bear near A21 Muster Station, makes announcement

1244 ENV arrives on scene - no bear in sight

1255 ENV finds bear on Tundra near Lakeshore Blvd

12:55-2:30 ENV monitors bear, bear slowly heads west, eventually leaves Island heading west on ice.

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 17th May, 2019 ⌚ 2:40 PM MDT
Final Location of Wildlife Heading west from island

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gord C 21st May, 2019 7:45 AM MDT	

Photos

1 Photos

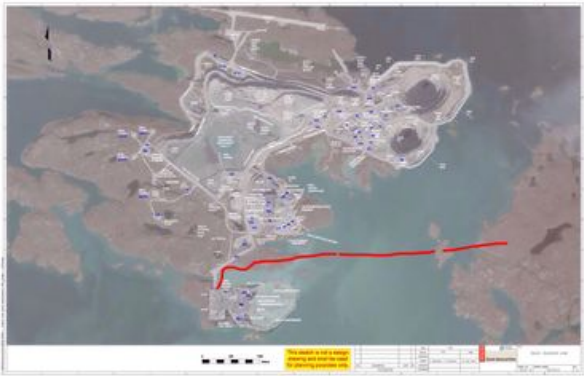


Photo 1

Grizzly - 2019-05-21 - Shallow Bays

Wildlife Report - 2019 Conducted on 21st May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
2.27%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-21 - Shallow Bays
Document No.
WildlifeReport000024

Completed On

📅 21st May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 21st May, 2019 ⌚ 10:35 AM MDT

Department/Individual Who Reported Wildlife:

Kenny G from process plant

Environment On Scene

Environment at Call-out Location

📅 21st May, 2019 ⌚ 10:43 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear, light brown with dark stripe down back and around butt. Dark paws, darker fur patch on rump. Remnants of white tag on side of left ear

Photo (If Possible):

Photos



Photo 1



Photo 2

Chronological Events

10:35 Bear called in by ken from process plant
10:37 ENV made announcement, heads to area
10:43 ENV on scene, bear eating roots, ENV leaves scene
18:23 ENV back on scene at shallow bays
18:30 attempted to move bear, hit with rubber bullet, fired 1x 12G explosive, 1x 12G flare, 1x pen banger
18:35 bear lies down for a little while, gets back up and moves.
18:40 ENV fires 1 pen banger
18:44 cycled action on shotgun, bear moved away over ridge and out of sight.
18:55 ENV repositioned, regained visual,
19:35 fired 12G explosive, wind caught it, didn't go far and had no effect on bear.
20:05 bear chases fox towards south haul road
20:06 bear and fox cross haul road, ENV attempts to block with truck, can't get there in time
20:12 bear climbs rock wall by pond 1, beds down on sandy area near top of wall.
20:30 bear still Bedded, ENV off scene, updated bear advisory

Movement Map (Import NotePlus Site Map)

Photos



Photo 3

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	2 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	2 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	1 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	2 From 0 to 40
Specify 1x 12G flare, cycling shotgun action	

Environment Off Scene

End of Environment Call-out 📅 21st May, 2019 ⌚ 9:00 PM MDT
Final Location of Wildlife On rock wall south of backfill plant

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gord C 24th May, 2019 7:22 AM MDT	

Photos

3 Photos



Photo 1



Photo 2



Photo 3

Grizzly - 2019-05-22 BB dorm

Wildlife Report - 2019 Conducted on 22nd May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.68%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-22 BB dorm
Document No.
WildlifeReport000303

Completed On

📅 22nd May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

Unanswered

Department/Individual Who Reported Wildlife:

Unanswered

Environment On Scene

Environment at Call-out Location

📅 22nd May, 2019 ⌚ 4:20 PM MDT

Animal Type

Unanswered

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear, white tag remnants on left ear.

Photo (If Possible):

Unanswered

Chronological Events

16:20 ENV spots bear in intersection between south haul road and main camp road, heading towards by dorm. ENV makes announcement and pushes bear away from camp onto ice of shallow bays

16:30 to 19:45 bear moves around shallow bays for several hours

19:45 ENV leaves scene, updates wildlife advisory

20:10 bear called in crossing PKC, Updated advisory

Movement Map (Import NotePlus Site Map)

Unanswered

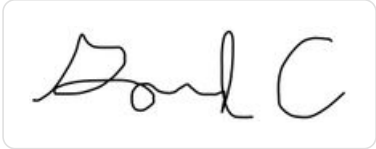
Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 22nd May, 2019 ⌚ 7:45 PM MDT
Final Location of Wildlife PKC facility

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gord Cumming 23rd May, 2019 7:25 AM MDT	

Grizzly - 2019-05-23 - Till Pile

Wildlife Report - 2019 Conducted on 23rd May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.68%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-23 - Till Pile
Document No.
WildlifeReport000305

Completed On

 23rd May, 2019
--

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 23rd May, 2019 ⌚ 8:05 AM MDT

Department/Individual Who Reported Wildlife:

Delphis, site Services

Environment On Scene

Environment at Call-out Location

📅 23rd May, 2019 ⌚ 8:25 AM MDT

Animal Type

Unanswered

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear, tag remnants on left ear.

Photo (If Possible):

Unanswered

Chronological Events

08:05 bear called in crossing airport road and climbing till pile. Wildlife announcement made
08:25 ENV on scene, minutes later bear spotted walking west down road of till pile.
08:35 ENV persuades bear down till pile towards north inlet by approaching in vehicle and calling out
08:40 ENV moves to airport road, ensures bear is staying in north inlet
09:05 ENV off scene.

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	1 From 0 to 40
Specify "Hey you, bugger off!"	

Environment Off Scene

End of Environment Call-out 📅 23rd May, 2019 ⌚ 9:05 AM MDT
Final Location of Wildlife North inlet

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gord c 23rd May, 2019 6:30 PM MDT	

Grizzly - 2019-05-25 - Crusher Plant

Wildlife Report - 2019 Conducted on 26th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
1.81%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-25 - Crusher Plant
Document No.
WildlifeReport000020

Completed On

📅 26th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 25th May, 2019 ⌚ 6:26 PM MDT

Department/Individual Who Reported Wildlife:

Logan - Projects

Environment On Scene

Environment at Call-out Location

📅 25th May, 2019 ⌚ 6:40 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear - sandy coloured with darker legs and stripe down its back

Photo (If Possible):

Unanswered

Chronological Events

1826 - Bear called in near Crusher by Logan (Projects) - ENV issues announcement
1840 - ENV spots Bear on South Haul Road, Bear moves into the Rose Garden
1843 - ENV uses GUN CYCLE, Bear is alert but resumes eating
1846 - Bear in Rose Garden, ENV uses BANGER to move Bear - no response
1858 - ENV uses BANGER - no response
1938 - ENV uses 12GA EXPLOSIVE to move Bear toward Lake edge of Shallow Bays
2008 - ENV uses BANGER, no movement
2026 - ENV uses RUBBER BUCKSHOT - Bear moved then returned to same spot
2038 - ENV uses RUBBER BUCKSHOT to move Bear - Bear ran toward water, then once it was past the hill, it moved along the rocks to the edge of the Rose Garden
2220 - Bear bedded down on rocks near the Rose Garden - ENV updates announcement and leaves scene

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

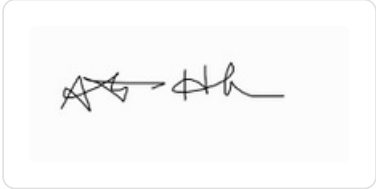
Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	3 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	1 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	3 From 0 to 40
Specify 1 Gun Cycle, 2 Rubber Buckshot	

Environment Off Scene

End of Environment Call-out  25th May, 2019  10:20 PM MDT
Final Location of Wildlife Rose Garden

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Atikin Hehn 26th May, 2019 9:04 AM MDT	

Photos

1 Photos



Photo 1

Grizzlies - 2019-05-26

Wildlife Report - 2019 Conducted on 26th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
1.59%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzlies - 2019-05-26
Document No.
WildlifeReport000307

Completed On

📅 26th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 26th May, 2019 ⌚ 1:50 PM MDT

Department/Individual Who Reported Wildlife:

Karen at airport

Environment On Scene

Environment at Call-out Location

📅 26th May, 2019 ⌚ 1:55 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Dark coated sow and two cubs, one larger light cub, one smaller dark one

Photo (If Possible):

Unanswered

Chronological Events

13:50 bear called in by airport apron heading to n17.
14:40, atikin switches with gord,
15:05 ENVspots bears cresting till pile
15:20 ENV approaches bears in Turcos, fires 4 pen bangers in succession and persuades bear family down north side of till pile.
15:25 ENV goes around, waits for bears to climb down till pile then herds them across road back into north inlet.
16:30 ENV watches bears head west down north inlet, leaves to finish other tasks
17:30 ENV returns to heck for bears, no visual gained, ENV leaves scene.

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	4 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out Unanswered
Final Location of Wildlife Unanswered

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gord C 26th May, 2019 6:09 PM MDT	



Photo 1

Grizzly - 2019-05-26 - veg plots

Wildlife Report - 2019 Conducted on 26th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.91%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-26 - veg plots
Document No.
WildlifeReport000306

Completed On

📅 26th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 26th May, 2019 ⌚ 6:50 AM MDT

Department/Individual Who Reported Wildlife:

Ken rosebrink - site Services maintenance

Environment On Scene

Environment at Call-out Location

📅 26th May, 2019 ⌚ 7:15 AM MDT

Animal Type

Unanswered

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear with tag on left ear

Photo (If Possible):

Unanswered

Chronological Events

06:50 bear called in by ken from site services maintenance at shallow bays veg plot Road
07:15 ENV on scene in truck, bear stays in veg plot
09:05 bear beds down to sleep for a while, ENV leaves scene
11:15 ENV spots bear in shallow bay near SHR curve near Truck Shop
11:45 ENV blocked bear from crossing SHR, bear returns to grazing
12:15 ENV blocked bear from crossing SHR again, bear returns to grazing
12:50, bear begins heading north back towards veg plots,
13:05 bear in same place, ENV off scene,
19:55 bear called in heading to backfill, ENV mobilizes
20:20 ENV on scene, bear still in exactly the same spot
21:30 bear crosses south haul road, ENV chases across road, bear climbs rock wall and beds down in usual spot. ENV off scene

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	3 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 26th May, 2019 ⌚ 9:30 PM MDT
Final Location of Wildlife Near one 1

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Gord C 27th May, 2019 7:03 AM MDT	

Photos

1 Photos



Photo 1

Grizzly-2019-05-29-A21 Zone 2

Wildlife Report - 2019 Conducted on 30th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.68%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly-2019-05-29-A21 Zone 2
Document No.
WildlifeReport000308

Completed On

📅 30th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 29th May, 2019 ⌚ 4:00 PM MDT

Department/Individual Who Reported Wildlife:

Ray, Surface Ops

Environment On Scene

Environment at Call-out Location

📅 29th May, 2019 ⌚ 4:40 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident Male, Ugly butt

Photo (If Possible):

Unanswered

Chronological Events

16:00 called in by Ray
16:40 arrive at Zone 2, truck and horn
16:48 bear walking along shore heading west
16:54 lost visual
16:58 spotted heading west
17:37 spotted south of emulsion plant, west of SCRP, grazing near shore

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	1 From 0 to 40
Air Horn	1 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 30th May, 2019 ⌚ 6:30 AM MDT
Final Location of Wildlife Emulsion Plant

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Liam Case 30th May, 2019 2:44 PM MDT	

Grizzly-2019-05-29- Shallows near UG

Wildlife Report - 2019 Conducted on 29th May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
1.13%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly-2019-05-29- Shallows near UG
Document No.
WildlifeReport000025

Completed On

📅 29th May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 29th May, 2019 ⌚ 3:20 PM MDT

Department/Individual Who Reported Wildlife:

Joe, surface mining

Environment On Scene

Environment at Call-out Location

📅 29th May, 2019 ⌚ 3:16 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Sow, one cub

Photo (If Possible):

Unanswered

Chronological Events

1615 received notification of sow and burn from joe, announced
1620 arrived at location spotted bears, left for deterrent
1630 returned to last spotted location, no visual
1637 left shallows to drive dike
1641 spotted across the bay 1 km south of comm shack
1648 spotted on lake off of point, near winter road access
1650 one gun cycle, then one bearbanger fired, bears fled across the channel towards A21 north dike
1740 updated alert
1820 sow and cub in middle of bay near lakeshore, begin heading towards Haul Road
1830 pushed by us with truck and horn up berm across A21 Haul Road
1836 lost visual, left to Z2 to deter ugly butt

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	1 From 0 to 40
Air Horn	1 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	1 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	1 From 0 to 40
Specify 1 gun cycle	

Environment Off Scene

End of Environment Call-out 📅 30th May, 2019 ⌚ 6:27 AM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Liam Case 30th May, 2019 6:28 AM MDT	

Grizzly - 2019-05-31 - North Inlet

Wildlife Report - 2019 Conducted on 31st May, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.45%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-05-31 - North Inlet
Document No.
WildlifeReport000309

Completed On

📅 31st May, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 31st May, 2019 ⌚ 8:30 AM MDT

Department/Individual Who Reported Wildlife:

Dwayne - Site Services

Environment On Scene

Environment at Call-out Location

📅 31st May, 2019 ⌚ 8:55 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear, blonde with dark stripe down back

Photo (If Possible):

Unanswered

Chronological Events

8:30 Dwayne reported bear at NI, issued bear alert
8:40 Dwayne reported bear at south haul road and airport road intersection, updated bear alert
8:45 ENV at SCAP with eyes on bear heading towards back warehouse building
8:50 mike, from warehouse, spotted bear at N18
9:00 ENV has eyes on bear at UG haul road heading towards 418 pit
9:05 Used TRUCK to move bear off road, bear grazing on tundra
9:25 ENV leaves bear grazing tundra by 418 pit

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out  31st May, 2019  9:25 AM MDT
Final Location of Wildlife Tundra near A418

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Shelby Skinner 1st Jun, 2019 6:32 PM MDT	

Photos

1 Photos



Photo 1

Grizzly - 2019-06-06 - North Inlet

Wildlife Report - 2019 Conducted on 6th Jun, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
0.23%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-06-06 - North Inlet
Document No.
WildlifeReport000028

Completed On

 6th Jun, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 6th Jun, 2019 ⌚ 3:30 PM MDT

Department/Individual Who Reported Wildlife:

Chuck - Surface Ops

Environment On Scene

Environment at Call-out Location

📅 6th Jun, 2019 ⌚ 3:41 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear, blonde with dark brown stripe down back

Photo (If Possible):

Unanswered

Chronological Events

1530 Chuck on dozed at NI reported blonde bear between NI and the new airport road. Issued bear alert.
1541 ENV on scene, no visual on bear.
1550 Bear called in at Backfill and North Haul Road intersection
1555 Bear called in at Shallow Bays by Dwayne with Site Services
1609 ENV with eyes on bear in Shallow Bays near Veggie Plots. Updated bear alert.
1619 ENV out. Left bear in Shallow Bays across from Fresh Water Uptake

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 7th Jun, 2019 ⌚ 6:30 AM MDT
Final Location of Wildlife Shallow Bays

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	Liam Case 9th Jun, 2019 10:07 AM MDT	

Grizzly - 2019-06-11

Wildlife Report - 2019 Conducted on 11th Jun, 2019 By Environment Department

Complete

Inspection score	Failed items	Created actions
2.27%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-06-11
Document No.
WildlifeReport000313

Completed On

 11th Jun, 2019
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Wildlife Report

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 11th Jun, 2019 ⌚ 11:20 AM MDT
Department/Individual Who Reported Wildlife: Dozer operator in north inlet

Environment On Scene

Environment at Call-out Location 📅 11th Jun, 2019 ⌚ 12:54 PM MDT	
Animal Type	Grizzly Bear
Description (eg. number of individuals, colour, age, size, etc.): Resident blondie with tag on left ear	
Photo (If Possible):	
Photos  Photo 1	

Chronological Events

11:20 bear spotted in north inlet
12:20 bear spotted in hanging tree area headed to airport road, ENV mobilizes
12:54 ENV on scene at hanging tree, began search for bear
13:00 bear called in at Batch Plant on top of equipment
13:04 ENV arrives, sees bear moving south on UG/batch plant road, pushes bear into Laydown off of road,
13:05 env fires 1 pen banger to keep bear moving south over rocks
13:07 bear crosses 418 Dike road, ENV chases across road with truck
13:09 ENV fires 2 pen bangers to push bear south away from road
13:22 bear beds down to nap
13:55 bear gets up and continues waddling south towards shallow bays
16:02 bear called in at Batch Plant again, ENV mobilizes
16:07 ENV spots bear by UG refuelling station, pushes south over berm onto LV ramp with truck.
16:08 ENV pushes bear down ramp and across berm to haul road, then chases across haul road into shallow bays
16:40 bear heading towards raw water inlet
16:55 ENV fires pen banger toward bear from raw water intake to encourage it to continue moving east away from camp
18:08 bear spotted heading towards A21 from south winter road Approach.
18:24 ENV blocks bear on Dike of a21. Bear starts heading east off island
18:35 ENV off scene

Movement Map (Import NotePlus Site Map)

Photos



Photo 2

Deterrent Count

Truck	5 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	4 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 11th Jun, 2019 ⌚ 6:35 AM MDT
Final Location of Wildlife Off island heading east for A21

Closure & Sign-off

Wildlife Report Complete		On
Signature		
	GC	12th Jun, 2019 8:51 AM MDT

Photos

2 Photos



Photo 1



Photo 2

Grizzly Bear - 2019-06-16 Backfill Plant

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
2.95%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly Bear - 2019-06-16 Backfill Plant
Document No.
WildlifeReport000314

Completed On

📅 16th Jun, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 16th Jun, 2019 ⌚ 7:43 AM MDT

Department/Individual Who Reported Wildlife:

George

Environment On Scene

Environment at Call-out Location

📅 16th Jun, 2019 ⌚ 7:58 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident blonde grizzly bear

Photo (If Possible):

Unanswered

Chronological Events

Bear first spotted near the backfill, headed towards north country haul road, was deterred towards the till pile using 3 c/f bear bangers. ENV anticipated its direction and moved toward the NIWTP however, the bear was not seen on the other side of the till pile next to the NIWTP. ENV received radio confirmation that the bear was spotted on north country haul road heading to the PKC pond and barge road. ENV did not see the Bear until ENV received radio confirmation that the bear was located on the East PKC heading southwest along the PKC pond. During that time another ENV member came over to assist in another vehicle. Together we blocked the bear from wondering into the PKC pond work areas. Eventually the bear was deterred to the base of the test piles and the PKC. Where the bear ended up sleeping. Bears last known location was at the base of the test pile and the PKC napping.

18:55 Bear called in at truck shop heading towards pond 5

19:52 Env on scene at pond 5

19:55 fired 3x C/F bangers, 3x 12G explosives

21:00 Bear lays down to sleep, env leaves scene

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	3 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	6 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	3 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

Environment Off Scene

End of Environment Call-out 📅 16th Jun, 2019 ⌚ 9:48 AM MDT
Final Location of Wildlife Base of test pile and PKC napping.

Closure & Sign-off

Wildlife Report Complete	On
Signature GC	

Grizzly 2019-06-16 PKC Muster

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
2.72%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly 2019-06-16 PKC Muster
Document No.
WildlifeReport000022

Completed On

 24th Jun, 2019
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Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 16th Jun, 2019 ⌚ 3:30 AM MDT

Department/Individual Who Reported Wildlife:

Unanswered

Environment On Scene

Environment at Call-out Location

📅 16th Jun, 2019 ⌚ 4:00 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident blonde Grizzly

Photo (If Possible):

Unanswered

Chronological Events

03:30 Bear called in at the PKC muster Station
03:50 Env on scene at Barge road
03:52 Pushed bear down barge road to east pkc light vehicle entrance
03:54 Env fired 1 banger to push bear over dam berm
04:22 Fired 2x C/F bangers, bear moved down berm towards test piles
04:25 fired 3x 12G explosives at bear below
04:43 2x 12G explosives
04:39 cycled Action, "Hey bear"
05:20 Bear enters area west of Waste transfer, env off scene.

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

1
From 0 to 40

Air Horn	0 From 0 to 40
C/F Bear Banger	3 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	5 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	2 From 0 to 40
Specify Shotgun cycling, "Hey Bear"	

Environment Off Scene

End of Environment Call-out  16th Jun, 2019  5:20 PM MDT
Final Location of Wildlife On Tundra west of Waste transfer

Closure & Sign-off

Wildlife Report Complete	On
Signature GC	

Grizzly- 2019-06-17 -PKC

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
5.67%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2019-06-17 -PKC
Document No.
WildlifeReport000316

Completed On

 17th Jun, 2019
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Wildlife Report

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 17th Jun, 2019 ⌚ 3:30 AM MDT
Department/Individual Who Reported Wildlife: Ian trainer

Environment On Scene

Environment at Call-out Location 📅 17th Jun, 2019 ⌚ 3:50 AM MDT	
Animal Type	Unanswered
Description (eg. number of individuals, colour, age, size, etc.): Resident grizzly, blonde with dark paws and face, white tag on left ear	
Photo (If Possible): Unanswered	

Chronological Events

03:30 bear called in at PKC muster station
03:52 ENV on scene at Barge Road
03:53 pushes bear with TRUCK to south PKC entrance
03:54 fired 1 c/f BANGER to push over berm down towards Test Piles
04:22 bear near top of PKC dam, fired 2 c/f BANGERS, bear moved down off dam
04:25 fired 3 12 GA EXPLOSIVES, bear moved south 100m
04:43 ENV moved down to Test Piles area, fired 2 12 GA EXPLOSIVES, moved bear towards AN road
05:17 bear spotted by ENV across AN road
05:20 fired 1 12 GA BANGER, bear moved further onto tundra
05:24 ENV repositions, finds bear in good spot, heading away from Waste Transfer, updates announcement, leaves scene
14:30 Bear called in near PKC Muster Station, moving toward ROM Hill pipeline, ENV issues announcement
14:40 ENV arrives on scene and locates bear in Pond 5, updates announcement
14:42 ENV fires 2 BANGERS at Bear in Pond 5
14:49 ENV uses GUN CYCLE, Bear moves away from ROM road, continues grazing in Pond 5
15:18 ENV uses TRUCK to move Bear out of Pond 5 onto Pipe adjacent to South Haul Road, headed to Pond 1
15:21 ENV uses GUN CYCLE to keep Bear moving
15:25 ENV uses CLAPPING to keep Bear moving
15:28 ENV uses GUN CYCLE to keep Bear moving along pipe toward Pond 1
15:58 ENV fires BANGER to move Bear, bear moves a few meters then continues grazing
16:18 ENV uses TRUCK to move Bear and keep it from crossing the South Haul Road to Pond 13, Bear continues along ditch toward Till Pile
16:45 ENV uses TRUCK/HORN, no reaction from Bear
17:08 ENV uses GUN CYCLE to move Bear
17:14 ENV uses ROCKS to keep Bear moving
17:17 ENV uses TRUCK to move Bear across Airport Road into the North Inlet
17:35 Bear grazing and moving in direction toward the Airport, ENV updates announcement and leaves area

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	5 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	6 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	1 From 0 to 40
12GA Explosive	5 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	7 From 0 to 40
Specify 5 Gun Cycle, 1 Rocks, 1 Clapping	

Environment Off Scene

End of Environment Call-out 📅 17th Jun, 2019 ⌚ 5:35 PM MDT
Final Location of Wildlife North Inlet

Closure & Sign-off

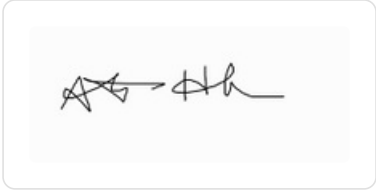
Wildlife Report Complete	On
Signature  Atikin Hehn 19th Jun, 2019 2:41 PM MDT	



Photo 1

Grizzly - 2019-06-19 till pile

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
2.95%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-06-19 till pile
Document No.
WildlifeReport000319

Completed On

 19th Jun, 2019
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Wildlife Report

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 19th Jun, 2019 ⌚ 4:24 PM MDT
Department/Individual Who Reported Wildlife: Delphis - Site Services

Environment On Scene

Environment at Call-out Location Unanswered	
Animal Type	Grizzly Bear
Description (eg. number of individuals, colour, age, size, etc.): Mother and 2 cubs	
Photo (If Possible): Unanswered	

