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1 April 2019

Re: 2018 Wildlife Monitoring Report

Attached is an electronic copy of the 2018 Wildlife Monitoring Program report for Diavik Diamond Mines (2012) Inc (DDMI). This report summarizes work performed under Diavik's Wildlife Research (Monitoring) Permit during 2018. Included as an appendix are the final results of the joint regional grizzly bear DNA study (with Dominion Diamond Mines), which occurred over the period of 2012 to 2017.

DDMI requests that you review these documents and provide comments and recommendations by May 31, 2019. DDMI will provide responses by July 30, 2019. 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
Superintendent, Environment

Attach: 2018 Wildlife Monitoring Report

REPORT

Diavik Diamond Mines (2012) Inc.

2018 Wildlife Monitoring Report

Submitted to:

Diavik Diamond Mines (2012) Inc.
PO Box 2498
300 - 5201 50th Avenue
Yellowknife, NT
1XA 2P8

Attention: Mr. Sean Sinclair

Submitted by:

Golder Associates Ltd.
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Golder Reference No. 1893542-1724-R-Rev0-8000

Diavik PO No. D04254

Work Plan No. WP 567 Rev.0

27 March 2019

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) 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 2017 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 helpful, comparisons to the information gathered during the previous monitoring (2000 to 2016) and the pre-construction baseline (June 1995 to August 1997) have been included.

General observations for each program include the following.

Landscape Changes

- In 2018, the Mine footprint increased by 0.31 square kilometres (km^2). The total loss of terrestrial and aquatic habitats to date from mining activities (11.62 km^2) is below that predicted in the Environmental Effects Report (EER). The current footprint is expected to be at its maximum now 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.

Barren-Ground Caribou

- The total caribou summer habitat loss to date is 2.90 habitat units, which remains below the prediction made in the EER.
- Caribou aerial surveys were not required or completed in 2018. DDMI is waiting for the 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.
- Sixty ground-based caribou behavioural scanning observations were completed in 2018. All observations occurred during winter and from 0 to 80 km from Mine infrastructure.
- There were no mine-related caribou injuries or mortalities reported in 2018.
- During 2018, 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 south of Lac de Gras far from the Mine site.
- There was no action taken to herd caribou away from potential hazards in 2018.

Grizzly Bear

- The total direct grizzly bear habitat loss to date is 8.44 km^2, 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, but did occur in 2017. Diavik completes this program in collaboration with the Ekati mine. Data analysis indicated that there have been no negative impacts on the regional population of grizzly bears in the Slave Geological Province (grizzly bear populations are stable and increasing) due to the Diavik mine. The long-term monitoring frequency will be discussed at the next wildlife monitoring workshop and determined with partners.
- In 2018, 90 reported instances of grizzly bears were recorded on East Island from 16 April to 17 October. Of these, 37 required deterrent actions and 53 did not require deterrent actions. There were no grizzly bear mortalities and no relocation events.

Wolverine

- The snow track survey was completed twice in 2018. Earnest (Patty) Lockhart from Lutsel K'e participated in the wolverine track surveys.
- The wolverine hair snagging program was not completed in 2018. The schedule for future monitoring programs will be determined after the data summary analysis report from ENR is complete and reviewed.
- A total of 28 reported instances of wolverine were recorded within and adjacent to the wildlife study area during 2018 from 15 January to 31 December.
- There were no relocations or mortalities of wolverine in 2018.

Raptors

- In 2018, 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 40 Pit Wall / infrastructure inspections were completed from 20 May until 17 September 2018 to determine use by raptors. During the inspections, one peregrine falcon nest site was confirmed at the Site Services Building and 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 2018.

Waste Management

- In 2018, 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 sign of wildlife and activity. Based on the results of inspections, workers are educated on waste management practices as part of adaptive management.
- Throughout 2018, 13,945 units of aluminum containers and 7,450 units of plastic containers were recycled and the total monetary value ($2,154.50) was donated to charity.
- During 2018, a total of 277,756 litres of waste oil were collected and burned in waste oil heat-generating boilers.
- In 2018, the wind farm generated 18,001.3 megawatt hours (MWh) of power, which represents an estimated diesel savings of 4.5 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)
- Wildlife Baseline Report, Diavik Diamonds Project (Penner 1998)

Monitoring by DDMI during construction and operation of the Mine has been used to test impact 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 effectiveness of data to test impact predictions, community concerns, adaptive management principles and the establishment of regional monitoring programs. Further, community site visits occur annually and allow 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 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 will no longer complete an independent comprehensive analysis report for wildlife. Instead all comprehensive statistical analyses related to active monitoring programs will be included every three years in the annual WMP report, and would begin 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.

1.2 Objectives

The overall objectives of the 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.
- Detect effects that were not predicted in the EER.

Objectives specific to valued components 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 (km^2) 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 km^2.

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 now for operations, with the exception of the South Country Rock Pile. The footprint may expand slightly during closure activities.