Chronological Events

16:28 Delphis called in mother grizzly and two cubs at Backfill heading to Till Pile
 16:34 ENV arrived on scene, sow and cubs on Till Pile, lost visual
 13:40 bears back in Backfill, shot 3 c/f BANGERS to get them moving out of pond near Backfill north entrance
 13:41 bears climbing Till Pile, ENV shoots 12 GA RUBBER BULLET at mother
 16:52 bears move down N side of Till Pile, pushed across Airport Road with TRUCK
 16:55 bears move around NIWTP, ENV follows on foot, truck beside, bears head towards Hanging Tree
 17:15 bears cross Hanging Tree, ENV shoots 12 GA RUBBER BULLET at mother
 17:20-18:37 bears in in-field area of 154 pit, threw ROCKS, bears moved further into infield
 18:37 ENV techs swapped out, bears napping in A154 Fish Habitat
 19:25 Bears napping, ENV leaves area
 21:10 Bears called in at FAR, ENV issues announcement
 21:20 ENV arrives on scene, Bears on berm of the entrance to the FAR/A418 Ramp, ENV uses TRUCK to push bears toward D1 Laydown
 21:30 Bears move into Rock Quarry (Dump 12) behind the Batch Plant
 21:35 ENV spots bears on Rocks behind the Batch Plant
 21:45 ENV sees bears on Tundra South of the 418 Dike entrance, headed in the direction of the shallow bays
 21:50 ENV fires 2 c/f BANGERS to move bears away from road onto the Tundra more
 22:28 ENV uses 12 GA BANGER to keep bears from napping and move them more onto the Tundra
 22:34 ENV moved to better/closer spot to access Bears, ENV fires 12 GA BANGER to wake bears and move them more onto the Tundra, Bears move into valley and disappear
 23:05 ENV searches area and cannot locate Bears, updates areas on last known location of bears and leaves area

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	5 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	2 From 0 to 40
12GA Explosive	0 From 0 to 40

12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	2 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	1 From 0 to 40
Specify Thrown rocks,	

Environment Off Scene

End of Environment Call-out Unanswered
Final Location of Wildlife Tundra between North Winter Road approach and entrance to 418 Dike

Closure & Sign-off

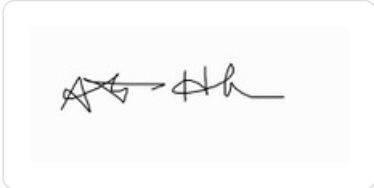
Wildlife Report Complete	On
Signature  Atikin Hehn 21st Jun, 2019 10:44 AM MDT	



Photo 1

Grizzly- 2019-06-20 - Pond 5

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
4.08%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2019-06-20 - Pond 5
Document No.
WildlifeReport000320

Completed On

 20th Jun, 2019
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Wildlife Report

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 20th Jun, 2019 ⌚ 7:30 AM MDT
Department/Individual Who Reported Wildlife: Team drilling

Environment On Scene

Environment at Call-out Location 📅 20th Jun, 2019 ⌚ 7:45 AM MDT	
Animal Type	Grizzly Bear
Description (eg. number of individuals, colour, age, size, etc.): Mother and two cubs, one small cub, always lagging behind	
Photo (If Possible): Unanswered	

Chronological Events

07:30: Team drilling reports sow and two cubs (bears) located in southern Shallow Bay Area.
 07:45: ENV arrives on scene, observes bears grazing and then lay down for a sleep.
 08:55: Bears observed sleeping for one hour, ENV leaves scene.
 09:30: Rick (ERT) reports bears in Pond 5 area.
 09:40: ENR arrives on scene, observes bears grazing. ROCKS thrown to deter bears from advancing southward.
 10:05: Bears advance up to North Haul Road, ENV advances up ROM ramp to North Haul Road and notifies presence of bears in PKC area. Bears spotted on drainage pipe heading southwest, TRUCK used to push bears in north direction.
 10:20: Bears advance towards North Country Rock Pile (NCRP) and into landfill area. ENV moves to landfill and notifies the presence of bears in the area.
 10:30: ENV uses 4 12 GA EXPLOSIVES to deter bears out of landfill, Bears advance northward onto NCRP. ENV uses TRUCK to push bears northward off NCRP.
 10:45: ENV spots bears on Airport Haul Road advancing northward into North Inlet area. ENV notifies of bears in area. Bears cross drainage pipe and ENV loses sight of bears.
 11:00: ENV moves to North Inlet Water Treatment Plant area to lookout for bears.
 11:35: No sign of bears. ENV notifies area of last bear sighting and leaves scene.
 13:47: Bears called in heading to NIWTP
 14:30 ENV has eyes on bears, snacking, ENV leaves area
 14:50 Norm (Dozer operator) calls in bears headed in direction of NIWTP
 14:59 ENV has eyes on bears, uses CLAPPING to move bears back into North Inlet
 15:02 ENV uses CLAPPING to move bears into North Inlet
 15:03 ENV uses CLAPPING and ROCKS to move bears away from NIWTP
 15:16 ENV uses ROCKS and GUN CYCLE to move bears around NIWTP
 15:23 ENV uses TRUCK to push bears around NIWTP onto Tundra, bears move onto Tundra between NIWTP and Hanging Tree
 15:36 Bears move toward Fish Habitat of A154, ENV uses ROCKS to move bears further into A154 Fish Habitat
 15:39 ENV uses ROCKS to move bears further into Fish Habitat of A154, ENV updates announcement
 16:30 ENV uses ROCKS and GUN CYCLE to get bears moving, not much movement/reaction
 17:56 Cubs feeding, Bears located in A154 Fish Habitat, ENV leaves area

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40

C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	4 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	11 From 0 to 40
Specify 6 Rocks, 3 Clapping, 2 Gun Cycle	

Environment Off Scene

End of Environment Call-out 📅 20th Jun, 2019 ⌚ 5:56 PM MDT
Final Location of Wildlife A154 Fish Habitat

Closure & Sign-off

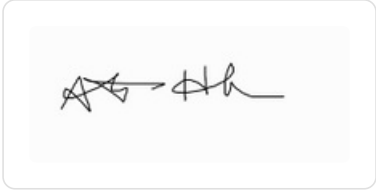
Wildlife Report Complete	On
Signature  Atikin Hehn 21st Jun, 2019 10:59 AM MDT	



Photo 1

Grizzly bear - 2019-06-22 - Process Plant ROM

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
9.07%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly bear - 2019-06-22 - Process Plant ROM
Document No.
WildlifeReport000029

Completed On

 22nd Jun, 2019
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Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 22nd Jun, 2019 ⌚ 8:00 AM MDT

Department/Individual Who Reported Wildlife:

Process Plant ROM Operator

Environment On Scene

Environment at Call-out Location

📅 22nd Jun, 2019 ⌚ 8:18 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Blonde Bear - potentially not the resident bear
2nd bear - blonde bear - resident bear

Photo (If Possible):

Unanswered

Chronological Events

08:00 – Bear called in from Process Plant ROM – bear headed West to Waste Transfer Area
08:18 – ENV contacts Process Plant ROM, bear not on ROM, headed to WTA
08:19 – Site Services calls in bear near South Tank Farm
08:20 – ENV arrives at location – bear spotted headed to Winter Road Laydown, then down South Winter Road Approach, grazing on tundra
09:20 – 5 x HORN – bear entered Pond 11
09:48 – 2nd bear called in at NCRP/NIWTP
10:43 – Bear headed South onto Tundra again, slowly moved South toward A21
11:45 – Lost sight of bear on Tundra near Lakeshore Blvd
12:15 – ENV leaves area
17:30 – Blonde bear (resident bear) called in near AN sign in shack (Pond 12)
17:37 – ENV arrives on scene and locates bear in Pond 12, throws ROCKS x 3 to push bear further into the Pond
17:44 – ENV fires 3 x 12 GA EXPLOSIVES to attempt to push bear toward AN road, bear moves further, then resumes grazing
17:48 – ENV throws ROCKS to get bear moving – no reaction from bear
17:50 – ENV fires 2 x 12 GA EXPLOSIVES to push bear away from WTA
18:08 – ENV fires 3 x 12 GA EXPLOSIVES, 1 x 12 GA BANGER to attempt to push bear away from WTA, bear moved toward AN road, then returns to Pond 12 area

Bear moved toward AH road, then returns to Pond 12 area

18:10 – ENV leaves area, GC drops off AH at MAC, then returns to Pond 12

18:20 – ENV locates bear in Pond 12

18:40 – Bear moves onto WTA road headed in direction on PKC, ENV uses TRUCK to move bear

18:45 – Bear crosses road, headed in direction of METCON Yard, ENV searches area

18:55 – AH deploys again to help GC, Both search, MAC, Powerhouses, PKC areas, ROM, Cannot locate bear

19:20 – GC leaves, AH continues searching

19:39 – ENV locates bear in Process Plant Yard, Updates announcement, ENV uses ROCKS to move bear, bear heads in direction of STP

19:44 – Bear located at STP, ENV fired RUBBER BULLET, bear moved up toward Powerhouse 2 yard, then returned to STP

19:50 – ENV fired RUBBER BULLET to move bear, bear headed toward Powerhouse 2 yard, then returned to STP

20:15 – ENV threw ROCKS, no reaction, ENV fired c/f BANGER – bear ran towards South Tank Farm, walking along the pipeline on top of the berm

20:20 – bear crossed road toward Cold Storage Building, ENV used TRUCK to push bear into Pond 11 area, updated Announcement

20:50 – Bear crossed road headed toward South Winter Road Approach

20:55 – ENV threw ROCKS – no reaction

20:58 – ENV fired c/f BANGER to push bear, bear moved a bit further down the tundra

21:30 – ENV loses eyes on bear after disappearing behind rocks on the Tundra – headed in direction of Shallow Bays/Pond 10

21:40 – ENV locates bear near Raw Water Intake, bear crosses road and heads to Pond 10

21:51 - ENV fired 12 GA B.B. MARKER at bear in Pond 10 – Bear starts moving again, headed in the direction of the South Haul Road/Pond 5

22:00 – ENV uses GUN CYCLE x 2 to get bear moving again – bear moves out of Pond 10, across the South Haul Road into Pond 5

22:22 – ENV uses GUN CYCLE to move bear further into Pond 5

22:27 – ENV uses c/f BANGER – bear moves, then returns to same spot

22:35 – Bear starts moving out of Pond 5 and starts moving along the South Haul Road towards Pond 1

22:40 – ENV uses GUN CYCLE to keep bear moving along South Haul Road

22:43 – ENV uses GUN CYCLE to keep bear moving

22:47 – ENV uses GUN CYCLE

22:56 – ENV uses GUN CYCLE to move bear into Pond 1 area, updates announcement

23:27 – ENV uses 12 GA EXPLOSIVE to attempt to push bear toward Backfill Yard (out of Pond 1)

23:31 – Bear grazing in Pond 1 – ENV leaves area for Washroom

23:39 – ENV returns to Pond 1 – no bear

23:50 – ENV contacts Backfill, bear spotted in Load out yard headed in direction of Till Pile

23:53 – ENV spots bear near pipeline between Crusher Load out and South Haul Road, uses GUN CYCLE to push bear toward Till Pile

00:05 – Bear crosses North Haul Road to base of Till Pile

00:12 – Bear spotted along Pipeline near bottom of Till Pile, ENV uses GUN CYCLE to push bear toward North Inlet

00:21 – Bear headed up Till Pile – good area, ENV updates announcement and leaves area

Movement Map (Import NotePlus Site Map)

Photos



Photo 1

Deterrent Count

Truck	2 From 0 to 40
Air Horn	5 From 0 to 40
C/F Bear Banger	3 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	1 From 0 to 40
12GA Explosive	9 From 0 to 40
12GA B.B. Marker	1 From 0 to 40
12GA Rubber Bullet	2 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	16 From 0 to 40
Specify 7 Rocks, 9 Gun cycle	

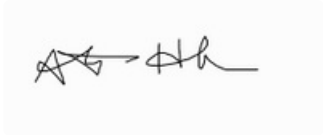
Environment Off Scene

End of Environment Call-out 📅 23rd Jun, 2019 ⌚ 12:21 AM MDT
Final Location of Wildlife Till Pile

Closure & Sign-off

Wildlife Report Complete	On
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Signature

A handwritten signature in black ink, appearing to read 'Atikin Hehn', is displayed within a light gray rectangular box. The signature is stylized, with the first part being a large 'A' followed by a horizontal line and then the name 'Hehn'.

Atikin Hehn

23rd Jun, 2019 9:29 AM MDT



Photo 1

Grizzly-2019-06-29

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
1.36%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly-2019-06-29
Document No.
WildlifeReport000323

Completed On

 29th Jun, 2019
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Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 29th Jun, 2019 ⌚ 6:45 AM MDT

Department/Individual Who Reported Wildlife:

Mike, Site Services

Environment at Call-out Location

📅 29th Jun, 2019 ⌚ 7:10 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident Male

Photo (If Possible):

Unanswered

Chronological Events

6:45 Reported on south haul road
near Truck Shop, Annouce
7:10 Sighted by LC JK near pond 5 grazing
7:30 Bedded down near boulder at pond 5, sleeping
8:11 still sleeping
9:02 still sleeping
10:05 grazing
11:00 Bedded behind boulder, no visual
11:30 rolled onto back and stuck legs in air, very lazy
11:45 SS2 took over for LC, bear sleeping at base of rock wall
13:10 LC took over for SS2, bear still at base of rock wall
14:00 still sleeping
14:30 still snoozin
14:50 SS2 took over for LC, bear grazing in Pond 5.
15:50 bear moving towards truck, bear heard ACTION CYCLE
while preparing to fire rubber bullet and ran in opposite direction
17:12 opened TRUCK DOOR 2x and bear moved away
17:35 bear sleeping in Pond 5, reissued bear alert, SS2 out
20:40 bear reported near White sprung across from Warehouse, issued bear alert
20:55 bear reported passing by STP and heading up towards H dorm
21:00 SS2 has eyes on bear at Winter Road Staging Area, bear crosses over into Steel Yard and SS2 uses
TRUCK to move bear down to Pond 11. Bear grazing in Pond 11.
21:30 bear still grazing in Pond 11. Used AIR HORN and bear looked up
22:22 bear still grazing in Pond 11, SS2 out

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	1 From 0 to 40
Air Horn	1 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	3 From 0 to 40
Specify Slam truck door 2x, cycle gun 1x	

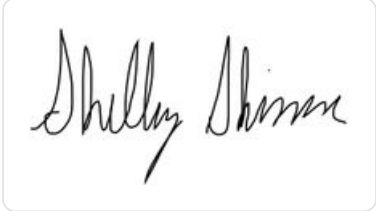
End of Environment Call-out

📅 29th Jun, 2019 ⌚ 10:22 PM MDT

Final Location of Wildlife

Pond 11

Closure & Sign-off

Wildlife Report Complete	On
Signature  Shelby Skinner 30th Jun, 2019 6:26 PM MDT	

Photos

1 Photos

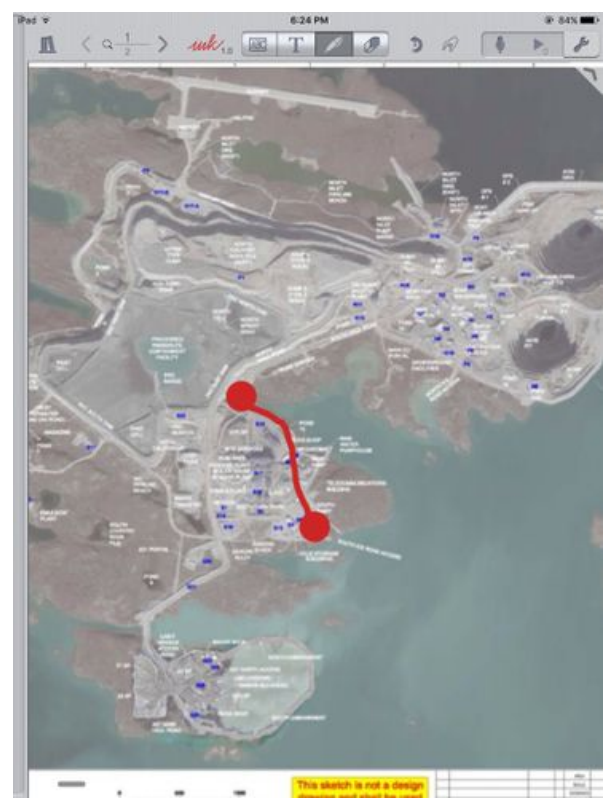


Photo 1

Grizzly - 2019-07-01 - Airport Road

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.45%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-07-01 - Airport Road
Document No.
WildlifeReport000032

Completed On

 1st Jul, 2019

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 1st Jul, 2019 ⌚ 9:20 AM MDT

Department/Individual Who Reported Wildlife:

Site Services

Environment at Call-out Location

📅 1st Jul, 2019 ⌚ 9:30 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Ugly butt

Photo (If Possible):

Unanswered

Chronological Events

9:20 Bear reported on Airport road
9:30 LC and JK on scene, no visual of bear
15:00 Bear reported on Airport road, SS2 and JK on scene, no visual of bear
16:00 Bear reported at Backfill Crusher Loadout. SS2 and JK have visual of bear in ditch alongside South Haul Road. Issued bear alert.
16:20 Bear crossed South Haul Road towards Fabrication Shop. Reissued bear alert.
16:30 Used TRUCK to move bear off of Batch Plant road, went up toward UG Mine Dry. Grazing in grass above portal. Bear started heading towards LV road to Old Mine Dry. Updated bear alert.
17:00 Lost visual of bear
17:14 SS2 and JK headed back to office

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

1

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 1st Jul, 2019 ⌚ 5:15 PM MDT
Final Location of Wildlife Shallow Bays

Closure & Sign-off

Wildlife Report Complete	On
Signature  Shelby Skinner 5th Jul, 2019 10:23 AM MDT	

Grizzly - 2019-07-03 - SCAP

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
2.72%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-07-03 - SCAP
Document No.
WildlifeReport000033

Completed On

 3rd Jul, 2019

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 3rd Jul, 2019 ⌚ 7:20 AM MDT
Department/Individual Who Reported Wildlife: SCAP

Environment at Call-out Location 📅 3rd Jul, 2019 ⌚ 7:41 AM MDT	
Animal Type	Grizzly Bear
Description (eg. number of individuals, colour, age, size, etc.): Resident bear	
Photo (If Possible):	
— Photos  Photo 1Photo 2Photo 3Photo 4	

Chronological Events

0720 Bear reported at SCAP Warehouse. Issued bear alert.
 0741 SS2 and DB2 have eyes on bear on the edge of Pond 13. Bear resting on rocks.
 0755 ENV went between cement bags at C portal to move bear further into Pond 13
 0800 Threw ROCKS 4x and bear looked in my direction but did not move
 0840 ENV moved locations out of sight of bear.
 0911 Bear up and moving in Pond 13 heading towards exit to UG road
 0945 Bear crossed UG road over to Veggie Plot road. Used TRUCK to move bear further onto Veggie Plot road
 1015 Bear tried crossing South Haul Road. Used TRUCK to keep bear off the road. Bear attempted to cross the road again and went into Pond 1. ENV notified Backfill Plant
 1100 Bear climbed up rock wall and is sleeping on fine grain gravel near top
 1450 Bear reported crossing South Haul Road into Shallow Bays
 1530 Bear tried crossing South Haul Road into Pond. Used TRUCK 3x
 1600 Bear crossed South Haul Road into Pond 5 grazing. Updated bear alert.
 1656 Bear napping in Pond 5
 1745 CLAPPED and Bear moved up towards green space between Process ROM and North Haul Road
 1800 Bear at PKC. Updated bear alert. Bear walking out on PKC Barge Road
 1820 Bear on Barge Road, used TRUCK to move it off road.
 1845 Bear spotted going down ramp towards Pond 4. ENV out.

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	6 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	5 From 0 to 40

Specify Clapped and threw rocks
End of Environment Call-out 📅 3rd Jul, 2019 ⌚ 6:45 PM MDT
Final Location of Wildlife Pond 4

Closure & Sign-off

Wildlife Report Complete	On
Signature	
 Shelby Skinner 5th Jul, 2019 10:16 AM MDT	

Photos

4 Photos



Photo 1



Photo 2



Photo 3



Photo 4

Grizzly and Two cubs 2019-07-07- shallow bays

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
2.04%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly and Two cubs 2019-07-07- shallow bays
Document No.
WildlifeReport000326

Completed On

 7th Jul, 2019

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 7th Jul, 2019 ⌚ 10:30 AM MDT

Department/Individual Who Reported Wildlife:

Backfill

Environment at Call-out Location

📅 7th Jul, 2019 ⌚ 10:45 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Sow and two cubs

Photo (If Possible):

Unanswered

Chronological Events

Sow and 2 cubs called in 1030 on s haul Rd near Backfill
1045 ENV on scene, search area
1100 find bears in ditch along S haul road near Backfill, walking up berm to backfill
TRUCK used
BANGER used
Bears move onto S haul road, across towards shallow bays
TRUCK, BANGER used
Bears move further into shallow bays
ROCKs used
11.45 bears moving back towards haul road
ROCKS used
1202 bears moving back towards haul road
EXPLOSIVE used
Bears cross south haul road
TRUCK used, bears into pond 5, ROCKS used
1300 bears sleeping ENV leave scene, return 1345, leave 1530
Called in again on S haul road, TRUCK used, into Pond 1
Announce called
ENV leave scene 1730, bears sleeping

Movement Map (Import NotePlus Site Map)

– Photos

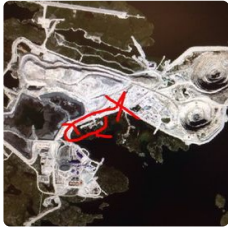


Photo 1

Deterrent Count

Truck	3 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	2 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	1 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	2 From 0 to 40
Specify Rocks	

End of Environment Call-out

📅 7th Jul, 2019 ⌚ 11:17 AM MDT

Final Location of Wildlife

Pond 1

Closure & Sign-off

Wildlife Report Complete	On
Signature	
	Nicole Goodman 8th Jul, 2019 6:23 PM MDT

Photos

1 Photos

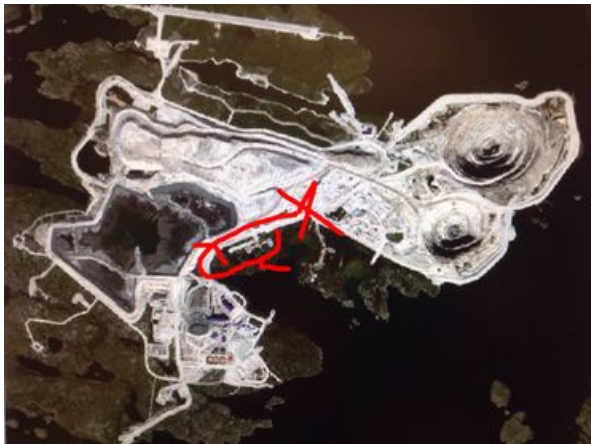


Photo 1

Grizzly - 2019-07-08 Backfill

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
1.59%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-07-08 Backfill
Document No.
WildlifeReport000035

Completed On

 8th Jul, 2019

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 8th Jul, 2019 ⌚ 11:23 AM MDT

Department/Individual Who Reported Wildlife:

Jeff with IT

Environment at Call-out Location

📅 8th Jul, 2019 ⌚ 11:36 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Sow and 2 cubs

Photo (If Possible):

— Photos



Photo 1

Chronological Events

11:23 bears called in on south haul Road by Backfill Plant

11:36 ENV on scene bears in ditch between South Haul Road and Backfill Loadout

11:42 pushed bears along pipeline with rocks and words

11:48 pushed bears across road with truck

11:56 bears start climbing Till Pile

12:04 lost visual, last spotted at top of Till Pile

13:08 bear called in atop Till Pile, near drillers, ENV mobilizes immediately

13:10 ENV finds mother Bear behind parked vehicles, charges with vehicle and pushes mother and cubs east over berm. Continued throwing rocks to encourage them to leave the area.

13:50 ENV off scene.

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	4 From 0 to 40
Specify Threw rocks, shouted	

End of Environment Call-out

 8th Jul, 2019  2:00 PM MDT

Final Location of Wildlife

Heading east from Till Pile

Closure & Sign-off

Wildlife Report Complete

On

Signature



GC

8th Jul, 2019 6:25 PM MDT

Photos

1 Photos



Photo 1

Grizzly - 2019-07-15 - pond 13

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
2.04%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-07-15 - pond 13
Document No.
WildlifeReport000327

Completed On

 15th Jul, 2019
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Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 15th Jul, 2019 ⌚ 9:13 AM MDT

Department/Individual Who Reported Wildlife:

Kevin in LV 209

Environment at Call-out Location

📅 15th Jul, 2019 ⌚ 9:20 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Very dark butt, large male, short stocky snout, dark brown coat, very round.

Photo (If Possible):

Unanswered

Chronological Events

09:13 called in at n winter road approach heading down road.

09:20 ENV on scene, bear in pond 13

09:45 bear crosses S haul road, ENV pushes into backfill loadout with truck

09:47 pushed north with truck towards n haul road, cycled shotgun action to move bear up berm of n haul road

9:48 bear enters n haul road, pushed but gets to Backfill ROM berm instead of till pile. Pushed off berm and across haul road with truck to till pile.

09:53 bear goes down north side of till pile, pushed with truck

09:57 ENV finds bear in north inlet heading towards airport

10:30 ENV off scene, updates bear alert

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

5

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	3 From 0 to 40
Specify Cycled shotgun once, Threw rocks twice	

End of Environment Call-out 📅 15th Jul, 2019 ⌚ 10:30 AM MDT
Final Location of Wildlife North Inlet, heading west towards airport

Closure & Sign-off

Wildlife Report Complete	On
Signature Gordon Cumming	

Grizzly - 2019-07-15 Shallow Bays

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
2.27%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2019-07-15 Shallow Bays
Document No.
WildlifeReport000036

Completed On

 15th Jul, 2019
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Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 15th Jul, 2019 ⌚ 9:40 PM MDT

Department/Individual Who Reported Wildlife:

Jimmy Peddle

Environment at Call-out Location

📅 15th Jul, 2019 ⌚ 9:57 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Not ugly butt, smaller, scragglier, no tag. Also blonde, but all over, light butt hair. Looks underfed

Photo (If Possible):

Unanswered

Chronological Events

09:40 Bear called in heading to Zone one on Haul Road

09:51 Bear called in crossing UG mine dry

10:02 ENV on scene, bear in Shallow Bays Near north winter road approach, slowly moves west

10:50 on west side of shallow Bays shot 3 pen bangers at bear to move it across Haul Road, did not work

11:00 Bear climbs Haul Road berm, pushed across road to pond 13

11:15 shot banger to try and move bear, bear started going slowly in right direction

11:20 Bear goes up to c Portal loadout, ENV pushes off pad to s Haul Road

11:22 Bear enters Backfill, pushed across road, loader follows grizzly north to n Haul Road, ENV meets at n Haul Road intersection

11:31 pushed Bear across Haul Road to Till Pile

11:32 shot 1 pen banger, bear climbed Till Pile

11:3 Bear last spotted heading down Till Pile heading north

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

4

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger	5 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 16th Jul, 2019 ⌚ 12:30 AM MDT
Final Location of Wildlife Heading to North Inlet

Closure & Sign-off

Wildlife Report Complete	On
Signature Gordon Cumming	

Grizzly 2019-07-15 till pile resident bear

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
1.59%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly 2019-07-15 till pile resident bear
Document No.
WildlifeReport000328

Completed On

 15th Jul, 2019
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Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 15th Jul, 2019 ⌚ 3:30 PM MDT

Department/Individual Who Reported Wildlife:

Paul with survey

Environment at Call-out Location

📅 15th Jul, 2019 ⌚ 3:38 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Very blonde, small grizzly, not our resident bear, not as well fed

Photo (If Possible):

Unanswered

Chronological Events

Called in at pond 13

15:38 ENV on scene

15:43 bear attempts to go to c portal pad, ENV blocks and pushes towards south haul road

15:52 bear in ditch beside S haul road, cycles shotgun, bear moves across haul road to Backfill

16:20 bear in ditch at north end of Backfill, fired 2 bangers to move it up berm to haul road

16:22 chased bear across haul road, fired one banger to send it up the Till pile,

Lost visual of bear, checked all around till pile, no sightings. updated bear call, left scene at 17:00

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	3 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	1 From 0 to 40
Specify Cycled shotgun action	

End of Environment Call-out 📅 15th Jul, 2019 ⌚ 5:00 PM MDT
Final Location of Wildlife Last spotted on till pile

Closure & Sign-off

Wildlife Report Complete	On
Signature Gord C	

Photos

1 Photos



Photo 1

Grizzly-2019-07-31- ROM

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.45%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly-2019-07-31- ROM		
Document No.		
WildlifeReport000040		
📅 31st Jul, 2019		

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 31st Jul, 2019 ⌚ 1:55 AM MDT
Department/Individual Who Reported Wildlife: ROM

Environment at Call-out Location 📅 31st Jul, 2019 ⌚ 2:10 AM MDT	
Animal Type	Grizzly Bear
Description (eg. number of individuals, colour, age, size, etc.): Juvenile	
Photo (If Possible): Unanswered	

Chronological Events

02:10 LC Leaves offices, Clayton spots bear at pond 5 02:20 LC uses TRUCK to pushes bear along South Haul to Backfill 02:40 lost visual
Movement Map (Import NotePlus Site Map) Unanswered

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40

12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 31st Jul, 2019 ⌚ 2:40 AM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete	On
Signature  Liam Case 2nd Aug, 2019 1:52 PM MDT	

Grizzly - 2019-08-08 Hanging Tree

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
5.67%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-08 Hanging Tree		
Document No.		
WildlifeReport000042		
📅 8th Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 8th Aug, 2019 ⌚ 2:50 PM MDT

Department/Individual Who Reported Wildlife:

Jimmy Larkin

Environment at Call-out Location

📅 8th Aug, 2019 ⌚ 3:12 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear with white tag on left ear, looking a bit thin

Photo (If Possible):

Unanswered

Chronological Events

14:50 Bear called in near hanging tree
015:22 found bear in A154 infield area
15:38 threw rocks, little effect
1551 repositioned truck, shot 2 12g explosives
1555 shot 2 more 12 g explosives
1611 repositioned, shot 1 medium range (MR) rubber slug
1628 repositioned, shot 1 MR rubber slug
1654 until 1715 cycled action 3 times and threw rocks twice
1715 blocked from crossing road with truck, cycled action to push away from road
1715-1805 cycled action 5 times, threw rocks 3 times, kept bear occupied
1805 shot 12g rubber slug,
1630 env left scene to check on moose

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	4 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	3 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	15 From 0 to 40
Specify Cycled action, threw rocks	

End of Environment Call-out

📅 8th Aug, 2019 ⌚ 6:30 PM MDT

Final Location of Wildlife

A154 Infield north side

Closure & Sign-off

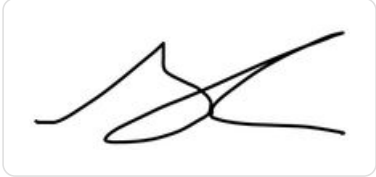
Wildlife Report Complete	On
Signature	
	GC 9th Aug, 2019 8:28 AM MDT



Photo 1

Grizzly - 2019-08-09 - Backfill

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
3.17%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-09 - Backfill		
Document No.		
WildlifeReport000025		
📅 9th Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 9th Aug, 2019 ⌚ 12:00 PM MDT

Department/Individual Who Reported Wildlife:

Mike at the airport

Environment at Call-out Location

📅 9th Aug, 2019 ⌚ 12:20 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Single resident male with tag on left ear, and Sow and 2 cubs

Photo (If Possible):

Unanswered

Chronological Events

12:12 Grizzly called in at Backfill

12:25 ENV on scene, bear on pipe bench beside South Haul Road

12:40 TRUCK to block bear from reaching pond at north end of backfill yard, failed

12:46 TRUCK to push bear across the North Haul road to the till pile

12:48 GUN CYCLE to push bear down north side of till pile to the north inlet.

12:55 bear heading west in north inlet, ENV off scene

13:30 bear called in next to Sow and two cubs on airport road. ENV mobilized, no visual gained.

17:40 Bears called in near Backfill/Pond 1, ENV updates announcement

17:50 ENV arrives on scene and has eyes on bears (Sow and 2 cubs) near Pond 1

17:55 ENV uses ROCKS to move bears away from road

18:02 ENV uses C/F BANGER to move bears toward Backfill

18:15 Bears trying to nap, ENV fires C/F BANGER, bears alert but no movement in any direction

18:35 ENV fires 12 GA CRACKER to wake bears, bears move toward Backfill

18:45 ENV throws ROCKS to push bears toward Backfill

18:54 ENV throws ROCKS to push bears toward Backfill

19:01 ENV uses TRUCK to push bears into Backfill Yard

19:03 ENV uses TRUCK to move bears through Backfill Yard toward the Till Pile

19:22 ENV uses AIR HORN to attempt to move bears, Sow is alert but then continues grazing

19:38 ENV uses TRUCK to move bears across North Haul Road toward the Till Pile

19:50 ENV loses eyes on Bears on the Till Pile, updates announcement and leaves the area

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	5 From 0 to 40
Air Horn	1 From 0 to 40
C/F Bear Banger	2 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	5 From 0 to 40
Specify 1 Gun Cycle, 3 Rocks, 1 12 GA Cracker	

End of Environment Call-out

📅 9th Aug, 2019 ⌚ 7:50 PM MDT

Final Location of Wildlife

Till Pile

Closure & Sign-off

Wildlife Report Complete	On
Signature  Atikin Hehn 11th Aug, 2019 3:40 PM MDT	



Photo 1

Grizzly - 2019-08-10 - Hanging Tree

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
2.04%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-10 - Hanging Tree		
Document No.		
WildlifeReport000026		
📅 11th Aug, 2019		

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 10th Aug, 2019 ⌚ 7:00 AM MDT	
Department/Individual Who Reported Wildlife: Delphis - Site Services	
Environment at Call-out Location 📅 10th Aug, 2019 ⌚ 7:20 AM MDT	
Animal Type	Grizzly Bear
Description (eg. number of individuals, colour, age, size, etc.): Sow and 2 cubs, resident bear (white tag in its ear)	
Photo (If Possible): Unanswered	

Chronological Events

07:00 Bears (Sow and 2 cubs) called in at the Hanging Tree, ENV updates announcement
 07:20 ENV arrives on scene, uses TRUCK to push bears toward A154 Dike infield area (Fish Habitat)
 08:50 Bears move further infield and head in the direction of the FAR, ENV updates announcement
 09:20 ENV locates bears near top of A154 Dike near Dump 7. Bears are bedded down napping, ENV leaves area
 10:20 ENV receives call of bears near Dump 7 (A154 Ramp)
 10:30 ENV arrives on scene and locates bears near the entrance to the A418 Ramp/FAR
 10:59 ENV uses TRUCK to push bears NE along the A154 Dike
 11:09 4th bear (resident bear) present near the Fish Habitat on the E side of the A154 Pit, Sow and Cubs present in trench below the resident bear
 11:25 Resident bear is hesitant/scared on the approaching cubs – runs away when they approach
 11:29 The Sow charges the resident bear to scare it off, resident bear moves into the trench while the 3 other bears (Sow and 2 cubs) move along further into the Fish Habitat Area
 11:37 Resident bear continues grazing and the Sow and Cubs move along, ENV updates announcement
 11:40 Bears all in good areas, ENV leaves area
 16:00 ENV receives call of bears (Sow and cubs) near Batch plant, updates announcement
 16:02 ENV arrives on scene and locates Bears near Batch plant entrance
 16:10 Bears move from Tundra beside the Batch Plant into the Batch Plant Yard
 16:12 ENV uses TRUCK to keep bears from moving toward Mine Dry
 16:15 ENV uses TRUCK to push bears toward Zone 1 – bears move and attempt to go around another route but ENV uses TRUCK to cut them off and push them back into the Batch Plant yard
 16:20 Bears move back into the Batch Plant Yard, ENV uses TRUCK to keep bears from crossing road, bears move behind cement bags in Batch Plant Yard
 16:27 ENV uses TRUCK to keep bears from crossing road toward Mine Dry
 16:38 ENV uses TRUCK to push bears back into Batch Plant Yard
 16:47 ENV uses TRUCK to push bears over berm onto Tundra beside the Batch Plant
 17:02 ENV loses eyes on bears, searches surrounding areas

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	8 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40

12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out Unanswered
Final Location of Wildlife Unanswered

Closure & Sign-off

Wildlife Report Complete	On
Signature Gordon Cumming (For Atikin Hehn)	

Grizzly 2019-08-11 - Batch Plant

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
7.26%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly 2019-08-11 - Batch Plant		
Document No.		
WildlifeReport000028		
📅 13th Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 11th Aug, 2019 ⌚ 4:30 AM MDT

Department/Individual Who Reported Wildlife:

Batch plant

Environment at Call-out Location

📅 11th Aug, 2019 ⌚ 5:00 AM MDT

Animal Type

Unanswered

Description (eg. number of individuals, colour, age, size, etc.):

Mother Grizzly and 2 cubs, with single male resident grizzly interacting

Photo (If Possible):

Unanswered

Chronological Events

0530 Bear called in at batch plant, Env mobilizes
 0558 Mother bear shot with rubber slug, fired 2 12g explosives to move bears further from batch plant
 0608 Shot rubber slug, missed, and 1 C/F bear banger, sow and cubs went into boulder field south of batch plant
 0630 single male grizzly showed up in batch plant, Env coordinated with loader 290 to push bear south out of batch plant.
 0632 shot rubber at single male grizzly, another technician arrives in separate vehicle to help.
 0650 caught cubs sneaking across batch plant yard, intercepted and pushed south onto tundra with truck, mother bear followed shortly thereafter.
 0650-0801 bears make their way to North Winter Road Approach
 08:01 ENV uses GUN CYCLE to move bear (Resident) away from the North Winter Road Approach
 08:12 ENV uses TRUCK to move bear across road toward the Batch Plant Tundra
 08:20 ENV uses TRUCK to push bear toward pit
 08:21 Sow and cubs appear on berm to scare the resident bear away
 08:27 ENV uses GUN CYCLE on resident bear to move him off of a gravel pile in the batch plant yard
 08:34 Sow chases Resident Bear across the Batch Plant Yard – Bears have a bit of a stand off on the berm at the back of the Batch Plant yard
 08:40 Sow and 2 cubs cross the North Haul Road toward the ERT Training grounds
 08:50 Resident bear called in again at the Batch Plant
 08:53 ENV arrives at the Batch Plant and uses TRUCK to push bear away from equipment/building
 08:55 ENV uses TRUCK to push bear toward Zone 1
 09:02 All bear located on Tundra behind ERT Training grounds, ENV updates announcement
 09:20 Resident bear slowly circling along the edge of the rocks around the napping Sow and cubs
 09:37 Resident bear skirting along the edge of the rocks moving towards the pit area
 09:44 ENV leaves area momentarily to refuel truck, all bears are napping

10:06 All 4 bears still napping when ENV arrives back on scene
 10:07 Cubs wake up the Sow and all start feeding. The other bear (resident) is still napping
 10:30 ENV uses AIR HORN to wake bears, resident bear gets up, Sow gets up momentarily then resumes napping
 10:38 Resident bear reappears on hill above the other 3 bears (still napping)
 10:44 ENV uses GUN CYCLE to get bears to start moving. Resident bear crosses the road to the Tundra near the Hanging Tree
 10:53 ENV uses GUN CYCLE to get the other bears to start moving
 11:10 The rest of the bears cross the road to the Hanging Tree Tundra
 11:44 ENV uses CLAPPING to push bears (Sow and Cubs) further onto the Tundra (closer to the North Inlet). Resident bear is in the ditch between the Hanging Tree Tundra and the Airport Road
 12:05 All bears napping, ENV leaves area
 12:30 ENV arrives back on scene, Sow and cubs are up and feeding, resident bear is still in the ditch napping
 12:53 ENV throws ROCKS to wake up and move the resident bear out of the ditch, Bear wakes up but continues grazing
 12:57 ENV uses GUN CYCLE, bear (resident) starts to move toward the NIWTP
 13:01 ENV uses CLAPPING and bear (resident) continues along Pipeline toward the North Inlet
 13:05 ENV uses TRUCK to push the bear into the North Inlet
 13:10 Bear (resident) headed in good direction, ENV leaves to other side of the NIWTP to check on other 3 bears
 13:18 Sow and cubs are awake and grazing
 13:25 ENV fires 12 GA CRACKER to push bears toward the North Inlet
 13:42 ENV uses TRUCK to push bears toward the North Inlet
 13:46 ENV uses TRUCK to push bears into the North Inlet
 13:52 ENV uses ROCKS to push bears further into the North Inlet
 14:00 Bears headed in good direction, no sight of single resident bear. ENV updates announcement and leaves the area
 19:40 Bears (Sow and cubs) called in at North Mine Dry, ENV updates announcement
 19:55 ENV arrives on scene and finds cubs near the bay doors, uses TRUCK to push bears away from the building
 20:01 ENV uses TRUCK to push bears (Sow and cubs) away from Mine Dry, Bears move toward the SCAP yard, ENV updates the announcement
 20:10 ENV uses TRUCK to push the bears further into the SCAP Yard
 20:13 Bears cross the South Haul Road to the ditch by the Backfill
 20:25 ENV locates bears in ditch – difficult to access a good vantage point to see the bears due to berms and inaccessible roads
 20:30 Sow on ledge of Berm, ENV fires 12 GA Long Range RUBBER BULLET, Sow moves onto North Haul Road
 20:35 ENV uses TRUCK to keep Sow on Till Pile side of North Haul Road, Cubs cross the road to follow the Sow
 20:43 ENV locates bears at the base of the Till Pile headed around the base in the direction of the North Inlet
 20:52 ENV uses TRUCK to keep bears from crossing the Airport Road toward the Hanging Tree, Bears start grazing at the base of the Till Pile
 21:16 Bears headed in good direction, ENV updates announcement
 21:25 ENV confirms bears crossed the Airport Road to the North Inlet, ENV leaves area
 23:07 Bear (resident) called in at the North Mine Dry, ENV updates announcement
 23:15 Pit Supervisor has eyes on bear in Mine Dry yard, ENV on route to location
 23:20 ENV arrives on scene, bear has disappeared, last spotted headed in the direction of the Shallow Bays
 00:12 ENV cannot locate bear, leaves area

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	13 From 0 to 40
Air Horn	1 From 0 to 40
C/F Bear Banger	1 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	3 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	4 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	9 From 0 to 40
Specify Cycled shotgun action - 5, clapping - 2, rock throwing - 2	

End of Environment Call-out 📅 12th Aug, 2019 ⌚ 12:12 AM MDT
Final Location of Wildlife North Inlet, shallow bays

Closure & Sign-off

Wildlife Report Complete	On
Signature Gordon Cumming	

Grizzly - 2019-08-12 - EVERYWHERE

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
7.71%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-12 - EVERYWHERE		
Document No.		
WildlifeReport000027		
📅 12th Aug, 2019		

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 12th Aug, 2019 ⌚ 4:30 AM MDT	
Department/Individual Who Reported Wildlife: Batch plant	
Environment at Call-out Location Unanswered	
Animal Type	Grizzly Bear
Description (eg. number of individuals, colour, age, size, etc.): Mother and 2 cubs that have been on site a lot. also single male resident grizzly "Ugly Butt"	
Photo (If Possible): Unanswered	

Chronological Events

04:30 bear called in at the Batch Plant, ENV updates announcement
 04:45 ENV arrives on scene, finds bear in SCAP yard
 05:00 ENV uses GUN CYCLE to push bear out of the ditch toward the Backfill
 05:19 ENV uses 12 GA Long Range RUBBER BULLET to push bear toward the Till Pile
 05:27 ENV uses GUN CYCLE to push bear toward the Till Pile
 05:35 Bear crosses road to Till Pile, ENV receives call of Bear (Sow and Cubs) at the North Mine Dry, ENV updates announcement and leaves to deal with the 3 other bears
 05:42 ENV arrives on scene and spots bears leaving Mine Dry headed in the direction of the Veg Plots
 05:43 Bears cross road into the Veg Plots
 05:49 Bears (Sow and cubs) grazing in the area
 06:15 AH and GC switch
 07:03 shot mother bear with rubber slug in veg plots at edge of effective range, no response, possible miss?
 07:10 shot 1 12g explosive to keep bears moving south through shallow bays
 07:20 threw rocks, bears turned away from road
 0728 threw rocks in veg plots, bear continued moving downslope, lost visual
 0830 found on tundra north of truck shop
 0930 bears crossed haul road to pond 5, attempted to block with truck, failed
 0938 bears enter ROM hill, env pushed bears up hill towards north haul road, then over berm towards waste transfer.
 0942 2nd cub straggling behind, env ensured bear crossed haul road safely to its family.
 1005, shot 2 12g explosives to get bears moving away from waste transfer, single male called in at Backfill, env mobilized there.
 1030 Found bear beside south haul road and SCAP fabrication shop, shot 1 rubber slug, repositioned and lost visual, spent an hour looking for him
 1131 Found the sow and cubs at the South Winter Road Approach
 1143-48 used the truck to block mother from crossing east or north across road and 3 12 g explosives to persuade them back towards AN road
 1228 bears tried to run up the Haul road towards the ROM, blocked with truck and pushed towards waste transfer
 1242-48 blocked from climbing test piles towards pkc muster, shot 2 c/f bear bangers, swapped with Atikin
 ...
 16:30 Bears (Sow and cubs) spotted in Pond 5, ENV updates announcement
 16:35 ENV on scene, bears grazing
 17:21 ENV uses TRUCK to push Sow toward Pond 1 – bears at the intersection wanting to cross the South Haul Road to the Shallow Bays but too much traffic and bears return to Pond 5
 17:37 ENV uses ROCKS to keep bears moving
 17:50 Bears back in original spot
 17:55 ENV moves truck location to get bears moving towards the ROM, no luck
 18:17 ENV fires C/F BANGER to wake up bears, Sow continues grazing, cubs are hidden behind a hill
 18:25 AH and GC switch

 1840 Swapped back with Atikin, threw rocks towards sow and cubs to try and move them.
 1855 fired 1 C/f Banger
 1912 blocked with truck from crossing south haul road
 1926 shot 2 short range rubber bullets at cubs, 1 cub stood up and challenged me when I stepped out of vehicle
 2024 started to bed down, hit mother with rubber bullet to wake her up
 2045 Nicole took over for Gord
 2130 Bears bedded down to sleep, Nicole left scene

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	10 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	5 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	6 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	5 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	7 From 0 to 40
Specify threw rocks - 5, gun cycle - 2	

End of Environment Call-out

📅 12th Aug, 2019 ⌚ 5:01 PM MDT

Final Location of Wildlife

Pond 5 for sow and cubs and unknown for ugly butt

Closure & Sign-off

Wildlife Report Complete	On
Signature Gordon C	



Photo 1

Grizzly - 2019-08-13 - Pond 5

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
3.85%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-13 - Pond 5		
Document No.		
WildlifeReport000029		
📅 14th Aug, 2019		

Type of Wildlife Report	Deterrent Reporting
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Deterrent Report

Enter Initial Time of Wildlife Sighting 📅 13th Aug, 2019 ⌚ 5:28 AM MDT	
Department/Individual Who Reported Wildlife: Process plant door 9	
Environment at Call-out Location Unanswered	
Animal Type	Unanswered
Description (eg. number of individuals, colour, age, size, etc.): Mother Grizzly and 2 cubs and single male resident (ugly butt)	
Photo (If Possible): Unanswered	