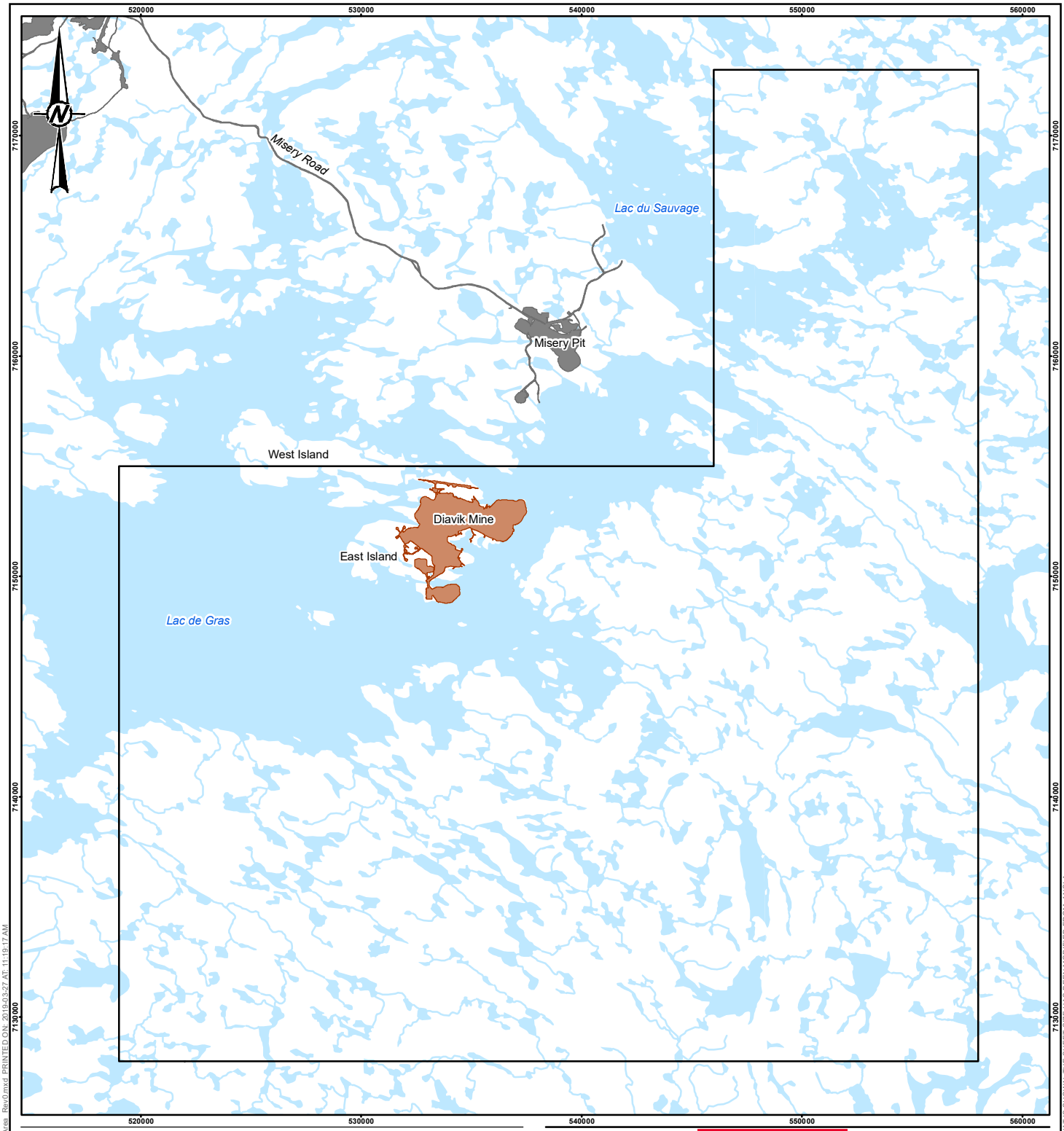
1.4 Report Organization

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 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 revisions 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). In 2018, EMAB requested additional content and clarification for caribou monitoring that were completed and included in this report (Table 1).

Table 1: Wildlife Monitoring Program Recommendations by the Environmental Monitoring Advisory Board, 2017

EMAB Recommendation	DDMI Response	WMP Section
WMP report should also identify how Traditional Knowledge is collected and presented for each component.	A section on Traditional Knowledge has been added to the WMP report.	Section 2
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 be 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



LEGEND

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

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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

DIAVIK WILDLIFE STUDY AREA, 2018

CONSULTANT

GOLDER

YYYY-MM-DD	2019-03-27
DESIGNED	DC
PREPARED	ANK
REVIEWED	DC
APPROVED	DC

PROJECT NO.	PHASE	REV.	FIGURE
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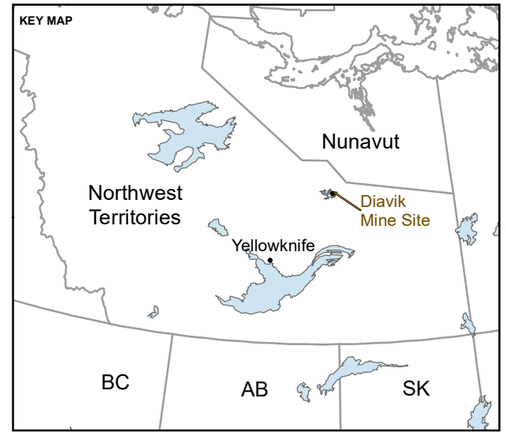
LEGEND

- INFRASTRUCTURE

KEY MAP



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CLIENT

Rio Tinto

PROJECT

DIAVIK DIAMOND MINES INC.

TITLE

DIAVIK MINE SITE INFRASTRUCTURE, 2018

CONSULTANT

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APPROVED	DC

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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 impacting the environment. As part of their commitment to the environment, Diavik incorporates available TK in environmental environmental plans and monitoring programs. For Diavik's WMP, TK has been incorporated through:

- study design
- wildlife ecology and the interpretation of monitoring results
- community participation with data collection

Incorporation of TK into study design of monitoring programs has occurred for caribou habitat, grizzly bear and wolverine. For caribou, Diavik and the Tłı̨chǫ Government carried out a TK study in the summer of 2013 through a series of workshops and site visits where four participating elders from Tłı̨chǫ and Lutsel K'e shared stories and knowledge about caribou migration, preferred habitats (vegetation communities and landscape features) and traditional land use (Tłı̨chǫ 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).

Where possible, Diavik tries to include community members in environmental monitoring annually. For example, Earnest (Patty) Lockhart from Lutseł K'e Dene First Nation participated in wolverine snow track surveys in 2018 (Section 6.1.1.2). 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 the 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 is generated every three years, which 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 reference sites (Appendix C).

The objective of this component of the WMP is to:

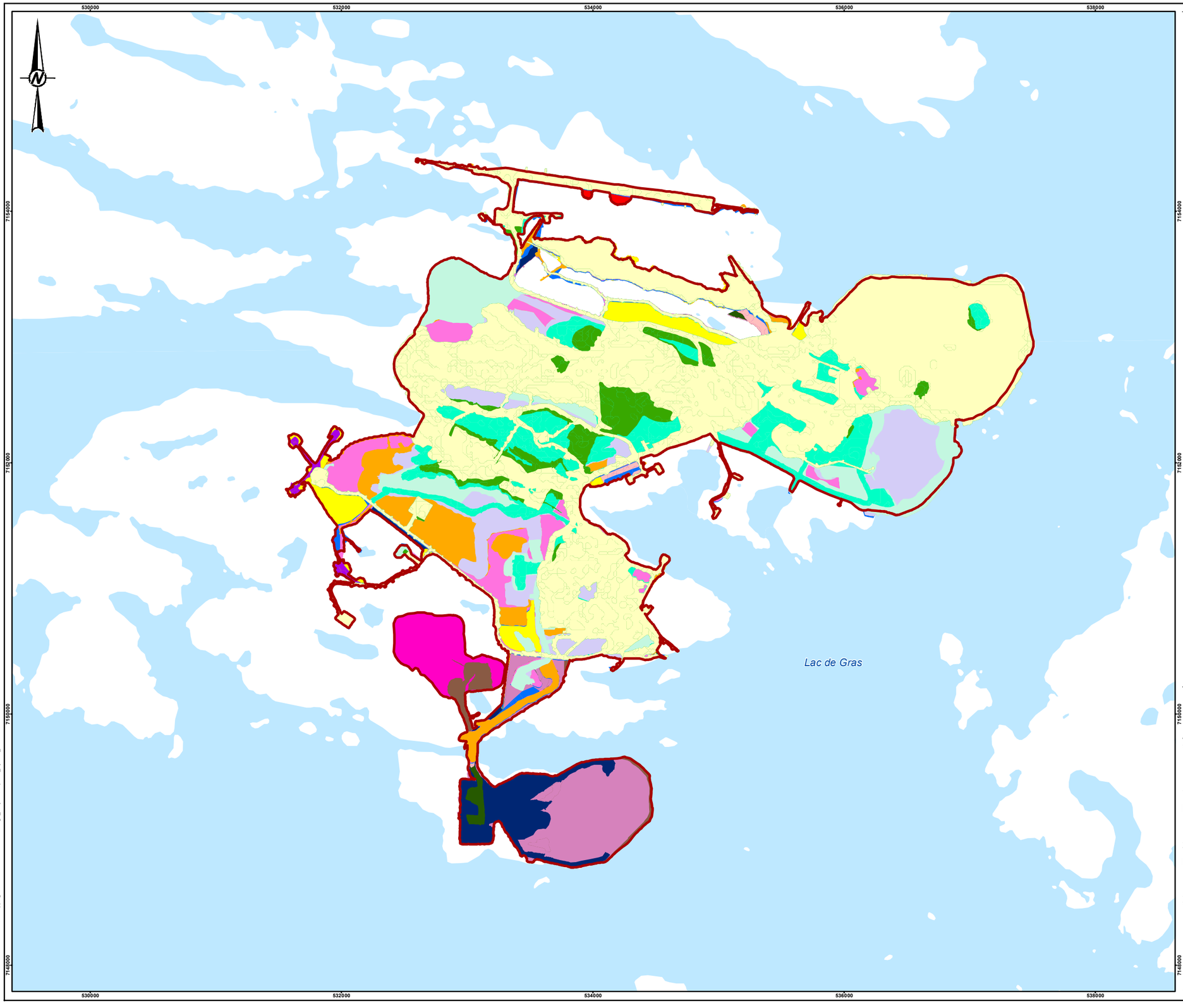
- Determine if direct vegetation / habitat loss due to the Mine footprint exceeds the prediction of 12.67 km^2.

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 (km^2) 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).

3.2 Results

- As of December 2018, a total area of 11.62 km^2 has been altered since Mine construction in 2000. This represents a relative loss of 91.7% 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 2). In 2018, the ELC types that changed included heath tundra, heath boulder (0.13 km^2), tussock / hummock (0.03 km^2), sedge wetland (0.02 km^2), birch seep and shrub (0.01 km^2), shallow water (0.02 km^2), and deep water (0.05 km^2). The current footprint is expected to be at its maximum now 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.

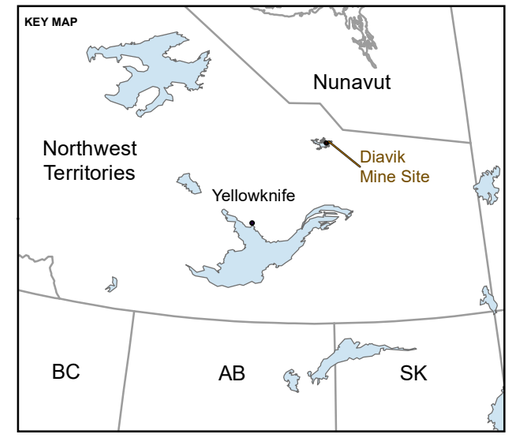


LEGEND

- MINE PERIMETER 2018
- WATERBODY

DISTURBANCE (2002-2017)

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



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CLIENT

RioTinto

PROJECT

DIAVIK DIAMOND MINES INC.