Chronological Events

0445 3 bears called in at process plant door 9
 0503 Env on scene
 0508 3 bears spotted in pond trying to come up ROM hill, used 12g explosive and gun cycle
 0520 3 bears try to come up ROM hill rd, Truck used, all bears cross into shallow bays
 0521 Ugly Butt spotted at S Haul Road berm entering shallow bays, Truck and gun cycle used
 0528 NG Swapped with AH
 0620 Ugly Butt called in near Main Accomodations Complex cafeteria, Env updates announcement and heads to area
 0621 ENV finds bear on Tundra near MAC deck, bears starts moving towards tundra between Raw Water Intake and COMM shack, ENV uses truck to push bear across the road.
 0625 AH and GC switch Single male near comm shack, sow and cubs in shallow bays heading north
 0649 single male passes steel yard entrance
 0700 blocked bear with truck from going over road to steel yard
 0738 sow and cubs called by truck shop, mobilizes
 0802 sow and cubs in pond 10 in front of truck shop
 0841 bears cross road to pond 5, 2 explosives in pond 5
 1017 1 explosive to wake them up
 1031 2 explosives to wake them up and move them, 1 explosive detonated in the barrel, shotgun tagged out.
 1220 report of single grizzly near waste transfer, Env updates announcement
 1230 GC and AH switch
 1235 Env has eyes on single bear on tundra between Test Piles and PKC, bear in good area, ENV leaves
 1242 bears still grazing in pond 5
 1244 ENV uses rocks to push bears, bears start moving up towards the tundra above pond 5
 13:11 ENV uses ROCKS to push bears further onto Tundra toward the ROM/PKC Muster Station
 13:35 Bears start moving up the rocks toward the PKC muster station, ENV updates announcement and heads over to the area
 13:37 ENV uses TRUCK to push bears across the road (away from the PKC Muster Station and toward the Tundra behind the Test Piles
 13:40 ENV relocates to base of the Test Piles
 13:42 ENV locates bears, uses TRUCK to push bears toward the Tundra behind the Test Piles/Base of the PKC
 14:05 Bears cross AN Road and move onto the Tundra between the AN Road the SCRP. Bears in good area, ENV updates announcement and leaves the area

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	6 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	6 From 0 to 40

12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	4 From 0 to 40
Specify Gun cycle - 2, rocks, - 2	

End of Environment Call-out 📅 13th Aug, 2019 ⌚ 2:00 PM MDT
Final Location of Wildlife on Tundra by AN road

Closure & Sign-off

Wildlife Report Complete	On
Signature Gordon C	

Grizzly - 2019-08-17 - North Winter Road Approach

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.45%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-17 - North Winter Road Approach		
Document No.		
WildlifeReport000332		
📅 17th Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 17th Aug, 2019 ⌚ 9:40 AM MDT

Department/Individual Who Reported Wildlife:

Blaine Talbot - UG

Environment at Call-out Location

📅 17th Aug, 2019 ⌚ 9:53 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Single resident bear

Photo (If Possible):

Unanswered

Chronological Events

09:40 ENV receives call of Bear near Norh Winter Road Approach, updates announcement
09:53 ENV arrives on scene and has eyes on bear, uses TRUCK to push bear further onto Tundra, bear moves a bit

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

1

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger

0

From 0 to 40

C/F Pen Whistle

0

From 0 to 40

12GA Bear Banger

0

From 0 to 40

12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 17th Aug, 2019 ⌚ 9:53 PM MDT
Final Location of Wildlife Tundra near NorthWinter Road Approach

Closure & Sign-off

Wildlife Report Complete	On
Signature  Shelby Skinner 20th Aug, 2019 4:32 PM MDT	

Grizzly bear - 2019-08-18 - Rose Garden

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
1.13%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly bear - 2019-08-18 - Rose Garden		
Document No.		
WildlifeReport000333		
📅 18th Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 18th Aug, 2019 ⌚ 7:00 AM MDT

Department/Individual Who Reported Wildlife:

Site Services

Environment at Call-out Location

📅 18th Aug, 2019 ⌚ 7:30 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Resident bear

Photo (If Possible):

Unanswered

Chronological Events

07:00 call in single grizzly in Rose Garden
07:30 ENV on scene cannot find bear
07:45 ENV spots bear on Tundra east of Pond 5 slowly grazing south towards truck shop
09:20 Bear moves north away from Truck Shop. ENV loses sight of bear behind Rose Garden and leaves
15:50 resident grizzly called in at Pond 11
16:00 ENV on scene, bear is grazing
16:47 bear slowly grazing toward Steel Yard. Fired Cracker Shell
16:49 Fired second Cracker Shell
16:55 fired Mid range rubber bullet (miss bear). Bear continues grazing in Pond 11
17:10 bear moves onto Tundra and heads along Lakeshore Blvd
17:15 ENV loses sight of bear and leaves
21:00 resident bear reported in Pond 11
21:15 ENV on scene, bear is grazing
21:50 hit bear with short range rubber bullet, bear moved north along Lakeshore and disappeared toward shallow bays
21:55 ENV leaves scene

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	2 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	2 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 18th Aug, 2019 🕒 9:55 PM MDT
Final Location of Wildlife Shallow Bays

Closure & Sign-off

Wildlife Report Complete	On
Signature  Shelby Skinner 20th Aug, 2019 4:34 PM MDT	

Grizzly - 2019-08-19 - Lakeshore Blvd

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.23%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-19 - Lakeshore Blvd		
Document No.		
WildlifeReport000043		
📅 19th Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 19th Aug, 2019 ⌚ 8:30 AM MDT

Department/Individual Who Reported Wildlife:

Site Services

Environment at Call-out Location

📅 19th Aug, 2019 ⌚ 9:05 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Sow and 2 cubs

Photo (If Possible):

— Photos

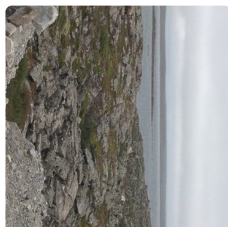


Photo 1

Chronological Events

8:30 call for 4 bears on Lakeshore Blvd

9:05 ENV on scene, spot sow and 2 cubs but other grizzly not located. Bears are on Tundra near winter road approach

9:45 as bears grazing toward Pond 11 cycle shotgun and they start grazing back toward A21

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

0

From 0 to 40

Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 20th Aug, 2019 ⌚ 10:27 AM MDT
Final Location of Wildlife Unknown

Closure & Sign-off

Wildlife Report Complete	On
Signature  Liam Case 20th Aug, 2019 10:28 AM MDT	

Photos

1 Photos



Photo 1

Grizzly - 2019-08-20 - Old Mine Dry

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.45%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-20 - Old Mine Dry		
Document No.		
WildlifeReport000334		
📅 20th Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 20th Aug, 2019 ⌚ 7:15 AM MDT

Department/Individual Who Reported Wildlife:

Underground

Environment at Call-out Location

📅 20th Aug, 2019 ⌚ 7:35 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Sow and two cubs

Photo (If Possible):

— Photos

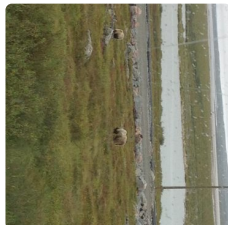


Photo 1

Chronological Events

715 (SS) Spw and cubs called in at Old Mine Dry
735 Arrived at Old Mine Dry Andrew and cubs split up
745 Reconnect at SCAP
755 Used TRUCK to push to South Haul Road
805 Crossed over into Backfill yard below Crusher Oversize
840 On Till Pile heading towards North Inlet along North Haul Road
852 In North Inlet near new road construction. Equipment only
930 SS switched with SS2
1000 Slowly grazing and walking towards Airport
1102 Almost at Old and new airport road intersection
1157 Bears cross airport road over to Tundra behind N17

Movement Map (Import NotePlus Site Map)

— Photos



Photo 2

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out

📅 20th Aug, 2019 ⌚ 12:00 PM MDT

Final Location of Wildlife

tundra near N17 laydown

Closure & Sign-off

Wildlife Report Complete	On
Signature Mark Nelson	

Photos

2 Photos



Photo 1



Photo 2

Grizzly - 2019-08-23 - Pond 11

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.91%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-23 - Pond 11		
Document No.		
WildlifeReport000044		
📅 23rd Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 23rd Aug, 2019 ⌚ 4:34 PM MDT

Department/Individual Who Reported Wildlife:

Site Services

Environment at Call-out Location

📅 23rd Aug, 2019 ⌚ 4:45 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

1 blonde with purple (?) paint on hind quarters

Photo (If Possible):

Unanswered

Chronological Events

16:35 site Services call a bear on Tundra near Lakeshore Blvd heading north

16:45 ENV on scene at Pond 11

17:41 Shot cracker shell at bear as it tried to sleep, bear moved 15m away and continued grazing

18:15 fired bean bag at bear (missed), bear moves 10m and continues to graze in Pond

18:25 hit bear with mid range rubber bullet, bearmovesnto Tundra near winer road approach ad ENV Dailies station.

18:50 ENV loses sight of bear and leaves scene

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	1 From 0 to 40
12GA B.B. Marker	1 From 0 to 40
12GA Rubber Bullet	1 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 23rd Aug, 2019 ⌚ 6:50 PM MDT
Final Location of Wildlife Tundra NE of dailies station

Closure & Sign-off

Wildlife Report Complete	On
Signature  Mark Nelson 23rd Aug, 2019 7:39 PM MDT	

Photos

1 Photos



Photo 1

Grizzly - 2019-08-24 - Pond 10

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.91%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-24 - Pond 10		
Document No.		
WildlifeReport000031		
📅 26th Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 25th Aug, 2019 ⌚ 9:00 PM MDT

Department/Individual Who Reported Wildlife:

Site Services

Environment at Call-out Location

📅 25th Aug, 2019 ⌚ 9:00 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Transient grizzly - darker than resident

Photo (If Possible):

Unanswered

Chronological Events

21:08 Bear called in along pipeline headed toward Pond 10, ENV updates announcement
21:15 ENV arrives on scene, uses TRUCK to push bear out of Pond 10 toward Shallow Bays
21:18 ENV fires 12 GA CRACKER to push bear further into Shallow Bays
21:35 ENV locates bear in Rose Garden, fires off BANGER to push bear further along
21:37 ENV uses GUN CYCLE to push bear further into Shallow Bays
21:39 ENV loses eyes on bear, getting much darker and difficult to see
21:55 ENV cannot locate bear in dark, updates announcement and leaves area

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	1 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	1 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out 📅 25th Aug, 2019 ⌚ 10:00 PM MDT
Final Location of Wildlife Shallow Bays

Closure & Sign-off

Wildlife Report Complete	On
Signature Mark Nelson	

Photos

1 Photos



Photo 1

Grizzly - 2019-08-24 - Shallow Bays

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.45%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-08-24 - Shallow Bays		
Document No.		
WildlifeReport000030		
📅 25th Aug, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 24th Aug, 2019 ⌚ 5:00 AM MDT

Department/Individual Who Reported Wildlife:

Site services

Environment at Call-out Location

📅 25th Aug, 2019 ⌚ 5:30 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Multiple bears - sow and 2 cubs and a transient

Photo (If Possible):

Unanswered

Chronological Events

05:15 Bear spotted near C-pOrtal
05:45 ENV on scene, cannot locate bear
06:15 ENV leaves
06:40 Sow and 2 cubs spotted on tundra near northern winter road access
06:50 ENV on scene, bears grazing on tundra, heading over hill (south)
07:00 ENV leaves as bears are no longer visible and moving away from UG
13:00 Single grizzly spotted near dining room by electrical services
13:10 ENV on scene. Transient grizzly on tundra between C Dorm and Communication Shack. Looks like same bear that was spotted in same area on 23rd
14:20 Transient moving north from dalies area. ENV leaves scene
14:40 ENV at Pond 1 - 2 cubs in pond
14:44 Fired cracker shell into Pond 1. Sow moves to Shallow Bays followed 2 minutes later by 2 cubs
14:52 Transient bear at dalies still grazing
15:08 Back at Shallow Bays, sow and 2 cubs grazing
15:25 Env leaves scene
18:15 Single bear called in at Pond 5
18:22 ENV on scene, no bear in Pond 5, 1, 13, or 10
18:40 ENV leaves scene - no bears spotted

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	1 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out

📅 24th Aug, 2019 ⌚ 6:30 PM MDT

Final Location of Wildlife

Sow and 2 cubs in Shallow Bays
Transient near Communication Shack

Closure & Sign-off

Wildlife Report Complete

On

Signature

Mark Nelson

Photos

1 Photos



Photo 1

2019-09-02

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.23%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
2019-09-02		
Document No.		
WildlifeReport000045		
📅 2nd Sep, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 2nd Sep, 2019 ⌚ 6:00 PM MDT

Department/Individual Who Reported Wildlife:

Old A21 Portal personnel

Environment at Call-out Location

📅 2nd Sep, 2019 ⌚ 6:10 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

One grizzly bear, dark bum with light tan on rump, back and upper shoulders with dark forearms starting from elbows down. Dark under jaw and under neck

Photo (If Possible):

— Photos



Photo 1



Photo 2



Photo 3

Chronological Events

Environment on scene at 6:10pm grizzly bear stayed on the Tundra between AN Sign in shack and old A21 Portal. The grizzly bear seems relaxed and is feeding on berries and vegetation in that patch of Tundra. Grizzly bear seems to be making its way towards South country rock Pile/ AN Plant

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40

12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	
End of Environment Call-out 📅 2nd Sep, 2019 ⌚ 6:30 PM MDT	
Final Location of Wildlife AN Road	

Closure & Sign-off

Wildlife Report Complete	On
Signature Mark Nelson	

Photos

3 Photos



Photo 1

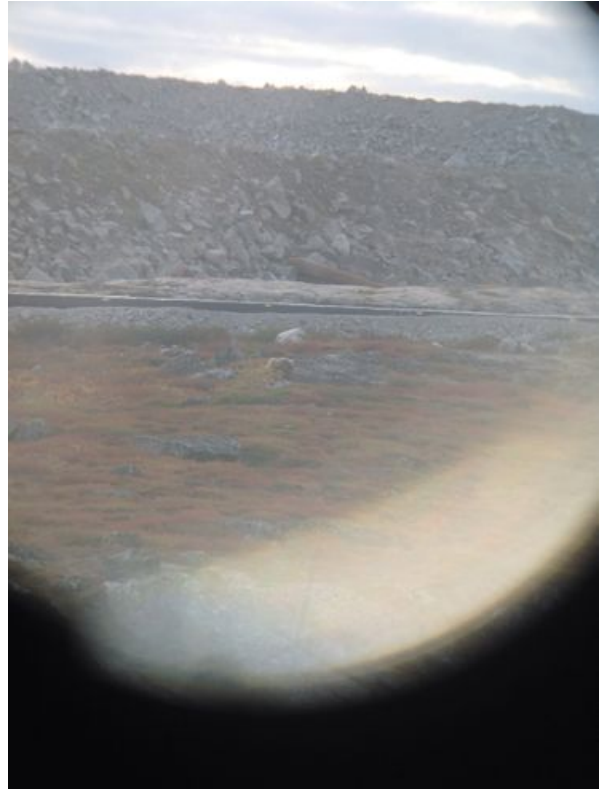


Photo 2

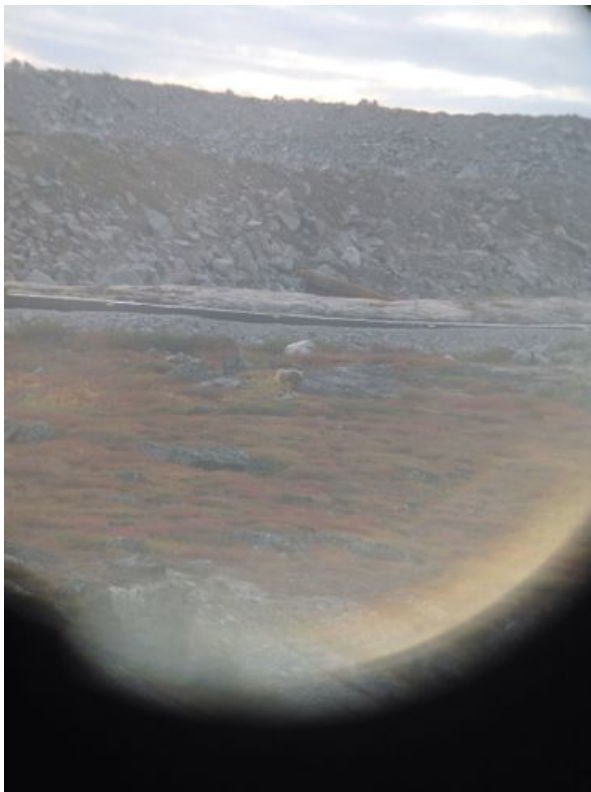


Photo 3

Grizzly - 2019-09-02 - Backfill

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.23%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-09-02 - Backfill		
Document No.		
WildlifeReport000335		
📅 2nd Sep, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 2nd Sep, 2019 ⌚ 6:20 AM MDT

Department/Individual Who Reported Wildlife:

HSE - Jon

Environment at Call-out Location

📅 2nd Sep, 2019 ⌚ 6:35 AM MDT

Animal Type

Unanswered

Description (eg. number of individuals, colour, age, size, etc.):

Dark brown, thin build

Photo (If Possible):

Unanswered

Chronological Events

0620 Received call from Jon that single grizzly was by Pond 10. Issued bear alert
0635 ENV spotted bear on South Haul Road. Used TRUCK to push bear along pipeline. Bear started climbing up Rock Pile onto North Haul Road heading for East PKC Area. Issued bear alert.
0650 Bear called in walking along inside pipeline of PKC
0655 Bear went down PKC barge road. Issued bear alert
0715 Followed bear towards PKC Muster and Fueling area
0730 ENV lost sight of bear leaving PKC Muster heading towards Windfarm

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck

0

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger

0

From 0 to 40

C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	
End of Environment Call-out 📅 2nd Sep, 2019 ⌚ 7:30 AM MDT	
Final Location of Wildlife Windfarm	

Closure & Sign-off

Wildlife Report Complete	On
Signature Mark Nelson	

Photos

1 Photos

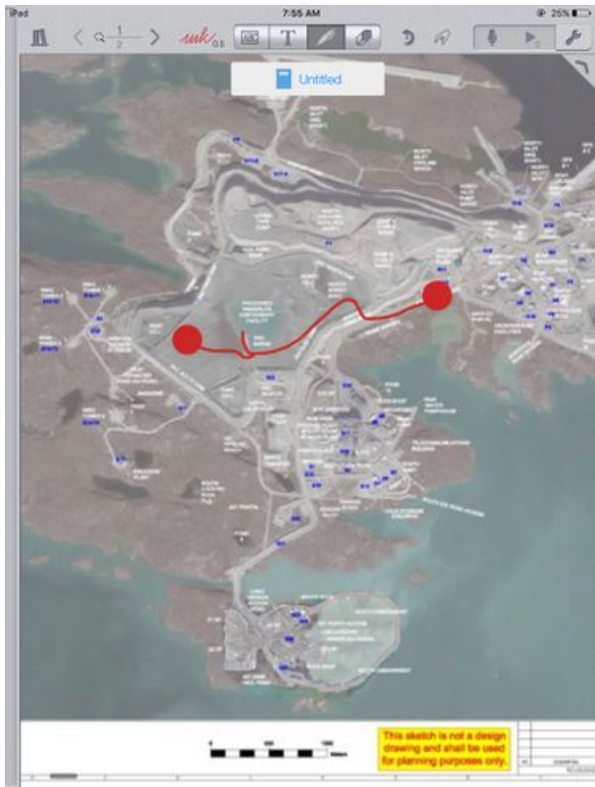


Photo 1

Grizzly - 2019 - 09 -04 - A418 south dike

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
1.36%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019 - 09 -04 - A418 south dike		
Document No.		
WildlifeReport000046		
4th Sep, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 4th Sep, 2019 ⌚ 4:15 PM MDT

Department/Individual Who Reported Wildlife:

Brian site Services

Environment at Call-out Location

📅 4th Sep, 2019 ⌚ 4:25 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Single male, non resident

Photo (If Possible):

Unanswered

Chronological Events

16:25 Bear located on Tundra south of A418 dike, Announce
 17:00 lost sight of bear moving south along shore
 2019-09-05 spotted in steel yard 16:00
 16:00 truck
 16:05 4 rocks

Movement Map (Import NotePlus Site Map)

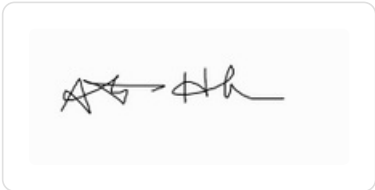
Unanswered

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40

12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	4 From 0 to 40
Specify Threw rocks - 4	
End of Environment Call-out 📅 5th Sep, 2019 ⌚ 4:05 PM MDT	
Final Location of Wildlife Tundra near South Winter Road Approach	

Closure & Sign-off

Wildlife Report Complete	On
Signature  Atikin Hehn 15th Sep, 2019 11:53 AM MDT	

Grizzly - 2019-09-06 - Shallow Bays

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
2.49%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-09-06 - Shallow Bays		
Document No.		
WildlifeReport000033		
📅 7th Sep, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

Unanswered

Department/Individual Who Reported Wildlife:

Jim - Site Services

Environment at Call-out Location

📅 6th Sep, 2019 ⌚ 5:22 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Dirty blonde shoulders, dark brown fur towards the rear.

Photo (If Possible):

Unanswered

Chronological Events

17:00 Bear called in on AN Road near WTA, ENV updates announcement
17:22 ENV finds bear in MET CON Yard, uses TRUCK to push bear toward A21 Haul Road
17:30 Bear moves over berm toward A21 Haul Road headed up toward ROM hill
17:35 ENV loses eyes on bear
18:14 ENV locates bear in Pond 5, updates announcement
18:15 ENV fires c/f BANGER, bear starts running
18:17 Bear stops to graze, ENV fire another c/f BANGER, bears starts running again
18:25 ENV uses TRUCK to push bear
18:28 Bear climbs rock wall toward North Haul Road
18:35 ENV locates bear on North Haul Road, uses TRUCK, bear moves back down hill toward Pond 1
18:40 ENV locates bear along South Haul Road, ENV fires c/f BANGER to push bear further toward Pond 1
18:57 ENV uses TRUCK, bear crosses South Haul Road toward Shallow Bays
0710 AH swapped with GC
0715 pushed east from veg plot road with truck
0727 fired 1 12G explosive to move bear east away from underground vicinity.
0738 yelled at bear from North Winter Road approach, bear ran east a short ways
0817 bear not visible, updated announcement and left scene.

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

5

From 0 to 40

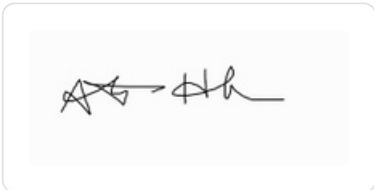
Air Horn

0

From 0 to 40

C/F Bear Banger	3 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	1 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	1 From 0 to 40
Specify "Hey bear"	
End of Environment Call-out 📅 6th Sep, 2019 ⌚ 8:17 PM MDT	
Final Location of Wildlife East side of shallow bays	

Closure & Sign-off

Wildlife Report Complete	On
Signature  Atikin Hehn 8th Sep, 2019 8:33 AM MDT	

2019-09-07 - Batch to North Inlet

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.68%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
2019-09-07 - Batch to North Inlet		
Document No.		
WildlifeReport000032		
📅 7th Sep, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 7th Sep, 2019 ⌚ 10:30 AM MDT

Department/Individual Who Reported Wildlife:

Delphis - Site Services

Environment at Call-out Location

📅 7th Sep, 2019 ⌚ 11:14 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

dirty blonde shoulders, dark fur

Photo (If Possible):

Unanswered

Chronological Events

10:30 bear called in near batch plant
1108 Bear spotted crossing zone 1 from batch plant
1114 ENV on scene, bear crossed from zone 1 to ERT training ground
1142 Used 2 12G explosives, in 154 fish habitat, bear begins moving west towards dyke entrance
1200 bear crosses hanging tree from 154 North Dyke to tundra by North Inlet Water Treatment Plant
1228 Bear moves to east end of runway, env off scene.

Movement Map (Import NotePlus Site Map)

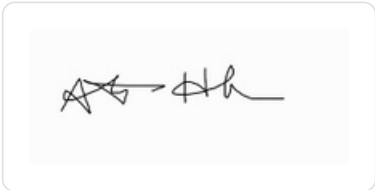
Unanswered

Deterrent Count

Truck	0 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	2 From 0 to 40

12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	
End of Environment Call-out 📅 7th Sep, 2019 🕒 12:28 PM MDT	
Final Location of Wildlife East of the Airport Runway	

Closure & Sign-off

Wildlife Report Complete	On
Signature  Atikin Hehn 8th Sep, 2019 10:19 AM MDT	

Grizzly - 2019-09-22 - A21 Zone 3

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.68%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-09-22 - A21 Zone 3		
Document No.		
WildlifeReport000337		
📅 22nd Sep, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 22nd Sep, 2019 ⌚ 2:30 PM MDT

Department/Individual Who Reported Wildlife:

Mike Boyd - Pit Ops

Environment at Call-out Location

📅 22nd Sep, 2019 ⌚ 2:45 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Large, Dark brown bear

Photo (If Possible):

Unanswered

Chronological Events

14:30 Bear called in at Zone 3 A21, issued bear alert

14:45 ENV on scene, Mike B has eyes on bear walking along shoeline of Lakeshore Boulevard. Bear as clawing at power pole. Bear up on Lakeshore Boulevard, used TRUCK to move it off road.