TITLE

MINE FOOTPRINT EXPANSION BY YEAR, 2002 TO 2018

CONSULTANT

GOLDER

YYYY-MM-DD	2019-03-27
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PREPARED	ANK
REVIEWED	DC
APPROVED	DC

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Table 2: Total and Predicted Ecological Landscape Classification Unit Loss, 2000 to 2018

ELC Type	Mine Phase - Total Area (km^2) Lost per Year				
	Construction and Open Pit Mining (2000 to 2005)	Open Pit Mining (2006 to 2009)	Underground Mining (2010 to 2016)	A21 Pit Development (2017 to 2018)	Predicted[(c)]
Heath Tundra	2.62	3.03	3.52	3.69	3.68
Heath Bedrock (30% to 80%)	0.45	0.59	0.67	0.67	0.78
Health Boulder (30% to 80%)	1.07	1.52	1.75	1.81	1.89
Tussock / Hummock	1.19	1.44	1.54	1.58	1.64
Sedge Wetland	0.16	0.21	0.23	0.25	0.26
Riparian Shrub	0.03	0.03	0.03	0.04	0.03
Birch Seep and Shrub	0.08	0.09	0.10	0.11	0.11
Boulder Complex	0.03	0.04	0.05	0.05	0.05
Bedrock Complex	0.05	0.06	0.07	0.07	0.07
Esker Complex	0.16	0.17	0.17	0.17	0.16
Disturbed[(b)]	0.05	0.06	0.06	0.06	0.06
Shallow Water	0.29	0.35	0.40	0.42	0.48
Deep Water	1.93	2.19	2.63	2.70	3.46
Total[(a)]	**8.15**	**9.78**	**11.22**	**11.62**	**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) From DDMI 1998a.

km^2 = square kilometres; % = percent.

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 (± 95% confidence interval) of the Bathurst caribou herd was estimated at 349,000 ± 95,000 (Case et al. 1996; Gunn et al. 1997). The most recent population estimate is determined by ENR in June 2018, was 8,200 animals in the herd (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), like the Bathurst caribou 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
- 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 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 2018, ENR developed a draft Bathurst Caribou Range Plan (GNWT 2018), which proposes development limitations and hierarchical management actions for different areas in the Bathurst annual range. The Diavik Mine is located in Area 2 of the draft Bathurst Caribou Range Plan, which has a proposed moderate development level and status of cautionary.

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 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 2), the area (km^2) 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 2.90 HUs (Table 3). As noted above (Table 2), 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 3: Caribou Summer Habitat Unit Loss to 2018

ELC Type	Habitat Suitability Value	ELC Loss to 2018 (km^2)	Habitat Unit Loss to 2018
Heath Tundra	0.37	3.69	1.365
Heath Boulder	0.40	1.81	0.724
Riparian Shrub	0.46	0.04	0.018
Bedrock Complex	0.27	0.07	0.019
Tussock / Hummock	0.30	1.58	0.474

ELC Type	Habitat Suitability Value	ELC Loss to 2018 (km^2)	Habitat Unit Loss to 2018
Sedge Wetland	0.28	0.25	0.070
Esker Complex	0.30	0.17	0.051
Birch Seep and Shrub	0.11	0.11	0.012
Boulder Complex	0.21	0.05	0.011
Heath Bedrock	0.23	0.67	0.154
Total	**-**	**8.44**	**2.898**

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. DDMI 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 2014 through 2018.

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 Diamond Mine as they often have caribou close to the 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. 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. The response variable is caribou behaviour, while the covariates include distance from Mine, group composition, and weather variables. In order 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.

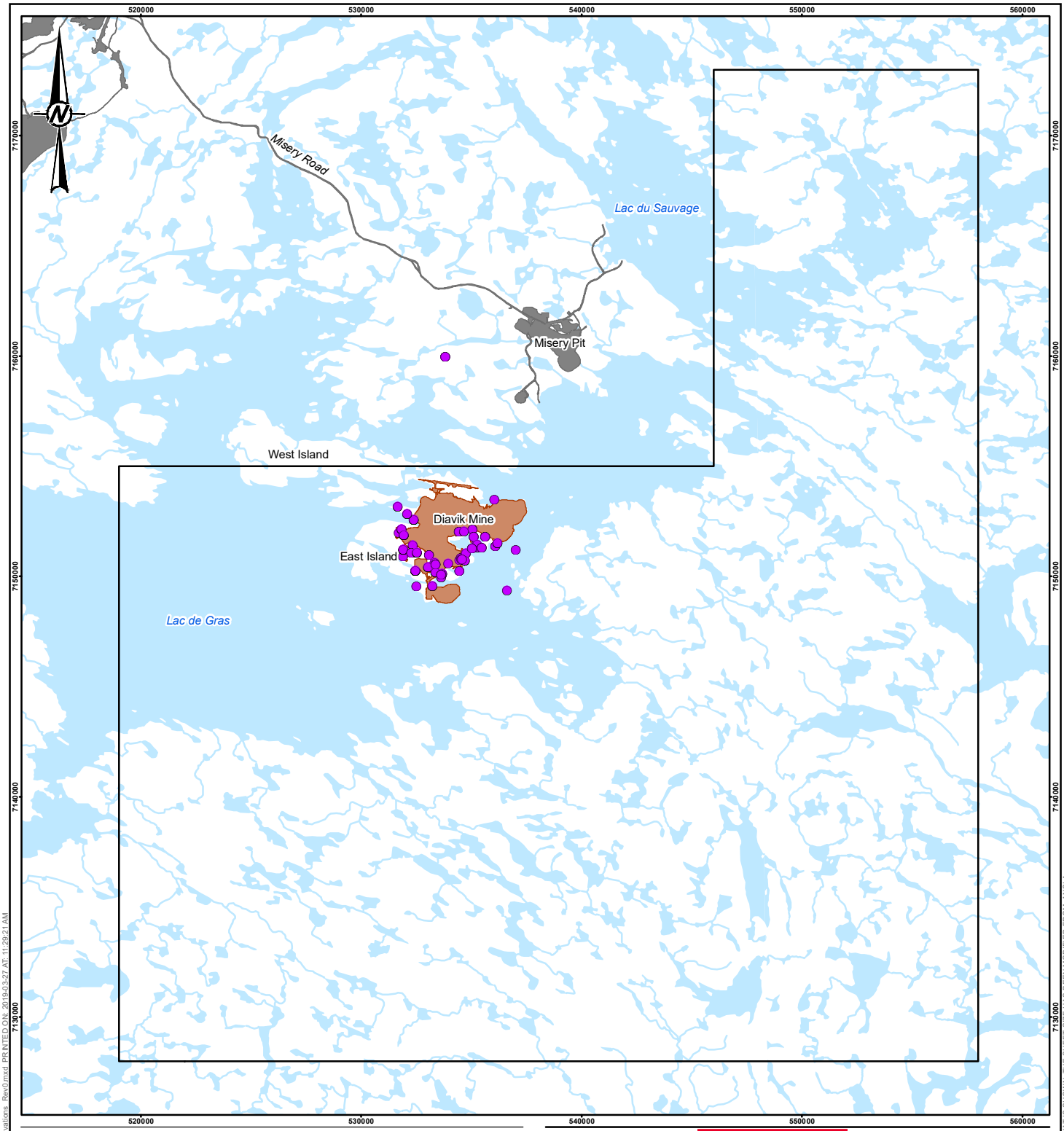
Response of caribou to stressors (natural or anthropogenic) was also assessed. In the event that a stressor was introduced during scan sampling, the observers noted the time and recorded the response of caribou to stressors as either no response, looked in the direction of the stressor, trotted or ran 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 will be undertaken on both cows and bulls, for a minimum of 20 minutes. The emphasis by DDMI 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 6 February to 23 December behaviour scans were completed on 56 caribou groups from 0 to 2.2 km from the Mine and additional four groups at 80 km from the Mine (Figure 4; Appendix B). Caribou collar locations suggest these animals were most likely from the Beverly / Ahiak and Bathurst herds. The total number of caribou observed was 562, group size ranged from 3 to 34 with the average group size of 9 animals and a standard deviation of 5.9. The estimated mean proportion (± 2SE) of caribou behaviour observed is as follows; bedded 27% (11%), feeding 51% (13%), standing 3% (4%), alert 3% (4%), walking 13% (9%), trotting 3% (4%) and running <1% (2%). No focal scans were completed in 2018.

These behaviours were observed during winter and likely reflect differences in seasonality from previous observations collected during summer and autumn. Although more caribou groups were observed in 2018 than in recent previous years, there remain insufficient numbers of groups to detect a 15% change in behaviour (Golder 2018b, Appendix D), particularly when 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). 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 feeding time is similar for animals observed within and beyond 15 km (Golder 2018b, Appendix D).



LEGEND

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

0 5 10

1:250,000 KILOMETRES

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

LOCATIONS OF CARIBOU BEHAVIOUR SCANNING OBSERVATIONS, 2018

CONSULTANT

GOLDER

YYYY-MM-DD	2019-03-27
DESIGNED	DC
PREPARED	ANK
REVIEWED	DC
APPROVED	DC

PROJECT NO.	PHASE	REV.	FIGURE
1893542	8000	0	4

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:

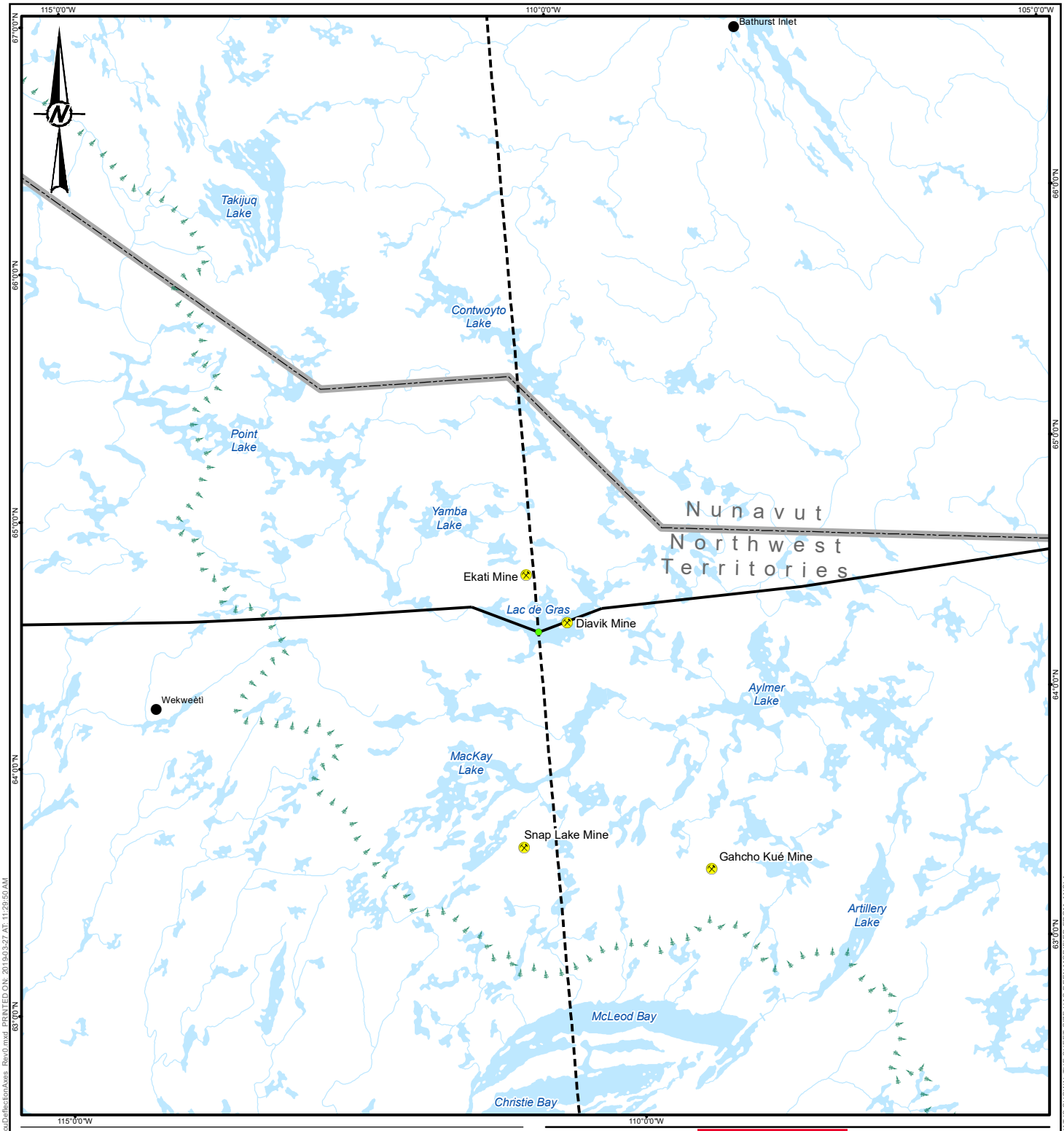
- during the northern (spring) migration, caribou would be deflected west of East Island and during the southern migration (fall), caribou would move around the east side of Lac de Gras