15:05 Bear out of sight in boulder field off Lakeshore Boulevard

15:44 Bear came it at 1645-33 road and ran to Pond 11. Updated bear alert, called security/medic/main accommodations.

15:50 TRUCK used to cross bear from Pond 11 to dailies Tundra

16:12 Bear crossed Fresh Water Uptake road and swam along shoreline towards Truck Shop, updated bear alert

17:00 ENV left bear grazing in Rose Garden

17:30 Bear called in at Pond 1, updated bear alert. No visual of bear

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

2

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger

0

From 0 to 40

C/F Pen Whistle

0

From 0 to 40

12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	
End of Environment Call-out 📅 22nd Sep, 2019 ⌚ 6:07 PM MDT	
Final Location of Wildlife Unknown	

Closure & Sign-off

Wildlife Report Complete	On
Signature  Shelby Skinner 25th Sep, 2019 8:09 AM MDT	

Grizzly - 2019-10-07 - PKC East Dam

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.68%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-10-07 - PKC East Dam		
Document No.		
WildlifeReport000035		
📅 7th Oct, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 7th Oct, 2019 ⌚ 7:10 AM MDT

Department/Individual Who Reported Wildlife:

PKC Construction

Environment at Call-out Location

📅 7th Oct, 2019 ⌚ 7:20 AM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Same bear from past few days - darker in colour, larger and scared of the vehicle

Photo (If Possible):

Unanswered

Chronological Events

07:10 Bear called in on PKC East Dam. ENV updates announcement
07:12 Bear reported crossing the North Haul Road
07:20 ENV arrives on scene near Pond 5 trying to locate the bear, still dusk out and difficult to see. ENV continues scanning the surrounding areas including the North Haul Road and PKC
08:50 ENV still searching for bear, bear called in crossing South Haul Road toward Pond 1.
08:51 ENV locates bear moving up berm toward Backfill Yard
08:55 Bear moves across yard and climbs wall toward the North Haul Road
08:58 ENV locates bear on Crusher ROM and uses TRUCK to push bear toward Till Pile
09:05 ENV locates bear in North Inlet, updates announcement
09:20 ENV uses TRUCK to keep bear moving toward the East Dam of the North Inlet
09:25 Bear headed in good direction. ENV leaves area

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck	2 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40

12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	
End of Environment Call-out 📅 7th Oct, 2019 ⌚ 9:25 AM MDT	
Final Location of Wildlife Tundra SE of Runway	

Closure & Sign-off

Wildlife Report Complete	On
Signature  Atikin Hehn 8th Oct, 2019 7:05 AM MDT	

Grizzly - 2019-10-11 - A21

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.91%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-10-11 - A21		
Document No.		
WildlifeReport000036		
📅 11th Oct, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 11th Oct, 2019 ⌚ 3:45 PM MDT

Department/Individual Who Reported Wildlife:

Dina - Surface Ops

Environment at Call-out Location

📅 11th Oct, 2019 ⌚ 3:48 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Larger darker coloured bear that has been hanging around the Island

Photo (If Possible):

Unanswered

Chronological Events

15:45 Bear called in on Tundra near Lakeshore Blvd/Zone 3
15:48 ENV arrives and has eyes on bear - larger brown grizzly (non-resident bear - no tag in ear)
15:55 ENV uses TRUCK to move bear back toward tundra away from the Dike
16:05 Bear crosses Dike and heads toward North Ramp of A21
16:06 ENV loses sight of bear
16:07 Bear crosses North Ramp behind ENV truck and head toward JJM Laydown
16:10 ENV locates bear in JJM Laydown
16:11 ENV uses TRUCK to push bear toward South Ramp (away from A21 area)
16:13 ENV uses TRUCK to push bear across A21 Haul Road toward Zone 2
16:20 ENV locates bear on Tundra West of Zone 2
17:20 Bear headed in good direction, ENV updates announcement and leaves the area

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Count

Truck

3

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger

0

From 0 to 40

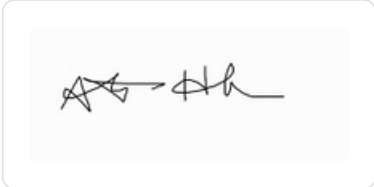
C/F Pen Whistle

0

From 0 to 40

12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	
End of Environment Call-out 📅 11th Oct, 2019 ⌚ 5:20 PM MDT	
Final Location of Wildlife Tundra West of A21 Zone 2	

Closure & Sign-off

Wildlife Report Complete	On
Signature  Atikin Hehn 13th Oct, 2019 5:54 PM MDT	

Grizzly - 2019-10-26 - Shallow Bays

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
0.45%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly - 2019-10-26 - Shallow Bays		
Document No.		
WildlifeReport000049		
📅 26th Oct, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 26th Oct, 2019 ⌚ 3:55 PM MDT

Department/Individual Who Reported Wildlife:

Surface Mining

Environment at Call-out Location

📅 26th Oct, 2019 ⌚ 1:41 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

Single cinnamon bear

Photo (If Possible):

— Photos

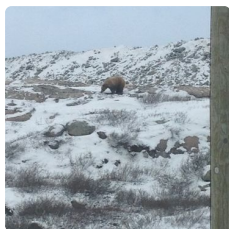


Photo 1

Chronological Events

1345 Bear spotted laying in Pond 1. Issued bear alert
1400 ENV on scene with visual of bear on ice in Shallow Bays
1430 Bear checking out den near Veggie Plot Road. Slowly approached the den.
1500 Bear crossed ice on bay heading towards Main Camp.
1530 Bear grazing on Tundra. ENV out.
1600 Bear called in at base of ROM Road. Updated bear alert.
1610 used TRUCK to move bear off the road. Headed up to ROM. Updated bear alert
1620 Bear headed towards PKC Muster. Updated bear alert.
1630 Bear grazing on Tundra near Test Piles

Movement Map (Import NotePlus Site Map)

— Photos



Photo 2

Deterrent Count

Truck	1 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	0 From 0 to 40
Specify Unanswered	

End of Environment Call-out

📅

 26th Oct, 2019

🕒

 4:30 PM MDT

Final Location of Wildlife

Test Piles

Closure & Sign-off

Wildlife Report Complete	On
Signature	
 Shelby Skinner 27th Oct, 2019 9:56 AM MDT	

Photos

2 Photos



Photo 1



Photo 2

Grizzly bear - 2019-10-15 - East bay

Wildlife Report - 2019

Complete

Inspection score	Failed items	Created actions
1.36%	0	0
Audit Title (Animal - yyyy-mm-dd - Location)		
Grizzly bear - 2019-10-15 - East bay		
Document No.		
WildlifeReport000338		
📅 15th Oct, 2019		

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

Enter Initial Time of Wildlife Sighting

📅 15th Oct, 2019 ⌚ 11:53 AM MDT

Department/Individual Who Reported Wildlife:

Airport staff

Environment at Call-out Location

📅 15th Oct, 2019 ⌚ 1:25 PM MDT

Animal Type

Grizzly Bear

Description (eg. number of individuals, colour, age, size, etc.):

One, young adult, brown rump, brown strip on back

Photo (If Possible):

Unanswered

Chronological Events

11:57 called in at airport, announce

13:00 called in at north Haul

13:30 called in at c portal, located by LC, Announce

14:00 bear tried to cross 418 dike road, intercepted by LC in truck

14:30 grazing and walking

15:30 tried to cross road to c portal, intercepted by LC in truck, horn

15:40 bear close to berm, 2 rocks, bear moved away

16:00 tried to cross road again, intercepted again

16:40 Bedded down, LC left for office

17:20 LC found bear again near east bay

17:40 bear ran across road through pond 13, across south haul, through Backfill, across north Haul, past the hanging tree then stopped north of NIWTP

2019-10-16

10:00 spotted between old airport road and new airport road

10:30 moved west along pipeline north of new airport road

Movement Map (Import NotePlus Site Map)

— Photos



Photo 1

Deterrent Count

Truck	3 From 0 to 40
Air Horn	0 From 0 to 40
C/F Bear Banger	0 From 0 to 40
C/F Pen Whistle	0 From 0 to 40
12GA Bear Banger	0 From 0 to 40
12GA Explosive	0 From 0 to 40
12GA B.B. Marker	0 From 0 to 40
12GA Rubber Bullet	0 From 0 to 40
12GA Slug	0 From 0 to 40
Helicopter	0 From 0 to 40
Other	2 From 0 to 40
Specify Rocks	

End of Environment Call-out

📅

16th Oct, 2019

🕒

12:26 PM MDT

Final Location of Wildlife

North Inlet

Closure & Sign-off

Wildlife Report Complete	On
Signature	
 Liam Case 16th Oct, 2019 6:27 PM MDT	

Photos

1 Photos

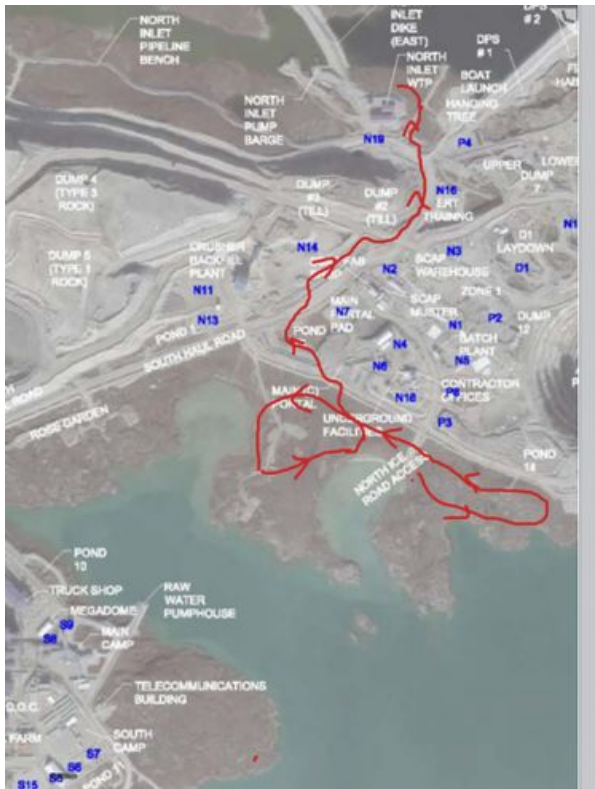


Photo 1

Wolverine-2019-01-10 - WTA Wildlife Report - 2018 Conducted on 12th Jan, 2019 By Environment Department		
Inspection score 1.59%	Failed items 0	Created actions 0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location) Wolverine-2019-01-10 - WTA
Document No. WildlifeReport000017

Completed On

 12th Jan, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

1.36%

Enter Initial Time of Wildlife Sighting

📅 10th Jan, 2019 ⌚ 07:09 AM MST

Department/Individual Who Reported Wildlife:

Waste Transfer / Luke

Deterrent Report / Environment On Scene

Environment at Call-out Location

📅 10th Jan, 2019 ⌚ 08:05 AM MST

Animal Type

Wolverine

Description (eg. number of individuals, colour, age, size, etc.):

1 dark, age unknown, dark

Photo (If Possible):

Unanswered

Deterrent Report / Chronological Events

0709 WTA notifies Environment

0805 Environment at site, proponent front man door, move round to side door

0810 ENV blows air horn 3 times into building, wolverine not seen moving

0811 ENV fully opens side door and looks around, wolverine spotted nearby, use air horn, wolverine does not react

0814 ENV closes side door and walks to front door, wolverine has left via front door, ENV goes back in via side door and closes front door from inside. While that is happening wolverine tries to reenter through front door, Truck engine revved and moves toward wolverine to discourage from re-entry.

0817 ENV loses sight of wolverine among totes near front bay door

0820 ENV uses 1 pen launcher Bear banger at totes, no reaction from wolverine, assume it moved on

0845 ENV leaves WTA

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Report / Deterrent Count

1.36%

Truck

1

From 0 to 40

Air Horn
4
From 0 to 40
C/F Bear Banger
1
From 0 to 40
C/F Pen Whistle
0
From 0 to 40
12GA Bear Banger
0
From 0 to 40
12GA Explosive
0
From 0 to 40
12GA B.B. Marker
0
From 0 to 40
12GA Rubber Bullet
0
From 0 to 40
12GA Slug
0
From 0 to 40
Helicopter
0
From 0 to 40
Other
0
From 0 to 40
Specify
Unanswered

End of Environment Call-out

📅 10th Jan, 2019 ⌚ 08:45 AM MST

Final Location of Wildlife

Totes near front bay door, but it probably left WTA

Closure & Sign-off

100.00%

Wildlife Report Complete

Off

Signature



Mark Nelson

12th Jan, 2019 7:21 AM MST

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)

Wolverine - 2019-01-13 - WTA

Document No.

WildlifeReport000018

2019-01-13

Score

2/441 - 0.45%

Completed on

2019-01-14, 5:06 PM

Audit - 2/441 - 0.45%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (1/440) 0.23%
Enter Initial Time of Wildlife Sighting	2019-01-13, 7:56 AM	
Department/Individual Who Reported Wildlife:	ENV at WTA	
Environment On Scene		
Environment at Call-out Location	2019-01-13, 7:56 AM	
Animal Type	Wolverine	
Description (eg. number of individuals, colour, age, size, etc.):	1, dark, age unknown, large	
Photo (If Possible):		
Chronological Events		
	7:56 ENV enter WTA, wolverine waiting at incinerator bay door 7:57 wolverine moves to burn pit, ENV attempts to spray with bear spray, too windy to be effective, wolverine retreats to edge of pit	
Movement Map (Import NotePlus Site Map)		
Deterrent Count		Score (1/440) 0.23%
Other	1	
Specify	Bear spray	
Environment Off Scene		
End of Environment Call-out	2019-01-13, 8:15 AM	
Final Location of Wildlife	Leaving WTA	
Closure & Sign-off		Score (1/1) 100%

Question		Response	Details
Wildlife Report Complete		On	
Signature	Mark Nelson	2019-01-14 5:06 PM	

Wildlife Report - 2019

Audit Title (Animal - yyyy-mm-dd - Location)

Wolverine - 2019-01-14 - Arctic Corridor

Document No.

WildlifeReport000290

14 Jan 2019

Completed on

15 Jan 2019

Score

1/441.0 - 0.23%

Audit - 1/441 0.23%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (0/440) 0.00%
Enter Initial Time of Wildlife Sighting	14 Jan 2019 08:45 PM	
Department/Individual Who Reported Wildlife:	Security/Michelle	
Environment On Scene		
Environment at Call-out Location	14 Jan 2019 09:00 PM	
Animal Type	Wolverine	
Description (eg. number of individuals, colour, age, size, etc.):		
Photo (If Possible):		

Question	Response	Details
Chronological Events		
		2045 ENV (SS2) received call from Security that wolverine was spotted in Arctic Corridor. Security made an announcement to close Arctic Corridor and called ERT Advisor. ENV banged on door to move wolverine away from the door to Main Camp. 2100 Members of ERT suited up and went to all Tower doors and opened them as well as blocked all doorways to Arctic Corridor. ENV (MN SS2) entered Arctic Corridor to move wolverine towards one of the open doors. Wolverine spotted by ERT at door to 3rd floor Maintenance Building. It was moving in and out of a pipes in Arctic Corridor and entered a hole in the wall near 3rd floor Maintenance Building door. It did this a few times before walking down the Arctic Corridor towards Tower 3 door. 2130 Wolverine exited the building and went down Tower 3 stairs. An ERT members closed all open doors. ERT called Security to let them know that the wolverine had left the building and the Arctic Corridor was opened. 2145 MN went to DOC and checked all doors to make sure they were properly latched. Wolverine was spotted by Truck Shop doors and MN made an announcement. 2200 ENV (SS2) received call from Security that wolverine was spotted in Arctic Corridor again. Security made an announcement to close Arctic Corridor and called ERT Advisor. Members of ERT suited up and went to all Tower doors and opened them as well as blocked all doorways to Arctic Corridor. ENV (MN SS2) entered Arctic Corridor to move wolverine towards one of the open doors. Wolverine went down towards 3rd floor Maintenance Building and was moving in and out of the pipes. It then walked towards Tower 3 door but did not go outside this time. It walked back towards the intersection and towards the Process Plant doors. It found an apple core in a waste bin and ate that then headed back towards the intersection. It started to walk directly towards MN and SS2. We backed away slowly and it turned down the hall towards the DOC. It went into the pipes down there and exited through an opening around where the pipes reach the wall. UG brought trap up and it was set up in the corridor just outside the entrance. 2245 Wolverine caught in trap. Trap was screwed shut and the wolverine was taken to the Fire Hall
Movement Map (Import NotePlus Site Map)		

Question		Response	Details
Deterrent Count		Score (0/440) 0.00%	
Truck	0		
Air Horn	0		
C/F Bear Banger	0		
C/F Pen Whistle	0		
12GA Bear Banger	0		
12GA Explosive	0		
12GA B.B. Marker	0		
12GA Rubber Bullet	0		
12GA Slug	0		
Helicopter	0		
Other	0		
Specify	Banging on doors		
Environment Off Scene			
End of Environment Call-out	14 Jan 2019 11:15 PM		
Final Location of Wildlife	ERT Firehall		
Closure & Sign-off		Score (1/1) 100.00%	
Wildlife Report Complete	On		
Signature	Shelby Skinner	15 Jan 2019 11:41 AM	

Wolverine - 2019-01-14 - WTA Wildlife Report - 2018 Conducted on 14th Jan, 2019 By Environment Department		
Inspection score	Failed items	Created actions
0.45%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)
Wolverine - 2019-01-14 - WTA
Document No.
WildlifeReport000019

Completed On

14th Jan, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

0.23%

Enter Initial Time of Wildlife Sighting

📅 14th Jan, 2019 ⌚ 16:03 PM MST

Department/Individual Who Reported Wildlife:

Site Services - Luke

Deterrent Report / Environment On Scene

Environment at Call-out Location

📅 14th Jan, 2019 ⌚ 16:13 PM MST

Animal Type

Wolverine

Description (eg. number of individuals, colour, age, size, etc.):

1, dark, unknown age, large

Photo (If Possible):

Unanswered

Deterrent Report / Chronological Events

16:03 ENV told of wolverine was back at incinerator, ENV picked up
16:13 ENV arrives at WTA, wolverine hanging around outside fence pacing back and forth
16:18 wolverine climbs fence and enters burn pit
16:20 ENV uses rubber buckshot shell and fires at wolverine in burn pit, animal runs away and climbs fence out of WTA

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Report / Deterrent Count

0.23%

Truck

0

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger 0 From 0 to 40
C/F Pen Whistle 0 From 0 to 40
12GA Bear Banger 0 From 0 to 40
12GA Explosive 0 From 0 to 40
12GA B.B. Marker 0 From 0 to 40
12GA Rubber Bullet 0 From 0 to 40
12GA Slug 0 From 0 to 40
Helicopter 0 From 0 to 40
Other 1 From 0 to 40
Specify Rubber buckshot

Deterrent Report / Environment Off Scene

End of Environment Call-out 📅 14th Jan, 2019 ⌚ 16:25 PM MST
Final Location of Wildlife WTA climbing over fence leaving toward tundra

Wildlife Report Complete

Off

Signature



Mark Nelson
14th Jan, 2019 5:19 PM MST

Wolverine-2019-01-15 - Relocation south Wildlife Report - 2019 Conducted on 15th Jan, 2019 By Environment Department		
Inspection score 0.45%	Failed items 0	Created actions 0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location) Wolverine-2019-01-15 - Relocation south
Document No. WildlifeReport000018

Completed On

15th Jan, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

0.23%

Enter Initial Time of Wildlife Sighting

📅 15th Jan, 2019 ⌚ 12:30 PM MST

Department/Individual Who Reported Wildlife:

Environment

Deterrent Report / Environment On Scene

Environment at Call-out Location

📅 15th Jan, 2019 ⌚ 12:30 PM MST

Animal Type

Unanswered

Description (eg. number of individuals, colour, age, size, etc.):

1 wolverine, dark with light stripes, unknown age, smallish

Photo (If Possible):

Unanswered

Deterrent Report / Chronological Events

Wolverine trapped previous evening (14 Jan),
12:30 relocation by helicopter started
13:00 relocation south of Diavik complete

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Report / Deterrent Count

0.23%

Truck

0

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger 0 From 0 to 40
C/F Pen Whistle 0 From 0 to 40
12GA Bear Banger 0 From 0 to 40
12GA Explosive 0 From 0 to 40
12GA B.B. Marker 0 From 0 to 40
12GA Rubber Bullet 0 From 0 to 40
12GA Slug 0 From 0 to 40
Helicopter 0 From 0 to 40
Other 1 From 0 to 40
Specify Relocation by helicopter

Deterrent Report / Environment Off Scene

End of Environment Call-out ☐ 15th Jan, 2019 <input type="clock"/> 14:00 PM MST
Final Location of Wildlife ~70km south of Diavik

Wildlife Report Complete	
On	
Signature	
	Mark Nelson

Wildlife Report - 2019

Audit Title (Animal - yyyy-mm-dd - Location)

Wolverine - 2019-01-16 - Old Mine Dry

Document No.

WildlifeReport000291

16 Jan 2019

Completed on

16 Jan 2019

Score

2/441.0 - 0.45%

Audit - 2/441 0.45%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (1/440) 0.23%
Enter Initial Time of Wildlife Sighting	16 Jan 2019 08:00 AM	
Department/Individual Who Reported Wildlife:	Mine Ops/Herb Dueck	
Environment On Scene		
Environment at Call-out Location	16 Jan 2019 08:30 PM	
Animal Type	Wolverine	
Description (eg. number of individuals, colour, age, size, etc.):	Larger wolverine, one that got into Incinerator building	
Photo (If Possible):		
Chronological Events		
	0800 Wolverine reported in Old Mine Dry building. ENV issued an alert and told Herb to open the door to let it walk out. 0820 Wolverine exited building just before SS2 and Patty on scene. Determined that wolverine came through front door which did not have a properly functioning latch. Wolverine got into 1 garbage can and then left. Site Services arrived to fix latch while ENV at Old Mine Dry. 0900 ENV and Herb set trap baited with sardines. 1400 ENV spotted wolverine crossing road from UG Laydown towards Batch Plant. 1430 Wolverine caught in trap. ENV picked up the trap and brought it to the Field Lab for the night. Wolverine was quite aggressive and was chewing on trap. Blood was observed around its mouth and on the trap where it was biting.	