4.4.1 Methods

Data on the geographic location of collared cows and bulls was provided courtesy of ENR, and this information was used to illustrate the movement paths of the Bathurst caribou herd during the northern and southern migration periods.

Movements of collared Bathurst caribou during the 1996 to 2018 northern and southern migrations are included in this report but are focused on caribou that are located within approximately 200 km of Lac de Gras and the Mine. The northern migration is defined by the period when Bathurst caribou cows leave the winter range, and migrate north to the calving grounds, typically in May (Gunn et al. 2002). The southern migration starts with the return from the calving and post-calving areas in July and continues to the fall / rut period ending around 31 October (Gunn et al. 2002). However, as the result of range contraction with smaller herd size, Bathurst caribou are moving past the Lac de Gras region later in the year. To address this phenomenon at the request of the EMAB, the southern migration season was extended to
30 November and applied to all previous years to increase the number of collared animals that can be evaluated against this prediction (EMAB 2017).

A north-south oriented centre or reference line was mapped across Lac de Gras. This reference line helped determine whether movements during the northern migration across a frozen Lac de Gras were east or west (Figure 5). An east-west oriented reference line was used to determine whether collared caribou movements could be categorized as having traveled past Lac de Gras (Figure 5), which was important during the southern migration because more recently collared cows were remaining further north during the summer / autumn. In some years, caribou paths traveled past Lac de Gras on one side, turned around and went back around the opposite side. In these cases, the direction of the first path was selected for quantitative analysis. When applied to all historical collar data, the use of reference lines changed the patterns previously determined using only visual examination in the 1996, 1998 and 2007 southern migration periods. A two-sample, single-tail test on proportions was used to evaluate whether collared caribou movements were consistent with predictions in the EER for the northern and southern migrations (Zar 1999).



LEGEND

- EXISTING MINE
- LAC DE GRAS CENTROID
- POPULATED PLACE
- EAST / WEST MIGRATION DEMARCATION LINE
- NORTH / SOUTH MIGRATION DEMARCATION LINE
- TERRITORIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY

0 50 100

1:2,500,000 KILOMETRES

REFERENCE(S)

1. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.
PROJECTION: NWT LAMBERT CONFORMAL CONIC DATUM: NAD 83

CLIENT

RioTinto

PROJECT

DIAVIK DIAMOND MINES INC.

TITLE

EAST-WEST, NORTH-SOUTH REFERENCE LINES USED FOR BATHURST CARIBOU DEFLECTION ANALYSIS

CONSULTANT

GOLDER

YYYY-MM-DD	2019-03-27
DESIGNED	DC
PREPARED	ANK
REVIEWED	DC
APPROVED	DC

PROJECT NO.	PHASE	REV.	FIGURE
1893542	8000	0	5

4.4.2 Results

Data from collared caribou in 2018 show that during the northern migration six caribou (3 females, 3 males) traveled west and five (2 females, 3 males) traveled east of Lac de Gras, which supports the prediction in the EER (Figure 6). These results are also consistent with the long-term patterns observed since 1996, and further support the observation that the northern migration route of Bathurst caribou relative to the west and east side of Lac de Gras is influenced by their location on the winter range (Golder 2017b; Figure 6; Table 4).

Table 4: Numbers of Collared Female Bathurst Caribou Moving Past Lac De Gras during the Spring and Southern Migrations, 1996 to 2018

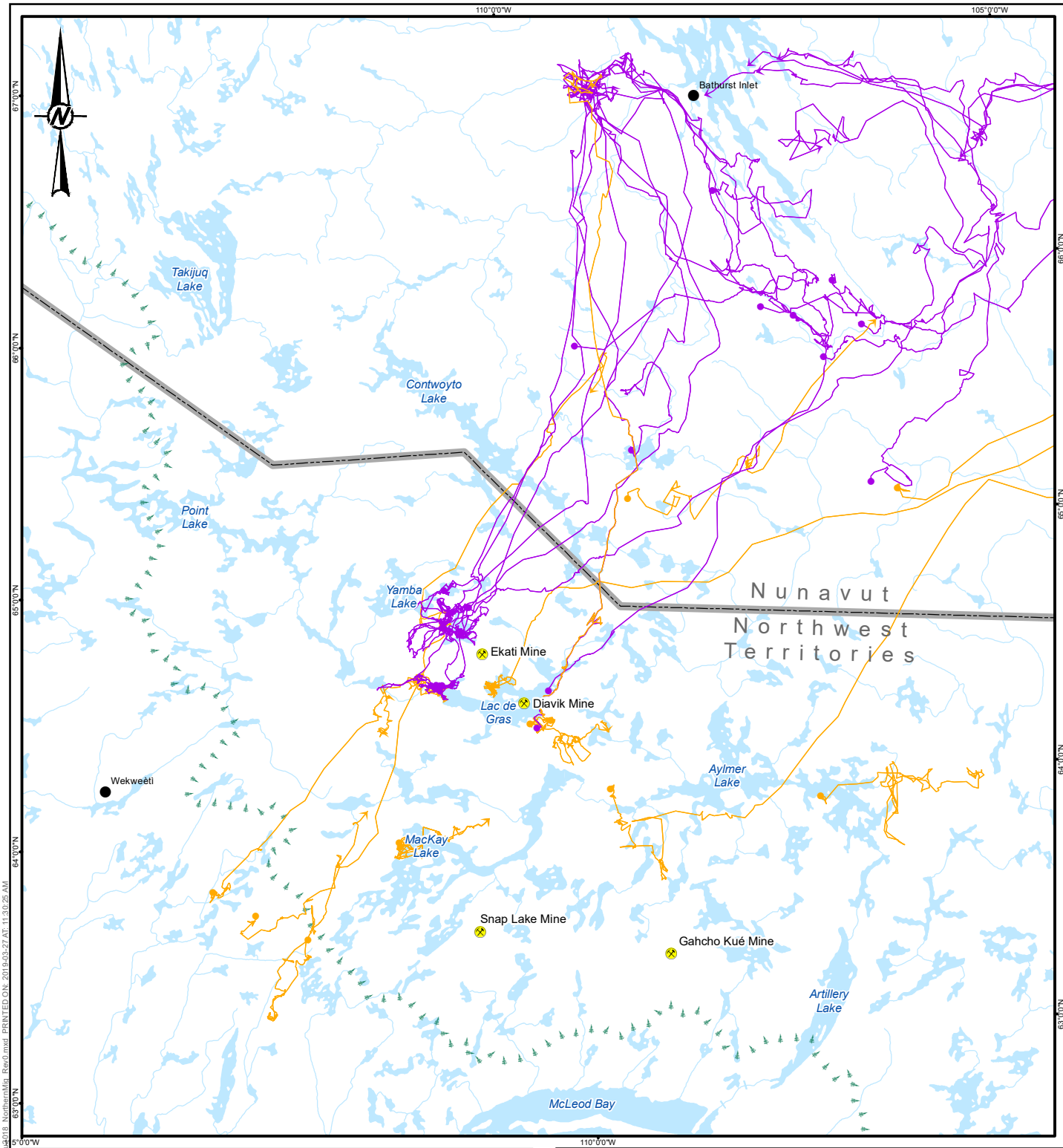
Year	Northern Migration (28 April to 30 June)		Southern Migration (1 July to 30 November)	
	West	East	West	East
1996	2	2	7	2
1997	7	0	1	6
1998	0	6	8	3
1999	12	1	1	13
2000	5	8	0	12
2001	0	11	4	6
2002	8	3	1	9
2003	11	0	0	10
2004	5	1	9	2
2005	14	3	1	18
2006	0	14	10	4
2007	19	1	12	6
2008	7	5	8	7
2009	4	0	4	5
2010	8	2	0	4
2011	17	0	11	0
2012	22	0	13	1
2013	11	4	8	0
2014	17	1	15	0
2015	21	3	21	3
2016	28	0	14	4
2017	31	6	5	11
2018	6	5	17	1
Total	**255**	**76**	**170**	**127**

During the southern migration, 17 collared caribou (9 females, 8 males) traveled west and 1 female collared caribou traveled east of Lac de Gras from July to 30 November 2018 (Figure 7). The results for 2018 are not consistent with the prediction of eastern movement around Lac de Gras during the southern migration in the EER.

Across all years, 255 (77%) of 331 collared caribou moved west past Lac de Gras during the northern migrations and 127 (57%) of 297 collared caribou moved east during the southern migrations past Lac de Gras, respectively (Golder 2017b). Long-term caribou movement paths generally correspond to the prediction made in the EER for the northern migration but not for the southern migration (DDMI 1998b; Golder 2017b). Year-to-year patterns have been variable since 1996, particularly for the southern migration. Since 2011 more collared caribou have been moving west around Lac de Gras during the southern movements. This pattern is also influenced by movements of collared males, which were first collared in 2015. Golder (2017b) showed that east-west movements by females with collars were similar over the long-term ($Z = 0.88$, $P = 0.19$) but inconsistent with EER predictions for the southern migration. There could also be caribou deflected by the development of Ekati Mine's Jay Project road, which was constructed in 2018 and is adjacent to Ekati Mine's Misery Pit.

Evidence from collared Bathurst caribou females show that they have remained further north than historically recorded and arrived in the Lac de Gras area later in the year (Golder 2014; Virgl et al. 2017), which is consistent with range contraction in declining herds (Bergerud et al. 1984, Valkenburg and Davis 1986, Messier et al. 1988, Bergerud et al. 2008). Collared caribou cow seasonal range overlap from year to year has been consistent over time (Virgl et al. 2017), so caribou are still able to access previously used areas despite variation in movements around Lac de Gras. The data suggest that the presence of mining activity within and adjacent to Lac de Gras has had little influence on the large scale movement and distribution of caribou in the region and no measurable ecological effect such as fragmentation of the Bathurst caribou herd. Based on the principles of adaptive management there is little benefit from continuing the monitoring of caribou collar deflections.

Golder (2018b, Appendix D) evaluated for a trend in the distance from annual Bathurst autumn range centroids to East Island at the request of EMAB. The results indicated no trend in annual distances between East Island and the annual autumn range centroids through time. This result is expected because East Island is farther north than the treeline and is centrally located in the Bathurst annual range (Golder 2018b, Appendix D). Caribou are considered sensitive to disturbance during the post-calving period because calves are maturing and still dependent on maternal cows. A northern shift during the post-calving period may be associated with a reduction in encounter rates with industrial activities in the Slave Geological Province (e.g., the Mine) and lower energetic costs for females and calves due to human-related disturbance (Golder 2014).