Question		Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 1			
Deterrent Count		Score (1/440) 0.23%	
Truck	0		
Air Horn	0		
C/F Bear Banger	0		
C/F Pen Whistle	0		
12GA Bear Banger	0		
12GA Explosive	0		
12GA B.B. Marker	0		
12GA Rubber Bullet	0		
12GA Slug	0		
Helicopter	0		
Other	1		
Specify	Trap		
Environment Off Scene			
End of Environment Call-out	16 Jan 2019 03:00 PM		
Final Location of Wildlife	Field Lab		
Closure & Sign-off		Score (1/1) 100.00%	
Wildlife Report Complete	On		
Signature	Shelby Skinner	16 Jan 2019 06:05 PM	

Media



Appendix 1

Wolverine-2019-01-17 - Relocation north Wildlife Report - 2019 Conducted on 17th Jan, 2019 By Environment Department		
Inspection score 0.45%	Failed items 0	Created actions 0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location) Wolverine-2019-01-17 - Relocation north
Document No. WildlifeReport000019

Completed On

 17th Jan, 2019

Wildlife Report

Type of Wildlife Report

Deterrent Reporting

Deterrent Report

0.23%

Enter Initial Time of Wildlife Sighting

 16th Jan, 2019 09:30 AM MST

Department/Individual Who Reported Wildlife:

ENV

Deterrent Report / Environment On Scene

Environment at Call-out Location

 17th Jan, 2019 09:30 AM MST

Animal Type

Wolverine

Description (eg. number of individuals, colour, age, size, etc.):

1 wolverine, dark, age unknown, large

Photo (If Possible):

Unanswered

Deterrent Report / Chronological Events

10:00 start relocation north by helicopter

11:30 relocation complete

Movement Map (Import NotePlus Site Map)

Unanswered

Deterrent Report / Deterrent Count

0.23%

Truck

0

From 0 to 40

Air Horn

0

From 0 to 40

C/F Bear Banger

0

From 0 to 40

C/F Pen Whistle 0 From 0 to 40
12GA Bear Banger 0 From 0 to 40
12GA Explosive 0 From 0 to 40
12GA B.B. Marker 0 From 0 to 40
12GA Rubber Bullet 0 From 0 to 40
12GA Slug 0 From 0 to 40
Helicopter 0 From 0 to 40
Other 1 From 0 to 40
Specify Helicopter relocation

Deterrent Report / Environment Off Scene

End of Environment Call-out 📅 17th Jan, 2019 ⌚ 12:00 PM MST
Final Location of Wildlife ~150km north of Diavik

Wildlife Report Complete	
On	
Signature	
	Mark Nelson

APPENDIX L

Wolverine Snow Track Survey Results 2019

Date	Transect	UTM Easting	UTM Northing	Snow Cover	Days Since		Observation Type	Number of Individuals	Age of Track	Comments
					Last Snow	Last Wind				
Round 1										
23/03/2019	WT08	548808	7156291	100%	>3	0.5	Animals	1	After	wolverine spotted, being chased by skidoo (not by us)
23/03/2019	WT08	548826	7156440	100%	>3	0.5	Animals	1	After	went into stand of bushed not far away, near hunting camp
23/03/2019	WT08	549196	7158034	100%	>3	0.5	Tracks	1	After	very slightly blown-in
29/03/2019	WT11	520108	7140897	100%	1	3	Tracks	1	-	-
23/03/2019	WT22	552967	7153117	100%	>3	0.5	Tracks	1	After	before windy night, not too old
24/03/2019	WT31	553564	7167184	100%	0	0.5	Animals	1	-	running NE from skidoos
24/03/2019	WT31	557151	7167522	100%	0	0.5	Animals	1	-	run N when spotted
23/03/2019	WT35	554375	7159083	100%	>3	0.5	Tracks	1	After	clean edges, new track
23/03/2019	WT35	553818	7159103	100%	>3	0.5	Tracks	1	After	slightly blown-in
27/03/2019	WT37	546447	7135916	100%	3	1	Tracks	2	-	lots of other old tracks, 1 large wolf travelling with 1 or 2 smaller
27/03/2019	WT38	543790	7141065	100%	3	1	Tracks	1	-	-
27/03/2019	WT38	544058	7141065	100%	3	1	Tracks	1	-	same wolverine
27/03/2019	WT38	544687	7140385	100%	3	1	Tracks	1	-	Very old, blown through tracks, only 2 prints
Round 2										
12/04/2019	Off Transect	577412	7158799	100%	5	5	Den	-	-	-
21/04/2019	WT02	520803	7142084	100%	0.5	2	Tracks	1	Before	Snow covered, possibly heading SE
21/04/2019	WT03	528505	7144467	100%	0.5	2	Tracks	1	After	Fresh, Large track, crossed transect heading SE
21/04/2019	WT03	530147	7144612	100%	0.5	2	Tracks	1	After	small track heading NW
19/04/2019	WT06	548282	7168982	100%	4	0.5	Tracks	1	After	-
12/04/2019	WT08	548800	7156076	100%	5	5	Tracks	1	After	Male (hind leg), Extra Large, fresh snow
12/04/2019	WT08	548987	7157109	100%	5	5	Tracks	1	After	small prints (possibly female), fluffy/fresh snow
12/04/2019	WT08	548952	7157717	100%	5	5	Tracks	1	After	large male, fluffy/ fresh snow
12/04/2019	WT08	549288	7159028	100%	5	5	Tracks	1	Before	small, packed windblown snow
21/04/2019	WT11	522770	7134182	100%	0.5	2	Tracks	1	After	crossed transect several times
21/04/2019	WT11	523817	7133152	100%	0.5	2	Tracks	1	After	heading N following fox tracks, same animal crossed again about 700 m away
21/04/2019	WT13	521083	7137475	100%	0.5	2	Tracks	1	After	Snow covered, heading NE
21/04/2019	WT13	522054	7137394	100%	0.5	2	Tracks	1	After	possibly same animal crossing transect, zig-zagging south. Crossed transect again several times about 200m away
12/04/2019	WT14	542691	7153649	100%	5	5	Tracks	1	Before	hard packed snow, large print, on lake
12/04/2019	WT14	542621	7153641	100%	5	5	Tracks	1	Before	hard packed, older than above, hardpacked on lake
12/04/2019	WT14	541839	7153274	100%	5	5	Tracks	1	Before	changed direction of travel from NW to SE, hard packed snow, on shoreline
18/04/2019	WT16	526112	7155024	100%	2	3	Tracks	1	After	many fresh fox, hare and ptarmigan tracks all around
18/04/2019	WT16	526440	7155007	100%	2	3	Tracks	1	After	same Wolverine crossing transect 100 m east of last tracks. Same animal crossed track again 20 m east
18/04/2019	WT16	526787	7155016	100%	2	3	Tracks	1	After	Probably same animal heading S down hill towards lake via small gully

Date	Transect	UTM Easting	UTM Northing	Snow Cover	Days Since		Observation Type	Number of Individuals	Age of Track	Comments
					Last Snow	Last Wind				
18/04/2019	WT16	527885	7155010	100%	2	3	Tracks	1	After	Wolverine over top of fox tracks, Heading north
12/04/2019	WT24	544486	7158320	100%	5	5	Tracks	1	Before	good-size, wind blown snow
12/04/2019	WT24	543821	7158942	100%	5	5	Tracks	1	After	small, fluffy snow, on lake
12/04/2019	WT24	542373	7160009	100%	5	5	Tracks	1	After	fluffy snow on top of hard packed snow, shore of lake, fair size
21/04/2019	WT27	529663	7139988	100%	0.5	2	Tracks	1	After	Blow in
17/04/2019	WT30	545496	7145341	100%	1	2	Tracks	1	After	Single fox following
17/04/2019	WT30	546230	7145931	100%	1	2	Tracks	2	Before	Same size as last tracks
13/04/2019	WT31	557252	7167887	100%	6	0.5	Tracks	1	After	Medium size, chasing a rabbit, hard snow
18/04/2019	WT32	528481	7161187	100%	2	3	Tracks	1	After	Wolverine tracks over fox tracks of same age, heading in same direction
19/04/2019	WT34	542278	7171098	100%	4	0.5	Tracks	1	After	Crossed track again further on
19/04/2019	WT34	540554	7169223	100%	4	0.5	Tracks	1	Before	Old
19/04/2019	WT34	539958	7168887	100%	4	0.5	Tracks	1	After	-
12/04/2019	WT35	554538	7159187	100%	5	5	Tracks	1	After	Soft/ fresh Snow
12/04/2019	WT35	554146	7159178	100%	5	5	Tracks	1	After	Male (hind leg), different from above

Note: Snow track surveys occurred 23 March to 21 April. Only detections of wolverine sign are reported.

APPENDIX M

Wolverine Incidental Observation Summary 2019

Date	Animals	Location	Descriptive Characteristics
2019/01/02	1	Moving S to N along A21 ramp	Unknown
2019/01/03	1	Near Pond 13, moved toward pond 5 before visual was lost	Unknown
2019/01/04	1	WTA non-burn bin, got out on its own. Animal seen hanging around incinerator building	Unknown
2019/01/07	1	Truck shop, shallow bay, to backfill	Unknown
2019/01/08	1	Metcon towards south tank farm	Unknown
2019/01/09	1	WTA toward wind farm	Unknown
2019/01/10	1	Inside incinerator building eating garbage. Length of time wolverine was in building is unknown.	Unknown
2019/01/11	1	WTA trying to get into seacan 7	Unknown
2019/01/12	1	Traveling through site service parking area at 0240hrs. Reported on N Haul Road by Clayton at 12:50 and again by Luke at WTA at 13:00	Unknown
2019/01/13	1	Waiting at incinerator bay door, withdrew as LV approached, when in burn pit used bear spray, but too windy to be effective. At 13:20 seen at Powerhouse inside a work area	Unknown
2019/01/14	1	After a few minutes wolverine re-entered WTA at burn pit. ENV fired rubber buckshot shell from shotgun, wovlerine ran to fence, climbed it and left toward tundra	Unknown
2019/01/14	1	Arctic corridor	Unknown
2019/01/14	1	Batch Plant Control room, Old Mine Dry, Batch Plant yard	Unknown
2019/01/15	1	Wolverine relocation to McKay lake	Unknown
2019/01/16	1	Inside Old Mine Dry	Unknown
2019/01/17	1	Wolverine relocated 150km north	Unknown
2019/03/02	1	Alleged wolverine spotted near containers at Emulsion Plant	Unknown
2019/05/12	1	Heading towards zone 1 and 2 at A21	Unknown
2019/11/20	1	Crossing north haul road heading to Zone 1 (HME refueling bay)	Unknown
2019/11/22	1	Batch Plant	Unknown
2019/12/18	1	Passed through walking path between South camp and DOC	Unknown

APPENDIX N

Pit Wall / Mine Infrastructure Raptor Survey Results 2019

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
23-Mar-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
23-Mar-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
24-Mar-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
24-Mar-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
25-Mar-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
25-Mar-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
26-Mar-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
26-Mar-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
27-Mar-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
27-Mar-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
30-Mar-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
30-Mar-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
02-Apr-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
02-Apr-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
03-Apr-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
03-Apr-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
22-May-19	A418 Pit South	L	Peregrine falcon	1	N	N	N	Flying over the North side of A418 pit, lost visual.
22-May-19	Tlichu Lineup	D	Peregrine falcon	1	N	Y	N	Flying over truck shop.
22-May-19	NCRP	D	Peregrine falcon	1	N	N	N	Flying over top of NCRP near the environment dataloggers.
22-May-19	Veg Plots in Shallow bays	D	Rough-legged hawk	3	N	N	N	spotted several times skimming the ground in the shallow bays.
24-May-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
24-May-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
25-May-19	A154 Lookout 1	L	N/A	0	N	N	N	-
25-May-19	A154 Lookout 2	L	N/A	0	N	N	N	-
25-May-19	A418 Lookout 1	L	N/A	0	N	N	N	-
25-May-19	A418 Lookout 2	L	Rough-legged hawk, Peregrine falcon	1	N	N	N	Bird flying near Lookout 2, met up with PEFA near A154 pit.
25-May-19	South Tank Farm	D	N/A	0	N	N	N	-
25-May-19	Process Plant	D	N/A	0	N	N	N	-
25-May-19	Powerhouse 1	D	N/A	0	N	N	N	-
25-May-19	Powerhouse 2	D	N/A	0	N	N	N	-
25-May-19	Boiler House	D	N/A	0	N	N	N	-
25-May-19	Site Services Line-up	D	N/A	0	N	N	N	-
25-May-19	Backfill Plant	D	N/A	0	N	N	N	-
25-May-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
25-May-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
26-May-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
26-May-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
28-May-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
28-May-19	A154 Lookout 2	L	Peregrine falcon	1	N	N	N/A	1 PEFA flying into pit.
28-May-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
28-May-19	A418 Lookout 2	L	N/A	0	N	Y	N/A	Potential PEFA nest, whitewash visible below ledge (see photo).
28-May-19	South Tank Farm	D	N/A	0	N	N	N/A	-
28-May-19	Process Plant	D	N/A	0	N	N	N/A	-
28-May-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
28-May-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
28-May-19	Boiler House	D	N/A	0	N	N	N/A	-
28-May-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
28-May-19	Backfill Plant	D	N/A	0	N	N	N/A	-
28-May-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
28-May-19	A21 Lookout #2	U	Peregrine falcon	1	N	N	N/A	-
30-May-19	A21 Lookout #1	U	Peregrine falcon	2	N	Y	N/A	Nesting behaviour noted; 2 peregrines on northwall below lookout 1, perched, three bear bangers used.
30-May-19	A21 Lookout #2	U	Peregrine falcon	2	N	Y	N/A	1 PEFA flyin gtowardsNorth wall, ENV installed snow fencing as deterrent.
31-May-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
31-May-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
01-Jun-19	A154 Lookout 1	L	N/A	0	N	N	N/A	4 peregrines flying above pit.
01-Jun-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
01-Jun-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
01-Jun-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
01-Jun-19	South Tank Farm	D	N/A	0	N	N	N/A	-
01-Jun-19	Process Plant	L	Peregrine falcon	1	N	Y	N	Perched on top of Process plant.
01-Jun-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
01-Jun-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
01-Jun-19	Boiler House	D	N/A	0	N	N	N/A	-
01-Jun-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
01-Jun-19	Backfill Plant	D	N/A	0	N	N	N/A	-
01-Jun-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
01-Jun-19	A21 Lookout #2	U	Peregrine falcon	0	N	N	N/A	1 PEFA sighted by pit personnel below Lookout#1 @ 0800.
02-Jun-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
02-Jun-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
04-Jun-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
04-Jun-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
04-Jun-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
04-Jun-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
04-Jun-19	South Tank Farm	D	N/A	0	N	N	N/A	-
04-Jun-19	Process Plant	D	N/A	0	N	N	N/A	-
04-Jun-19	Powerhouse 1	D	N/A	0	N	N	N/A	-

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
04-Jun-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
04-Jun-19	Boiler House	D	N/A	0	N	N	N/A	-
04-Jun-19	Site Services Line-up	L	Peregrine falcon	2	Y	N	N	Breeding pair. Observed mating on roof of process plant. Male flew from nest on rock face near field lab.
04-Jun-19	Backfill Plant	D	N/A	0	N	N	N/A	-
06-Jun-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
06-Jun-19	A21 Lookout #2	U	N/A	0	N	N	N/A	High wall scalers active on wall below Lookout #1.
07-Jun-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
07-Jun-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
07-Jun-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
07-Jun-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
07-Jun-19	South Tank Farm	D	N/A	0	N	N	N/A	-
07-Jun-19	Process Plant	D	Peregrine falcon	1	Y	N	N	Sighted flying over process plant and field lab, making calls.
07-Jun-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
07-Jun-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
07-Jun-19	Boiler House	D	N/A	0	N	N	N/A	-
07-Jun-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
07-Jun-19	Backfill Plant	D	N/A	0	N	N	N/A	-
07-Jun-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
07-Jun-19	A21 Lookout #2	U	N/A	0	N	N	N/A	Active equipment in area.
08-Jun-19	A21 Lookout #1	U	N/A	0	N	N	N/A	Active personnel in area.
08-Jun-19	A21 Lookout #2	U	N/A	0	N	N	N/A	Active equipment in area.
09-Jun-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
09-Jun-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
09-Jun-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
09-Jun-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
09-Jun-19	South Tank Farm	L	Common raven	1	N	Y	N	Nest being built on stairs on fuel tank closest to powerhouse 2. Can be spotted from powerhouse 2 yard near metcon entrance.
09-Jun-19	Process Plant	D	N/A	0	N	N	N/A	-
09-Jun-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
09-Jun-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
09-Jun-19	Boiler House	D	N/A	0	N	N	N/A	-
09-Jun-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
09-Jun-19	Backfill Plant	D	N/A	0	N	N	N/A	-
09-Jun-19	A154 Lookout 1	L	Peregrine falcon	1	N	Y	N	-
09-Jun-19	A154 Lookout 2	L	Rough-legged hawk, Peregrine falcon	2	N	Y	N	PEFA diving at flying RLHA, attempting to chase away from possible nest site. Located on North side of pit just west of the bulge in the wall
09-Jun-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
09-Jun-19	A418 Lookout 2	L	Common raven	1	Y	N	N/A	-
09-Jun-19	South Tank Farm	L	N/A	0	N	N	N/A	-

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
09-Jun-19	Process Plant	D	N/A	0	N	N	N/A	-
09-Jun-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
09-Jun-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
09-Jun-19	Boiler House	D	N/A	0	N	N	N/A	-
09-Jun-19	Site Services Line-up	D	Peregrine falcon	1	N	N	N/A	-
09-Jun-19	Backfill Plant	D	N/A	0	N	N	N/A	-
09-Jun-19	A21 Lookout #1	U	N/A	0	N	N	N/A	Active personnel in area.
09-Jun-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
10-Jun-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
10-Jun-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
12-Jun-19	A154 Lookout 1	L	Peregrine falcon	1	N	N	N/A	Bird flying along north end of 154 pit.
12-Jun-19	A154 Lookout 2	L	Rough-legged hawk, Peregrine falcon	2	N	Y	N/A	Birds fighting near north end of pit between lookouts. Possible nest in that area of PEFA area.
12-Jun-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
12-Jun-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
12-Jun-19	South Tank Farm	U	N/A	0	N	N	N/A	-
12-Jun-19	Process Plant	U	N/A	0	N	N	N/A	-
12-Jun-19	Powerhouse 1	U	N/A	0	N	N	N/A	-
12-Jun-19	Powerhouse 2	U	N/A	0	N	N	N/A	-
12-Jun-19	Boiler House	U	N/A	0	N	N	N/A	-
12-Jun-19	Site Services Line-up	U	Peregrine falcon	1	Y	N	N/A	One bird brooding on top of its nest.
12-Jun-19	Backfill Plant	U	N/A	0	N	N	N/A	-
15-Jun-19	A154 Lookout 1	L	N/A	0	N	Y	N/A	Potential nest spotted, did not see any birds.
15-Jun-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
15-Jun-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
15-Jun-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
15-Jun-19	South Tank Farm	D	Common raven	2	Y	N	N/A	-
15-Jun-19	Process Plant	D	N/A	0	Y	N	N/A	Nest is established, no eggs.
15-Jun-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
15-Jun-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
15-Jun-19	Boiler House	D	N/A	0	N	N	N/A	-
15-Jun-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
15-Jun-19	Backfill Plant	D	N/A	0	N	N	N/A	-
18-Jun-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
18-Jun-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
18-Jun-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
18-Jun-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
18-Jun-19	South Tank Farm	D	N/A	0	N	N	N/A	-
18-Jun-19	Process Plant	D	N/A	0	N	N	N/A	-

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
18-Jun-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
18-Jun-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
18-Jun-19	Boiler House	D	N/A	0	N	N	N/A	-
18-Jun-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
18-Jun-19	Backfill Plant	D	N/A	0	N	N	N/A	-
21-Jun-19	A154 Lookout 1	L	Peregrine falcon	1	N	Y	N/A	-
21-Jun-19	A154 Lookout 2	L	N/A	0	N	Y	N/A	-
21-Jun-19	A418 Lookout 1	L	Peregrine falcon, Rough-legged hawk	2	N	Y	N/A	-
21-Jun-19	A418 Lookout 2	L	Common raven	5	N	N	N	-
21-Jun-19	South Tank Farm	D	Common raven	1	Y	N	N	-
21-Jun-19	Process Plant	D	N/A	0	N	N	N/A	-
21-Jun-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
21-Jun-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
21-Jun-19	Boiler House	D	N/A	0	N	N	N/A	-
21-Jun-19	Site Services Line-up	D	Peregrine falcon	1	Y	N	N	-
21-Jun-19	Backfill Plant	D	N/A	0	N	N	N/A	-
24-Jun-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
24-Jun-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
24-Jun-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
24-Jun-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
24-Jun-19	South Tank Farm	D	N/A	0	N	N	N/A	-
24-Jun-19	Process Plant	D	N/A	0	N	N	N/A	-
24-Jun-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
24-Jun-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
24-Jun-19	Boiler House	D	N/A	0	N	N	N/A	-
24-Jun-19	Site Services Line-up	D	Peregrine falcon	1	Y	N	N/A	-
24-Jun-19	Backfill Plant	D	N/A	0	N	N	N/A	-
27-Jun-19	A154 Lookout 1	L	N/A	0	N	N	N	-
27-Jun-19	A154 Lookout 2	L	N/A	0	N	Y	N	-
27-Jun-19	A418 Lookout 1	L	Peregrine falcon	0	N	N	N	Nesting reported by Clayton; north wall, first terrace below set of 3 telephone poles, ledge with whitewash.
27-Jun-19	A418 Lookout 2	L	N/A	0	N	N	N	-
27-Jun-19	South Tank Farm	D	Common raven	0	N	N	N	Nest present but empty and appears unused.
27-Jun-19	Process Plant	D	N/A	0	N	N	N	-
27-Jun-19	Powerhouse 1	D	N/A	0	N	N	N	-
27-Jun-19	Powerhouse 2	D	N/A	0	N	N	N	-
27-Jun-19	Boiler House	D	N/A	0	N	N	N	-
27-Jun-19	Site Services Line-up	D	Peregrine falcon	0	Y	N	N	Appears to be a dead duck on ledge of nesting site.

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
27-Jun-19	Backfill Plant	D	N/A	0	N	N	N	-
30-Jun-19	A154 Lookout 1	L	N/A	0	N	N	N	-
30-Jun-19	A154 Lookout 2	L	N/A	0	N	N	N	-
30-Jun-19	A418 Lookout 1	L	Peregrine falcon	0	N	Y	N	Below three telephone poles.
30-Jun-19	A418 Lookout 2	L	Common raven	3	N	N	N	flying above pit.
30-Jun-19	South Tank Farm	D	Common raven	0	N	N	N	empty, unused nest .
30-Jun-19	Process Plant	D	N/A	0	N	N	N	-
30-Jun-19	Powerhouse 1	D	N/A	0	N	N	N	-
30-Jun-19	Powerhouse 2	D	N/A	0	N	N	N	-
30-Jun-19	Boiler House	D	N/A	0	N	N	N	-
30-Jun-19	Site Services Line-up	D	N/A	0	N	N	N	-
30-Jun-19	Backfill Plant	D	N/A	0	N	N	N	-
04-Jul-19	A154 Lookout 1	D	N/A	0	N	N	N/A	-
04-Jul-19	A154 Lookout 2	L	Peregrine falcon	1	N	N	N	-
04-Jul-19	A418 Lookout 1	L	N/A	0	N	Y	N	Heard PEFA calls but did not see it.
04-Jul-19	A418 Lookout 2	D	N/A	0	N	N	N	Pit truck driver says nest below white shack. ENV did not see any activity.
04-Jul-19	South Tank Farm	L	N/A	0	N	N	N	-
04-Jul-19	Process Plant	D	N/A	0	N	N	N	CORA nest present but no birds present.
04-Jul-19	Powerhouse 1	D	N/A	0	N	N	N	-
04-Jul-19	Powerhouse 2	D	N/A	0	N	N	N	-
04-Jul-19	Boiler House	D	N/A	0	N	N	N	-
04-Jul-19	Site Services Line-up	L	Peregrine falcon	2	Y	N	N	-
04-Jul-19	Backfill Plant	D	N/A	0	N	N	N	1 PEFA on top of truck shop and other on the nest.
07-Jul-19	A154 Lookout 1	L	N/A	0	N	N	N	-
07-Jul-19	A154 Lookout 2	L	N/A	0	N	N	N	-
07-Jul-19	A418 Lookout 1	L	Rough-legged hawk	1	N	N	N	1 RLHA flying over SE side of 418 pit, being accosted by 3 ravens.
07-Jul-19	A418 Lookout 2	L	N/A	0	N	N	N	-
07-Jul-19	South Tank Farm	D	N/A	0	N	N	N	-
07-Jul-19	Process Plant	D	N/A	0	N	N	N	-
07-Jul-19	Powerhouse 1	D	N/A	0	N	N	N	-
07-Jul-19	Powerhouse 2	D	N/A	0	N	N	N	-
07-Jul-19	Boiler House	D	N/A	0	N	N	N	-
07-Jul-19	Site Services Line-up	D	Peregrine falcon	1	Y	N	N	1 adult in nest on wall at back of site services lineup.
07-Jul-19	Backfill Plant	D	N/A	0	N	N	N	-
12-Jul-19	A154 Lookout 1	L	N/A	0	N	N	N	-
12-Jul-19	A154 Lookout 2	L	Rough-legged hawk	1	N	Y	N	Standing facing the pit, the bird landed to the Left (N facing direction. Bird flying over pit.
12-Jul-19	A418 Lookout 1	L	Peregrine falcon	1	N	Y	N	Bird flying over pit.
12-Jul-19	A418 Lookout 2	L	N/A	0	N	N	N	-

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
12-Jul-19	South Tank Farm	D	N/A	0	N	N	N	-
12-Jul-19	Process Plant	D	N/A	0	N	N	N	-
12-Jul-19	Powerhouse 1	D	N/A	0	N	N	N	-
12-Jul-19	Powerhouse 2	D	N/A	0	N	N	N	-
12-Jul-19	Boiler House	D	N/A	0	N	N	N	Old CORA nest present on one of the stacks.
12-Jul-19	Site Services Line-up	D	N/A	0	Y	N	N	No birds in nest.
12-Jul-19	Backfill Plant	D	N/A	0	N	N	N	-
15-Jul-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
15-Jul-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
15-Jul-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
15-Jul-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
15-Jul-19	South Tank Farm	D	N/A	0	N	N	N/A	-
15-Jul-19	Process Plant	D	N/A	0	N	N	N/A	-
15-Jul-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
15-Jul-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
15-Jul-19	Boiler House	D	N/A	0	N	N	N/A	-
15-Jul-19	Site Services Line-up	D	N/A	0	N	Y	N	Nest present, no birds in nest.
15-Jul-19	Backfill Plant	D	N/A	0	N	N	N/A	-
18-Jul-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
18-Jul-19	A154 Lookout 2	L	Rough-legged hawk	1	N	Y	N/A	-
18-Jul-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
18-Jul-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
18-Jul-19	South Tank Farm	D	N/A	0	N	N	N/A	-
18-Jul-19	Process Plant	D	N/A	0	N	N	N/A	-
18-Jul-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
18-Jul-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
18-Jul-19	Boiler House	D	N/A	0	N	N	N/A	-
18-Jul-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
18-Jul-19	Backfill Plant	D	N/A	0	N	N	N/A	-
18-Jul-19	A21 Lookout #1	U	N/A	0	N	N	N/A	-
18-Jul-19	A21 Lookout #2	U	N/A	0	N	N	N/A	Active personnel in area/active equipment in the pit.
21-Jul-19	A154 Lookout 1	L	Peregrine falcon	2	N	N	N/A	2 PEFA flying together squawking over NW side of 154 pit.
21-Jul-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
21-Jul-19	A418 Lookout 1	L	Peregrine falcon	2	N	N	N/A	1 confirms PEFA flying over NW side of 418, 1 unconfirmed heard answering call on SE side.
21-Jul-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
21-Jul-19	South Tank Farm	D	N/A	0	N	N	N/A	-
21-Jul-19	Process Plant	D	N/A	0	N	N	N/A	-
21-Jul-19	Powerhouse 1	D	N/A	0	N	N	N/A	-

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
21-Jul-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
21-Jul-19	Boiler House	D	N/A	0	N	N	N/A	-
21-Jul-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
21-Jul-19	Backfill Plant	D	N/A	0	N	N	N/A	-
25-Jul-19	A154 Lookout 1	L	Peregrine falcon	0	N	N	N/A	Empty nest.
25-Jul-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
25-Jul-19	A418 Lookout 1	L	Peregrine falcon	0	N	N	N/A	Empty nest.
25-Jul-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
25-Jul-19	South Tank Farm	D	N/A	0	N	N	N/A	-
25-Jul-19	Process Plant	D	N/A	0	N	N	N/A	-
25-Jul-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
25-Jul-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
25-Jul-19	Boiler House	D	N/A	0	N	N	N/A	-
25-Jul-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
25-Jul-19	Backfill Plant	D	N/A	0	N	N	N/A	-
27-Jul-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
27-Jul-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
27-Jul-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
27-Jul-19	A418 Lookout 2	U	N/A	0	N	N	N/A	Moose and calf sleeping in area, did not survey lookout.
27-Jul-19	South Tank Farm	D	N/A	0	N	N	N/A	-
27-Jul-19	Process Plant	D	N/A	0	N	N	N/A	-
27-Jul-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
27-Jul-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
27-Jul-19	Boiler House	D	N/A	0	N	N	N/A	-
27-Jul-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
27-Jul-19	Backfill Plant	D	N/A	0	N	N	N/A	-
03-Aug-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
03-Aug-19	A154 Lookout 2	D	N/A	0	N	N	N/A	-
03-Aug-19	A418 Lookout 1	D	N/A	0	N	N	N/A	-
03-Aug-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
03-Aug-19	South Tank Farm	D	N/A	0	N	N	N/A	-
03-Aug-19	Process Plant	D	N/A	0	N	N	N/A	-
03-Aug-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
03-Aug-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
03-Aug-19	Boiler House	D	N/A	0	N	N	N/A	-
03-Aug-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
03-Aug-19	Backfill Plant	D	N/A	0	N	N	N/A	-
03-Aug-19	A21 Lookout #1	U	N/A	0	N	N	N/A	Active equipment in the pit.
03-Aug-19	A21 Lookout #2	U	N/A	0	N	N	N/A	Active personnel in area/active equipment in the pit.

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
06-Aug-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
06-Aug-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
06-Aug-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
06-Aug-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
06-Aug-19	South Tank Farm	D	N/A	0	N	N	N/A	-
06-Aug-19	Process Plant	D	N/A	0	N	N	N/A	-
06-Aug-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
06-Aug-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
06-Aug-19	Boiler House	D	N/A	0	N	N	N/A	-
06-Aug-19	Site Services Line-up	D	N/A	0	N	N	N/A	Old nest present. No birds.
06-Aug-19	Backfill Plant	D	N/A	0	N	N	N/A	-
17-Aug-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
17-Aug-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
17-Aug-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
17-Aug-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
17-Aug-19	South Tank Farm	D	N/A	0	N	N	N/A	-
17-Aug-19	Process Plant	D	N/A	0	N	N	N/A	-
17-Aug-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
17-Aug-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
17-Aug-19	Boiler House	D	N/A	0	N	N	N/A	-
17-Aug-19	Site Services Line-up	D	N/A	0	N	N	N/A	Old nest present. No birds.
17-Aug-19	Backfill Plant	D	N/A	0	N	N	N/A	-
20-Aug-19	A154 Lookout 1	L	N/A	0	N	N	N/A	Heard PEFA calls, no visual.
20-Aug-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
20-Aug-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
20-Aug-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
20-Aug-19	South Tank Farm	D	N/A	0	N	N	N/A	-
20-Aug-19	Process Plant	D	N/A	0	N	N	N/A	-
20-Aug-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
20-Aug-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
20-Aug-19	Boiler House	D	N/A	0	N	N	N/A	-
20-Aug-19	Site Services Line-up	D	N/A	0	N	N	N/A	Old nest present. No birds.
20-Aug-19	Backfill Plant	D	N/A	0	N	N	N/A	-
01-Sep-19	A154 Lookout 1	L	Peregrine falcon	1	N	N	N/A	Perched on poer pole just beofre lookout #1 then flying away.
01-Sep-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
01-Sep-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
01-Sep-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
01-Sep-19	South Tank Farm	D	N/A	0	N	N	N/A	-
01-Sep-19	Process Plant	D	N/A	0	N	N	N/A	-

Date	Area	Method Used ^(a)	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y/N)	Young/Fledglings (Y/N)	Comments
01-Sep-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
01-Sep-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
01-Sep-19	Boiler House	D	N/A	0	N	N	N/A	-
01-Sep-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
01-Sep-19	Backfill Plant	D	N/A	0	N	N	N/A	-
01-Sep-19	A21 Lookout #1	U	N/A	0	N	N	N/A	Active equipment in the pit.
01-Sep-19	A21 Lookout #2	U	N/A	0	N	N	N/A	-
12-Sep-19	A154 Lookout 1	L	Rough-legged hawk	1	N	N	N/A	RLHA flying high over NE side of pitwall.
12-Sep-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
12-Sep-19	A418 Lookout 1	L	Peregrine falcon?	0	N	N	N/A	-
12-Sep-19	A418 Lookout 2	L	Peregrine falcon	1	N	N	N/A	Flying along side of top bench.
12-Sep-19	South Tank Farm	D	N/A	0	N	N	N/A	-
12-Sep-19	Process Plant	D	N/A	0	N	N	N/A	-
12-Sep-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
12-Sep-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
12-Sep-19	Boiler House	D	N/A	0	N	N	N/A	-
12-Sep-19	Site Services Line-up	D	N/A	0	N	N	N/A	Old nest present. No birds.
12-Sep-19	Backfill Plant	D	N/A	0	N	N	N/A	-
13-Sep-19	A154 Lookout 1	L	N/A	0	N	N	N/A	-
13-Sep-19	A154 Lookout 2	L	N/A	0	N	N	N/A	-
13-Sep-19	A418 Lookout 1	L	N/A	0	N	N	N/A	-
13-Sep-19	A418 Lookout 2	L	N/A	0	N	N	N/A	-
13-Sep-19	South Tank Farm	D	N/A	0	N	N	N/A	-
13-Sep-19	Process Plant	D	N/A	0	N	N	N/A	-
13-Sep-19	Powerhouse 1	D	N/A	0	N	N	N/A	-
13-Sep-19	Powerhouse 2	D	N/A	0	N	N	N/A	-
13-Sep-19	Boiler House	D	N/A	0	N	N	N/A	Old CORA nest present.
13-Sep-19	Site Services Line-up	D	N/A	0	N	N	N/A	-
13-Sep-19	Backfill Plant	D	N/A	0	N	N	N/A	-

(a) Method used to survey: L = look out scan, D = Driving, U = Unspecified.
N/A = information not available; Y = yes; N = no; – = none.

APPENDIX O

Average Number of Employees Summary 2019

Month	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
January	-	-	-	389	429	443	534	593	866	692	495	603	627	542	489	510	542	565	578	562
February	-	-	-	424	408	512	671	682	973	702	545	661	647	574	524	557	573	615	627	579
March	63	402	576	413	453	585	748	729	1010	712	552	672	617	559	508	556	572	635	620	580
April	-	-	-	318	570	678	743	755	1001	679	548	648	595	553	495	543	580	684	590	570
May	-	-	-	333	470	682	871	854	1021	645	610	634	618	561	509	552	642	718	614	594
June	189	523	751	326	392	746	821	873	1,028	600	612	641	611	552	500	561	694	698	587	606
July	-	-	-	443	396	736	819	857	600	378	589	588	607	524	465	554	701	692	574	583
August	-	-	-	425	399	745	768	868	990	335	623	607	625	524	442	562	703	651	562	584
September	211	681	879	432	408	755	708	943	993	526	639	648	608	547	466	586	704	670	561	609
October	-	-	-	457	390	726	714	950	1,042	524	620	646	577	546	481	564	664	649	563	589
November	-	-	-	379	425	670	704	984	1,043	536	608	648	579	515	498	550	627	618	562	604
December	287	881	766	-	386	611	524	696	1,030	453	510	546	464	452	460	498	490	518	518	545
Maximum (Jun-Sep)	211	681	879	433	408	755	821	943	1,028	600	639	672	647	574	500	562	703	698	587	609

APPENDIX P

Waste Inspections Summary 2019

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
	A21	Yes	Food Packaging	2	-	No	-	-	-	No	-	-	-
04/01/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
07/01/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
11/01/2019	A21	Yes	Drink Containers Recyclable, Gloves	2	-	No	-	-	-	No	-	-	-
13/01/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
16/01/2019	A21	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
19/01/2019	A21	Yes	Food Packaging	2	-	No	-	-	-	No	-	-	-
22/01/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
25/01/2019	A21	Yes	Gloves, Oil Contaminated Waste, Oily Rags, Other	6	3 non-burn waste	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
28/01/2019	A21	Yes	Cigarette Packaging, Gloves, Oil Contaminated Waste, Oily Rags	4	-	No	-	-	-	No	-	-	-
31/01/2019	A21	Yes	Oily Rags, Other	4	1 armour-all wipe container (other)	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
03/02/2019	A21	Yes	Oily Rags	1	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
07/02/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
09/02/2019	A21	Yes	Gloves, Oily Rags	2	-	No	-	-	-	No	-	-	-
12/02/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
15/02/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
18/02/2019	A21	Yes	Aerosol Cans, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	11	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
21/02/2019	A21	No	-	0	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
24/02/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
27/02/2019	A21	Yes	Other	1	1 pylon in burn bin	No	-	-	-	No	-	-	-
02/03/2019	A21	Yes	Other	1	Plastic jug in burn bin	No	-	-	-	No	-	-	-
05/03/2019	A21	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
07/03/2019	A21	Yes	Cigarette Packaging, Drink Containers Recyclable, Oil Contaminated Waste	3	-	No	-	-	-	No	-	-	-
12/03/2019	A21	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
14/03/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
17/03/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
20/03/2019	A21	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
24/03/2019	A21	Yes	Oily Rags	3	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
26/03/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
29/03/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
01/04/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
04/04/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
07/04/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
10/04/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
13/04/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
16/04/2019	A21	Yes	Food	2	-	No	-	-	-	No	-	-	-
19/04/2019	A21	Yes	Food, Gloves, Other	11	3 non-burn waste in burn bin	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
25/04/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
28/04/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
02/05/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
07/05/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
11/05/2019	A21	Yes	Oily Rags	2	-	No	-	-	-	No	-	-	-
13/05/2019	A21	Yes	Cigarette Packaging, Drink Containers Recyclable, Gloves, Oily Rags	7	-	No	-	-	-	No	-	-	-
16/05/2019	A21	Yes	Drink Containers Recyclable, Gloves, Oily Rags	11	-	No	-	-	-	No	-	-	-
19/05/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
22/05/2019	A21	Yes	Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
25/05/2019	A21	Yes	Batteries, Cigarette Packaging, Drink Containers Recyclable, Food, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	30	-	No	-	-	-	No	-	-	-
28/05/2019	A21	Yes	Oily Rags	5	-	No	-	-	-	No	-	-	-
31/05/2019	A21	Yes	Aerosol Cans, Cigarette Packaging, Drink Containers Recyclable, Food, Food Packaging, Gloves, Oil Contaminated Waste, Oil Products and Cans, Oily Rags	25	-	No	-	-	-	No	-	-	-
03/06/2019	A21	Yes	Drink Containers Recyclable, Gloves, Oil Contaminated Waste, Oily Rags	11	-	No	-	-	-	No	-	-	-
06/06/2019	A21	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Oily Rags	10	-	No	-	-	-	No	-	-	-
09/06/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
13/06/2019	A21	Yes	Aerosol Cans, Gloves, Oily Rags	24	A lot!! - comment in oily rags	No	-	-	-	No	-	-	-
15/06/2019	A21	Yes	Aerosol Cans, Gloves, Oily Rags	38	30-40 oily rags	No	-	-	-	No	-	-	-
18/06/2019	A21	Yes	Gloves, Oily Rags	3	-	No	-	-	-	No	-	-	-
21/06/2019	A21	Yes	Other	1	Bag of garbage (other)	No	-	-	-	No	-	-	-
24/06/2019	A21	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
27/06/2019	A21	Yes	Cigarette Packaging, Gloves, Oil Contaminated Waste, Oily Rags	7	-	No	-	-	-	No	-	-	-
30/06/2019	A21	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves	8	-	No	-	-	-	No	-	-	-
04/07/2019	A21	Yes	Drink Containers Recyclable, Oily Rags	12	-	No	-	-	-	No	-	-	-
06/07/2019	A21	Yes	Drink Containers Recyclable, Gloves, Oily Rags	11	-	No	-	-	-	No	-	-	-
10/07/2019	A21	Yes	Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	15	3 noodle bowls (food packaging)	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
12/07/2019	A21	Yes	Oil Contaminated Waste, Other	2	1 non-burn in burn bin	No	-	-	-	No	-	-	-
15/07/2019	A21	Yes	Aerosol Cans, Gloves, Oily Rags, Other	8	1 non-burn waste in burn bin	No	-	-	-	No	-	-	-
18/07/2019	A21	Yes	Aerosol Cans, Gloves, Oily Rags, Other	5	1 non-burn in burn bin	No	-	-	-	No	-	-	-
21/07/2019	A21	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Oil Products and Cans, Oily Rags	18	-	No	-	-	-	No	-	-	-
25/07/2019	A21	Yes	Gloves, Oil Products and Cans	4	-	No	-	-	-	No	-	-	-
27/07/2019	A21	Yes	Aerosol Cans, Drink Containers Recyclable, Oily Rags	6	-	No	-	-	-	No	-	-	-
31/07/2019	A21	Yes	Gloves	20	-	No	-	-	-	No	-	-	-
02/08/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
05/08/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
08/08/2019	A21	Yes	Gloves	4	-	No	-	-	-	No	-	-	-
11/08/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
17/08/2019	A21	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
20/08/2019	A21	Yes	Cigarette Packaging, Gloves, Oil Contaminated Waste	7	-	No	-	-	-	No	-	-	-
30/08/2019	A21	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
01/09/2019	A21	Yes	Food Packaging, Oil Products and Cans	3	-	No	-	-	-	No	-	-	-
05/09/2019	A21	Yes	Food Packaging, Gloves	5	-	No	-	-	-	No	-	-	-
08/09/2019	A21	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
12/09/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
13/09/2019	A21	Yes	Drink Containers Recyclable, Gloves, Oily Rags	7	-	No	-	-	-	No	-	-	-
16/09/2019	A21	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
20/09/2019	A21	Yes	Drink Containers Recyclable, Gloves, Oily Rags	14	-	No	-	-	-	No	-	-	-
23/09/2019	A21	Yes	Cigarette Packaging, Drink Containers Recyclable, Gloves, Oil Contaminated Waste, Oily Rags	15	-	No	-	-	-	No	-	-	-
26/09/2019	A21	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Oily Rags	15	-	No	-	-	-	No	-	-	-
29/09/2019	A21	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Oily Rags	6	-	No	-	-	-	No	-	-	-
02/10/2019	A21	Yes	Drink Containers Recyclable, Food, Gloves, Oily Rags	19	-	No	-	-	-	No	-	-	-
04/10/2019	A21	Yes	Drink Containers Recyclable, Food, Gloves, Oily Rags	19	-	No	-	-	-	No	-	-	-
08/10/2019	A21	Yes	Drink Containers Recyclable, Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
10/10/2019	A21	Yes	Cigarette Packaging, Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
13/10/2019	A21	Yes	Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
16/10/2019	A21	Yes	Food Packaging, Gloves, Oil Products and Cans	6	-	No	-	-	-	No	-	-	-
19/10/2019	A21	Yes	Gloves, Oil Products and Cans	7	-	No	-	-	-	No	-	-	-
22/10/2019	A21	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
25/10/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
28/10/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
01/11/2019	A21	Yes	Oily Rags	2	-	No	-	-	-	No	-	-	-
03/11/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
06/11/2019	A21	Yes	Gloves	5	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
10/11/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
12/11/2019	A21	Yes	Drink Containers Recyclable	2	-	No	-	-	-	No	-	-	-
16/11/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
22/11/2019	A21	Yes	Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	10	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
28/11/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
30/11/2019	A21	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
04/12/2019	A21	No	-	0	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
06/12/2019	A21	No	-	0	-	No	-	-	-	No	-	-	-
01/01/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
05/01/2019	Landfill	Yes	Gloves, Other	6	3 wood pallets should have gone to burn pile	No	-	-	-	Yes	Unspecified	tracks	Tracks
07/01/2019	Landfill	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
11/01/2019	Landfill	Yes	Food Packaging, Gloves, Oily Rags	15	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
13/01/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
16/01/2019	Landfill	Yes	Aerosol Cans, Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
19/01/2019	Landfill	Yes	Aerosol Cans, Food, Food Packaging, Gloves	5	-	No	-	-	-	Yes	Unspecified	tracks	Tracks
22/01/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
25/01/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Food Packaging, Gloves	7	-	No	-	-	-	No	-	-	-
28/01/2019	Landfill	Yes	Cigarette Packaging, Oily Rags	4	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
31/01/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
03/02/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	36	-	No	-	-	-	No	-	-	-
07/02/2019	Landfill	Yes	Gloves, Oily Rags	2	-	No	-	-	-	No	-	-	-
09/02/2019	Landfill	Yes	Aerosol Cans, Gloves, Oil Contaminated Waste	32	-	No	-	-	-	No	-	-	-
12/02/2019	Landfill	Yes	Cigarette Packaging	1	-	No	-	-	-	Yes	red fox	tracks	Fox Tracks
15/02/2019	Landfill	Yes	Drink Containers Recyclable	1	-	No	-	-	-	Yes	red fox	tracks	Fox tracks

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
18/02/2019	Landfill	Yes	Drink Containers Recyclable, Gloves, Oil Contaminated Waste, Oil Products and Cans, Oily Rags	8	-	No	-	-	-	No	-	-	-
21/02/2019	Landfill	Yes	Gloves, Oil Products and Cans, Oily Rags, Other	7	1 boot (other)	No	-	-	-	Yes	red fox	tracks	Prints in snow
24/02/2019	Landfill	Yes	Gloves, Oily Rags	13	-	No	-	-	-	Yes	red fox	tracks	Prints in snow
27/02/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
02/03/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Oily Rags, Other	36	1 windshield washer (other)	No	-	-	-	No	-	-	-
05/03/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	14	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
07/03/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
12/03/2019	Landfill	Yes	Food Packaging, Gloves, Oily Rags	3	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
14/03/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Other	5	1 Truck Seat cover, 1 toque (other)	No	-	-	-	No	-	-	-
17/03/2019	Landfill	No	-	0	-	No	-	-	-	Yes	Unspecified	Unknown	Yes
20/03/2019	Landfill	Yes	Gloves, Oil Contaminated Waste	3	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
24/03/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Oil Contaminated Waste, Oily Rags	18	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
26/03/2019	Landfill	Yes	Aerosol Cans, Gloves, Oily Rags	34	-	No	-	-	-	No	-	-	-
29/03/2019	Landfill	Yes	Gloves, Oily Rags	3	-	No	-	-	-	No	-	-	-
01/04/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
04/04/2019	Landfill	Yes	Aerosol Cans, Batteries, Gloves, Oily Rags, Other	8	-	No	-	-	-	No	-	-	-
07/04/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
10/04/2019	Landfill	No	-	0	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
13/04/2019	Landfill	Yes	Aerosol Cans, Cigarette Packaging, Drink Containers Recyclable, Food, Gloves, Oily Rags	20	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
16/04/2019	Landfill	Yes	Food Packaging	1	-	No	-	-	-	No	-	-	-
19/04/2019	Landfill	Yes	Drink Containers Recyclable, Oily Rags	3	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
25/04/2019	Landfill	Yes	Gloves, Oily Rags	26	Large pile - comment in oily rags	No	-	-	-	No	-	-	-
28/04/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
02/05/2019	Landfill	Yes	Cigarette Butts, Cigarette Packaging, Drink Containers Recyclable, Gloves, Oil Contaminated Waste, Oily Rags	19	-	No	-	-	-	No	-	-	-
07/05/2019	Landfill	Yes	Aerosol Cans, Cigarette Butts, Cigarette Packaging, Gloves, Oily Rags	24	-	No	-	-	-	No	-	-	-
11/05/2019	Landfill	Yes	Cigarette Packaging, Drink Containers Recyclable, Gloves	4	-	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
13/05/2019	Landfill	Yes	Cigarette Packaging, Gloves, Oil Products and Cans, Other	14	3 boots (Other)	No	-	-	-	No	-	-	-
16/05/2019	Landfill	Yes	Aerosol Cans, Cigarette Butts, Cigarette Packaging, Gloves, Other	21	-	No	-	-	-	No	-	-	-
19/05/2019	Landfill	Yes	Aerosol Cans, Gloves, Oily Rags, Other	13	2 work boots (other)	No	-	-	-	No	-	-	-
22/05/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
25/05/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
28/05/2019	Landfill	Yes	Batteries, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste	19	-	No	-	-	-	No	-	-	-
31/05/2019	Landfill	Yes	Drink Containers Recyclable, Gloves, Oily Rags	32	-	No	-	-	-	No	-	-	-
03/06/2019	Landfill	Yes	Gloves, Oily Rags, Other	18	Fluorescent bulbs x3, mask x1, chemical bottles (other)	No	-	-	-	No	-	-	-
06/06/2019	Landfill	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
09/06/2019	Landfill	Yes	Cigarette Butts, Cigarette Packaging, Gloves, Oily Rags	35	-	No	-	-	-	No	-	-	-
12/06/2019	Landfill	Yes	Food, Gloves, Oily Rags	14	rotting apple core (drink container recyclables)	No	-	-	-	No	-	-	-
15/06/2019	Landfill	Yes	Oil Contaminated Waste	1	Dirty oil filter (oil contaminated waste)	No	-	-	-	No	-	-	-
18/06/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Food, Gloves, Oil Contaminated Waste, Oily Rags	34	-	No	-	-	-	No	-	-	-
21/06/2019	Landfill	Yes	Aerosol Cans, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	17	-	No	-	-	-	No	-	-	-
24/06/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
27/06/2019	Landfill	Yes	Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	29	-	No	-	-	-	No	-	-	-
30/06/2019	Landfill	Yes	Aerosol Cans, Cigarette Butts, Drink Containers Recyclable, Gloves, Oil Contaminated Waste, Oil Products and Cans, Oily Rags	62	-	No	-	-	-	No	-	-	-
04/07/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	73	-	No	-	-	-	Yes	grey wolf	tracks	Wolf tracks
07/07/2019	Landfill	Yes	Cigarette Packaging, Oily Rags, Other	4	Half full bucket of grease (other)	No	-	-	-	No	-	-	-
10/07/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags, Other	21	1 Windex container (other)	No	-	-	-	No	-	-	-
12/07/2019	Landfill	Yes	Aerosol Cans, Food Packaging, Gloves, Oil Contaminated Waste, Oil Products and Cans, Oily Rags	15	-	No	-	-	-	No	-	-	-
15/07/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
18/07/2019	Landfill	Yes	Aerosol Cans, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oil Products and Cans, Oily Rags	72	3 bottles of various oil products (oily contaminants); A ton!!! Cups, plates, drink containers (Food packaging)	No	-	-	-	No	-	-	-
21/07/2019	Landfill	Yes	Cigarette Packaging, Gloves, Oily Rags	6	-	No	-	-	-	No	-	-	-
25/07/2019	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	15	-	No	-	-	-	Yes	Unspecified	chew	Chewed gloves
27/07/2019	Landfill	Yes	Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oil Products and Cans, Oily Rags	30	-	No	-	-	-	No	-	-	-
31/07/2019	Landfill	Yes	Drink Containers Recyclable, Gloves, Oil Contaminated Waste, Oily Rags	7	-	No	-	-	-	No	-	-	-
02/08/2019	Landfill	Yes	Cigarette Packaging, Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
08/08/2019	Landfill	Yes	Gloves	4	-	No	-	-	-	No	-	-	-
17/08/2019	Landfill	Yes	Gloves, Oily Rags	8	-	No	-	-	-	No	-	-	-
20/08/2019	Landfill	Yes	Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	71	-	No	-	-	-	No	-	-	-
29/08/2019	Landfill	Yes	Oil Products and Cans, Oily Rags	11	-	No	-	-	-	No	-	-	-
01/09/2019	Landfill	Yes	Aerosol Cans, Gloves, Oil Products and Cans, Oily Rags	19	-	No	-	-	-	No	-	-	-
04/09/2019	Landfill	Yes	Batteries, Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	26	-	No	-	-	-	No	-	-	-
07/09/2019	Landfill	Yes	Cigarette Packaging, Gloves, Oily Rags	8	-	No	-	-	-	No	-	-	-
10/09/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
13/09/2019	Landfill	Yes	Food Packaging, Gloves, Oily Rags	3	-	No	-	-	-	No	-	-	-
16/09/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
20/09/2019	Landfill	Yes	Aerosol Cans, Gloves, Oil Contaminated Waste, Oil Products and Cans, Oily Rags	20	-	No	-	-	-	No	-	-	-
22/09/2019	Landfill	Yes	Batteries, Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	31	-	No	-	-	-	No	-	-	-
26/09/2019	Landfill	Yes	Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	39	-	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
28/09/2019	Landfill	Yes	Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	14	-	No	-	-	-	No	-	-	-
02/10/2019	Landfill	Yes	Aerosol Cans, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	36	-	No	-	-	-	Yes	red fox	scat	Fox scat
04/10/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
08/10/2019	Landfill	Yes	Gloves, Oily Rags	4	-	No	-	-	-	No	-	-	-
10/10/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
13/10/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
16/10/2019	Landfill	Yes	Gloves, Oil Contaminated Waste, Oil Products and Cans, Oily Rags	19	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
19/10/2019	Landfill	Yes	Gloves, Oil Products and Cans	2	-	No	-	-	-	No	-	-	-
22/10/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
25/10/2019	Landfill	Yes	Gloves	1	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
28/10/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
01/11/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
03/11/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
06/11/2019	Landfill	Yes	Drink Containers Recyclable, Gloves, Oily Rags	12	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
09/11/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
12/11/2019	Landfill	Yes	Cigarette Packaging	1	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
15/11/2019	Landfill	No	-	0	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
19/11/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
22/11/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
24/11/2019	Landfill	Yes	Gloves	3	-	No	-	-	-	No	-	-	-
28/11/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
30/11/2019	Landfill	No	-	0	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
04/12/2019	Landfill	No	-	0	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
06/12/2019	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
01/01/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
05/01/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
07/01/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
11/01/2019	Underground	Yes	Cigarette Butts, Food, Food Packaging, Oily Rags	19	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
13/01/2019	Underground	Yes	Cigarette Butts, Gloves, Oily Rags	13	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
16/01/2019	Underground	Yes	Cigarette Packaging, Gloves	5	-	No	-	-	-	Yes	Unspecified	tracks	Tracks
19/01/2019	Underground	Yes	Aerosol Cans, Cigarette Butts, Gloves, Oily Rags	17	-	No	-	-	-	Yes	Unspecified	tracks	Tracks
22/01/2019	Underground	Yes	Food	1	-	Yes	red fox	2	1 fox near entrance to Mine Dry, 1 fox in burn bin getting into garbage	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
25/01/2019	Underground	Yes	Food Packaging, Gloves	2	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
28/01/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
31/01/2019	Underground	Yes	Gloves	3	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
03/02/2019	Underground	Yes	Food Packaging, Gloves, Oily Rags	5	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
06/02/2019	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
09/02/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
12/02/2019	Underground	Yes	Cigarette Butts, Oily Rags	6	-	No	-	-	-	No	-	-	-
15/02/2019	Underground	Yes	Other	1	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
18/02/2019	Underground	Yes	Cigarette Butts, Cigarette Packaging, Food, Gloves, Oil Contaminated Waste, Oily Rags	12	Coffee dumped in snow (food)	No	-	-	-	No	-	-	-
21/02/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
24/02/2019	Underground	Yes	Food Packaging, Oily Rags	2	-	No	-	-	-	No	-	-	-
27/02/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
02/03/2019	Underground	Yes	Drink Containers Recyclable, Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
05/03/2019	Underground	Yes	Food Packaging, Gloves, Oily Rags	6	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
07/03/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
12/03/2019	Underground	Yes	Cigarette Butts, Gloves, Other	28	-	No	-	-	-	No	-	-	-
14/03/2019	Underground	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
17/03/2019	Underground	Yes	Aerosol Cans, Cigarette Butts, Food, Gloves	14	-	No	-	-	-	No	-	-	-
20/03/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
24/03/2019	Underground	Yes	Oily Rags	3	-	No	-	-	-	No	-	-	-
26/03/2019	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
29/03/2019	Underground	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
01/04/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
04/04/2019	Underground	Yes	Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
07/04/2019	Underground	Yes	Cigarette Butts, Gloves	9	-	No	-	-	-	Yes	wolverine	tracks	Wolverine tracks
10/04/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
13/04/2019	Underground	Yes	Cigarette Butts, Gloves, Oily Rags	14	-	No	-	-	-	No	-	-	-
16/04/2019	Underground	Yes	Drink Containers Recyclable, Gloves, Oily Rags, Other	19	Metal rod in burn bin (1)	No	-	-	-	No	-	-	-
19/04/2019	Underground	Yes	Gloves, Oily Rags	5	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
25/04/2019	Underground	Yes	Gloves, Oily Rags	6	-	No	-	-	-	No	-	-	-
28/04/2019	Underground	Yes	Gloves, Oily Rags	14	-	No	-	-	-	No	-	-	-
02/05/2019	Underground	Yes	Cigarette Butts, Food Packaging, Gloves	24	-	No	-	-	-	No	-	-	-
07/05/2019	Underground	Yes	Cigarette Butts, Gloves, Oily Rags	26	-	No	-	-	-	No	-	-	-
11/05/2019	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
13/05/2019	Underground	Yes	Cigarette Butts, Drink Containers Recyclable, Gloves	14	-	No	-	-	-	No	-	-	-
16/05/2019	Underground	Yes	Cigarette Butts, Cigarette Packaging, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	105	-	No	-	-	-	Yes	red fox	scat	Fox scat
19/05/2019	Underground	Yes	Aerosol Cans	1	-	No	-	-	-	No	-	-	-
22/05/2019	Underground	Yes	Gloves, Oily Rags	12	many - comment in oily rags	No	-	-	-	No	-	-	-
25/05/2019	Underground	Yes	Gloves	4	-	No	-	-	-	No	-	-	-
28/05/2019	Underground	Yes	Cigarette Packaging, Drink Containers Recyclable, Gloves, Oil Products and Cans, Oily Rags, Other	11	1 plastic cup (other)	No	-	-	-	No	-	-	-
31/05/2019	Underground	Yes	Cigarette Butts, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags, Other	128	Glasses x 1, mask x 2 (other)	No	-	-	-	No	-	-	-
03/06/2019	Underground	Yes	Cigarette Butts, Drink Containers Recyclable, Food, Food Packaging, Gloves, Oil Products and Cans, Oily Rags	117	-	No	-	-	-	No	-	-	-
06/06/2019	Underground	Yes	Cigarette Butts, Gloves, Oily Rags, Other	49	2 boots and 2 Bamas in burn bin	No	-	-	-	No	-	-	-
09/06/2019	Underground	Yes	Aerosol Cans, Cigarette Butts, Oily Rags	50	-	No	-	-	-	No	-	-	-
13/06/2019	Underground	Yes	Oily Rags	4	-	No	-	-	-	No	-	-	-
15/06/2019	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
18/06/2019	Underground	Yes	Gloves, Oily Rags	4	-	No	-	-	-	No	-	-	-
21/06/2019	Underground	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
24/06/2019	Underground	Yes	Gloves, Oily Rags	4	-	No	-	-	-	No	-	-	-
27/06/2019	Underground	Yes	Cigarette Butts, Cigarette Packaging, Gloves	36	-	No	-	-	-	No	-	-	-
30/06/2019	Underground	Yes	Cigarette Butts, Gloves	23	-	No	-	-	-	No	-	-	-
04/07/2019	Underground	Yes	Cigarette Butts, Food Packaging, Gloves	13	-	No	-	-	-	No	-	-	-
07/07/2019	Underground	Yes	Cigarette Butts, Oily Rags	22	-	No	-	-	-	No	-	-	-
10/07/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
12/07/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
15/07/2019	Underground	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
18/07/2019	Underground	Yes	Cigarette Packaging, Oily Rags	3	-	No	-	-	-	No	-	-	-
21/07/2019	Underground	Yes	Cigarette Butts, Food Packaging, Gloves	27	-	No	-	-	-	No	-	-	-
25/07/2019	Underground	Yes	Cigarette Butts, Food Packaging, Gloves, Oily Rags	41	-	No	-	-	-	Yes	Unspecified	chew	Chewed glove
27/07/2019	Underground	Yes	Cigarette Butts, Gloves	25	-	No	-	-	-	No	-	-	-
31/07/2019	Underground	Yes	Gloves	3	-	Yes	Arctic hare	1	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
02/08/2019	Underground	Yes	Cigarette Butts, Cigarette Packaging, Gloves, Oily Rags	24	-	No	-	-	-	No	-	-	-
05/08/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
08/08/2019	Underground	Yes	Cigarette Packaging, Gloves, Oily Rags	3	-	No	-	-	-	No	-	-	-
11/08/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
17/08/2019	Underground	Yes	Food, Food Packaging, Gloves, Oily Rags	8	-	No	-	-	-	No	-	-	-
20/08/2019	Underground	Yes	Cigarette Butts, Food, Food Packaging, Gloves, Oily Rags	18	-	No	-	-	-	Yes	bear sp.	scat	Bear scat
29/08/2019	Underground	Yes	Cigarette Butts, Gloves	54	-	No	-	-	-	No	-	-	-
01/09/2019	Underground	Yes	Cigarette Butts, Gloves, Oily Rags	65	-	No	-	-	-	No	-	-	-
04/09/2019	Underground	Yes	Cigarette Butts, Cigarette Packaging, Food, Gloves, Oily Rags	25	-	No	-	-	-	No	-	-	-
07/09/2019	Underground	Yes	Cigarette Butts	2	-	No	-	-	-	No	-	-	-
10/09/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
13/09/2019	Underground	Yes	Gloves, Oily Rags	6	-	No	-	-	-	No	-	-	-
16/09/2019	Underground	Yes	Gloves, Oily Rags	3	-	No	-	-	-	No	-	-	-
20/09/2019	Underground	Yes	Cigarette Packaging, Gloves, Oil Products and Cans, Oily Rags	7	-	No	-	-	-	No	-	-	-
22/09/2019	Underground	Yes	Cigarette Butts, Food Packaging, Gloves, Oily Rags	30	-	No	-	-	-	No	-	-	-
26/09/2019	Underground	Yes	Aerosol Cans, Cigarette Butts, Food Packaging, Gloves, Oily Rags	30	-	No	-	-	-	Yes	Unspecified	chew	Chewed glove
28/09/2019	Underground	Yes	Cigarette Butts, Gloves, Oily Rags	22	-	No	-	-	-	No	-	-	-
02/10/2019	Underground	Yes	Oily Rags	2	-	No	-	-	-	No	-	-	-
04/10/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
08/10/2019	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
10/10/2019	Underground	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
13/10/2019	Underground	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
16/10/2019	Underground	Yes	Food Packaging, Gloves	4	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
19/10/2019	Underground	Yes	Cigarette Butts, Drink Containers Recyclable, Gloves	15	-	No	-	-	-	No	-	-	-
22/10/2019	Underground	Yes	Cigarette Butts, Gloves, Oily Rags	18	-	No	-	-	-	No	-	-	-
25/10/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
28/10/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
01/11/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
03/11/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
06/11/2019	Underground	Yes	Gloves, Other	2	1 drum in fuel containment area	No	-	-	-	Yes	red fox	tracks	Prints in snow
09/11/2019	Underground	Yes	Gloves, Other	2	1 bag of non-burn in burn bin	No	-	-	-	No	-	-	-
12/11/2019	Underground	Yes	Cigarette Butts, Oil Contaminated Waste	21	-	No	-	-	-	Yes	red fox	Unknown	Yes

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
15/11/2019	Underground	Yes	Cigarette Butts	15	-	No	-	-	-	No	-	-	-
19/11/2019	Underground	Yes	Food Packaging	3	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
22/11/2019	Underground	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
24/11/2019	Underground	Yes	Oily Rags, Other	2	Toilet paper (other)	No	-	-	-	No	-	-	-
28/11/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
30/11/2019	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
04/12/2019	Underground	Yes	Gloves, Oily Rags	4	-	No	-	-	-	Yes	Unspecified	tracks	prints in snow
06/12/2019	Underground	No	-	0	-	No	-	-	-	No	-	-	-
01/01/2019	Waste Transfer Area	Yes	Food Packaging	1	-	Yes	red fox	1	-	No	-	-	-
04/01/2019	Waste Transfer Area	Yes	Other	2	2 pallets in non burn bin	No	-	-	-	Yes	red fox; wolverine	tracks	Tracks; wolverine, fox
07/01/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
11/01/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	red fox; wolverine	tracks	Red fox, wolverine
13/01/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	red fox; wolverine	scat and tracks	Scat and tracks; 2 red foxes and 1 wolverine
16/01/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	13	-	No	-	-	-	Yes	Unspecified	scat and tracks	Scat and tracks
19/01/2019	Waste Transfer Area	Yes	Food	8	-	No	-	-	-	Yes	red fox	scat and tracks	Tracks, scat
22/01/2019	Waste Transfer Area	Yes	Drink Containers Recyclable	2	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
25/01/2019	Waste Transfer Area	Yes	Food, Food Packaging	3	-	Yes	red fox	1	Fox sleeping near fence	No	-	-	-
28/01/2019	Waste Transfer Area	Yes	Gloves, Oily Rags	7	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
31/01/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	red fox	tracks	Prints in snow
03/02/2019	Waste Transfer Area	Yes	Cigarette Packaging, Food, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	33	-	No	-	-	-	Yes	red fox	Chew and scat and tracks	Chew marks, scat, prints
07/02/2019	Waste Transfer Area	No	-	0	-	Yes	red fox	1	-	No	-	-	-
09/02/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
12/02/2019	Waste Transfer Area	Yes	Food, Food Packaging, Gloves	7	-	No	-	-	-	Yes	red fox	scat and tracks	Fox scat and tracks
15/02/2019	Waste Transfer Area	Yes	Cigarette Packaging, Gloves	6	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
18/02/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Food Packaging, Oil Contaminated Waste, Oily Rags	5	-	Yes	red fox	1	-	No	-	-	-
21/02/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Food Packaging, Gloves	7	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
24/02/2019	Waste Transfer Area	Yes	Food Packaging	1	-	No	-	-	-	Yes	Unspecified	scat	Scat in burn pit
27/02/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
02/03/2019	Waste Transfer Area	Yes	Gloves, Oil Contaminated Waste	5	-	Yes	red fox	1	-	No	-	-	-
05/03/2019	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Gloves	22	-	No	-	-	-	Yes	red fox	scat and tracks	Fox scat and tracks
07/03/2019	Waste Transfer Area	Yes	Other	2	2 shoes (other)	No	-	-	-	No	-	-	-
12/03/2019	Waste Transfer Area	Yes	Cigarette Packaging, Gloves	13	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
14/03/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
17/03/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Food Packaging, Gloves	3	-	Yes	red fox	1	-	No	-	-	-
20/03/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
24/03/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Food, Food Packaging, Gloves	15	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
26/03/2019	Waste Transfer Area	Yes	Oily Rags	2	-	No	-	-	-	No	-	-	-
29/03/2019	Waste Transfer Area	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
01/04/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
04/04/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
07/04/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
10/04/2019	Waste Transfer Area	Yes	Gloves	3	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
13/04/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
16/04/2019	Waste Transfer Area	No	-	0	-	Yes	red fox	1	-	No	-	-	-
19/04/2019	Waste Transfer Area	Yes	Gloves	2	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
25/04/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
28/04/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
02/05/2019	Waste Transfer Area	Yes	Cigarette Packaging, Food Packaging, Oily Rags	3	-	No	-	-	-	Yes	red fox	track	Fox prints
07/05/2019	Waste Transfer Area	Yes	Cigarette Packaging, Food Packaging, Gloves, Oily Rags	7	-	No	-	-	-	No	-	-	-
11/05/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
13/05/2019	Waste Transfer Area	Yes	Batteries, Drink Containers Recyclable, Gloves	5	-	No	-	-	-	No	-	-	-
16/05/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	6	-	No	-	-	-	No	-	-	-
19/05/2019	Waste Transfer Area	Yes	Food Packaging	1	-	No	-	-	-	No	-	-	-
23/05/2019	Waste Transfer Area	Yes	Other	2	Bag of clothing in non-burn bin	No	-	-	-	No	-	-	-
25/05/2019	Waste Transfer Area	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
28/05/2019	Waste Transfer Area	Yes	Cigarette Packaging, Food Packaging, Gloves, Oily Rags, Other	12	1 vape juice (other)	No	-	-	-	No	-	-	-
31/05/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
03/06/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Food, Gloves, Other	7	Coveralls x1 (other)	No	-	-	-	No	-	-	-
06/06/2019	Waste Transfer Area	Yes	Aerosol Cans, Cigarette Packaging, Drink Containers Recyclable, Gloves, Oily Rags	19	-	No	-	-	-	No	-	-	-
09/06/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
13/06/2019	Waste Transfer Area	Yes	Oily Rags, Other	7	Non burn waste in burn pit, also bag full of clothing	No	-	-	-	No	-	-	-
15/06/2019	Waste Transfer Area	Yes	Gloves, Other	11	Lots of non burn waste in burn pile (other)	No	-	-	-	No	-	-	-
18/06/2019	Waste Transfer Area	Yes	Cigarette Packaging, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	29	-	No	-	-	-	No	-	-	-
21/06/2019	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Gloves, Oily Rags	16	-	No	-	-	-	No	-	-	-
24/06/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Gloves	3	-	No	-	-	-	No	-	-	-
27/06/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
30/06/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Gloves	5	-	No	-	-	-	No	-	-	-
04/07/2019	Waste Transfer Area	Yes	Batteries, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Other	20	-	No	-	-	-	No	-	-	-
06/07/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Gloves, Oily Rags	12	-	No	-	-	-	No	-	-	-
10/07/2019	Waste Transfer Area	Yes	Aerosol Cans, Cigarette Butts, Cigarette Packaging, Drink Containers Recyclable, Food, Food Packaging, Gloves, Oil Products and Cans, Oily Rags	117	1 garbage bag full of food waste	Yes	Common raven, gull sp.	1	1 Gull and 1 Raven eating the bag of food in the burn pit	No	-	-	-
12/07/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Gloves, Oily Rags	9	-	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
15/07/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
18/07/2019	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Oil Products and Cans	14	-	No	-	-	-	No	-	-	-
21/07/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
25/07/2019	Waste Transfer Area	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
27/07/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
30/07/2019	Waste Transfer Area	Yes	Cigarette Packaging, Gloves, Oily Rags	10	-	No	-	-	-	No	-	-	-
02/08/2019	Waste Transfer Area	Yes	Aerosol Cans, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	12	-	No	-	-	-	No	-	-	-
05/08/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
08/08/2019	Waste Transfer Area	Yes	Gloves, Oily Rags, Other	15	Bags of garbage with gloves and oily rags in non-burn waste	No	-	-	-	No	-	-	-
17/08/2019	Waste Transfer Area	Yes	Oily Rags	2	-	No	-	-	-	No	-	-	-
30/08/2019	Waste Transfer Area	Yes	Gloves, Oily Rags, Other	23	Bag of mixed gloves/oily rags	No	-	-	-	No	-	-	-
01/09/2019	Waste Transfer Area	Yes	Oily Rags, Other	4	Wipes in non burn bin	No	-	-	-	No	-	-	-
08/09/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
10/09/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
13/09/2019	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Food, Food Packaging, Gloves, Oil Contaminated Waste	19	-	No	-	-	-	No	-	-	-
16/09/2019	Waste Transfer Area	Yes	Batteries, Cigarette Butts	4	-	No	-	-	-	No	-	-	-
19/09/2019	Waste Transfer Area	Yes	Aerosol Cans, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	22	-	No	-	-	-	No	-	-	-
23/09/2019	Waste Transfer Area	Yes	Food Packaging, Oil Contaminated Waste, Oily Rags	9	-	No	-	-	-	No	-	-	-
26/09/2019	Waste Transfer Area	Yes	Gloves, Oil Contaminated Waste, Oily Rags	11	-	No	-	-	-	No	-	-	-
29/09/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
04/10/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
08/10/2019	Waste Transfer Area	Yes	Food Packaging, Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-

Date	Location	Attractants				Wildlife				Wildlife Sign			
		Attractants Present?	Items	Number of Items Present	Comments	Wildlife Present?	Species	# of Individuals Observed	Wildlife Comments	Wildlife Sign Observed?	Wildlife Sign Observed Species	Wildlife Sign Type	Wildlife Sign Observed Comments
10/10/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
13/10/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
16/10/2019	Waste Transfer Area	Yes	Food Packaging, Gloves	5	-	No	-	-	-	No	-	-	-
19/10/2019	Waste Transfer Area	Yes	Drink Containers Recyclable, Gloves	9	-	No	-	-	-	No	-	-	-
22/10/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
25/10/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
29/10/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
01/11/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
03/11/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	red fox	track	Fox prints
06/11/2019	Waste Transfer Area	Yes	Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	9	-	No	-	-	-	Yes	red fox	tracks	Prints in snow
10/11/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
12/11/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	red fox	tracks	Fox tracks
16/11/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
19/11/2019	Waste Transfer Area	No	-	0	-	Yes	red fox	2	-	No	-	-	-
22/11/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
24/11/2019	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Gloves	3	-	No	-	-	-	No	-	-	-
28/11/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
01/12/2019	Waste Transfer Area	No	-	0	-	Yes	red fox	1	1 dark brown fox	No	-	-	-
04/12/2019	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	Unspecified	tracks	Prints in snow
06/12/2019	Waste Transfer Area	0	-	1	-	Yes	red fox	1	Fox sleeping near fence	No	-	-	-



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