LEGEND

- EXISTING MINE
- POPULATED PLACE
- NORTHERN MIGRATION OF FEMALES (APRIL 15 - JUNE 1)
- NORTHERN MIGRATION OF MALES (APRIL 15 - JUNE 1)
- TERRITORIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY

0 50 100

1:2,500,000 KILOMETRES

REFERENCE(S)

1. CARIBOU DATA SUPPLIED BY ENVIRONMENT AND NATURAL RESOURCES, 2019. PATHS DERIVED FROM BATHURST CARIBOU SATELLITE COLLAR LOCATIONS, JANUARY-NOVEMBER, 2018.
2. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

PROJECTION: NWT LAMBERT CONFORMAL CONIC DATUM: NAD 83

CLIENT

RioTinto

PROJECT

DIAVIK DIAMOND MINES INC.

TITLE

NORTHERN MIGRATION OF BATHURST CARIBOU HERD, 2018

CONSULTANT

GOLDER

YYYY-MM-DD	2019-03-27
DESIGNED	DC
PREPARED	ANK
REVIEWED	DC
APPROVED	DC

PROJECT NO.	PHASE	REV.	FIGURE
1893542	8000	0	6

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25mm

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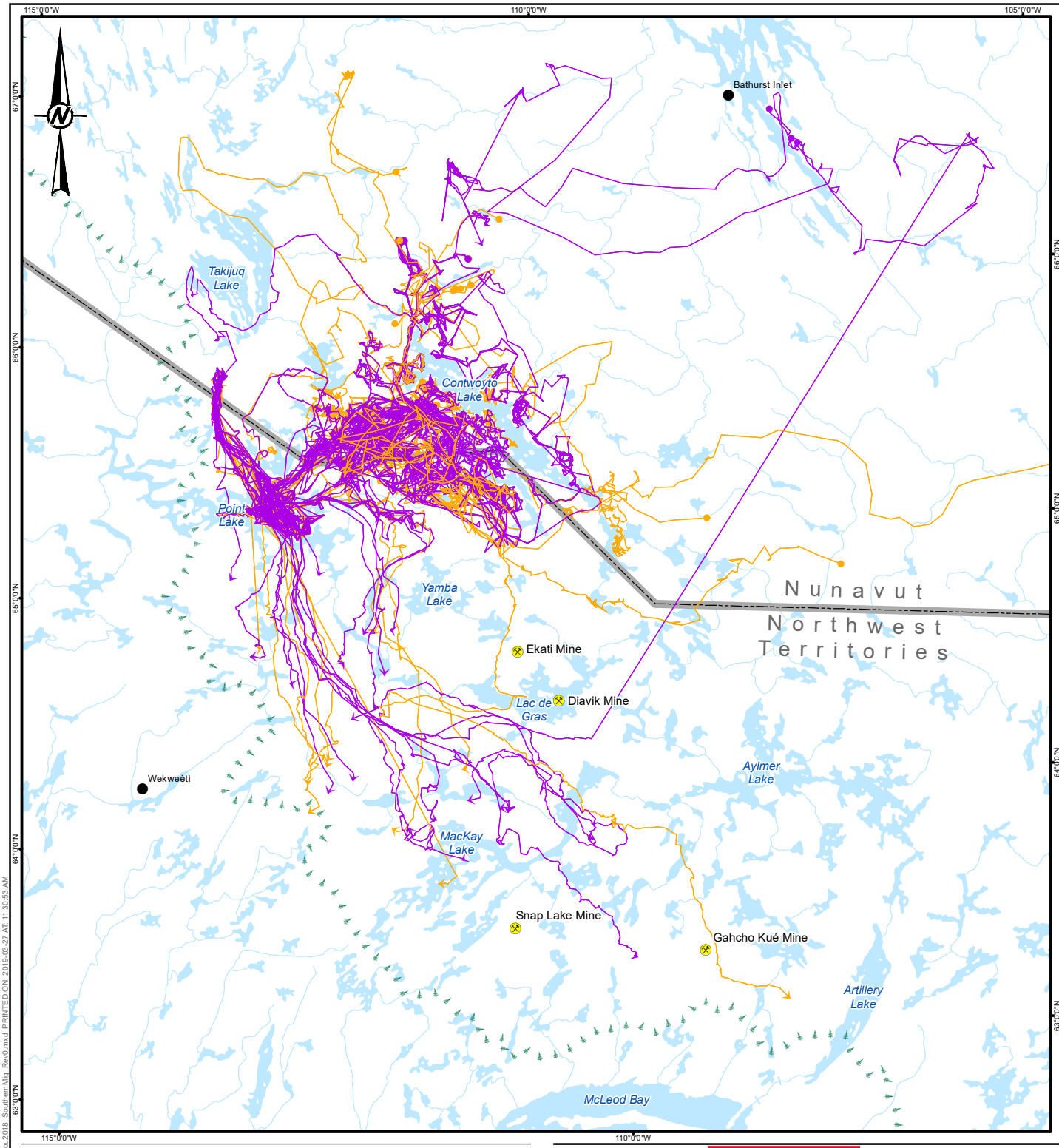


LEGEND

- EXISTING MINE
- POPULATED PLACE
- SOUTHERN MIGRATION OF FEMALES (JULY 1 - NOVEMBER 30)
- SOUTHERN MIGRATION OF MALES (JULY 1 - NOVEMBER 30)
- TERRITORIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY

0 50 100

1:2,500,000 KILOMETRES

REFERENCE(S)

1. CARIBOU DATA SUPPLIED BY ENVIRONMENT AND NATURAL RESOURCES, 2019. PATHS DERIVED FROM BATHURST CARIBOU SATELLITE COLLAR LOCATIONS, JANUARY-NOVEMBER, 2018.
2. BASE DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED.

PROJECTION: NWT LAMBERT CONFORMAL CONIC DATUM: NAD 83

CLIENT: RioTinto

PROJECT: DIAVIK DIAMOND MINES INC.

TITLE: **SOUTHERN MIGRATION OF BATHURST CARIBOU HERD, 2018**

CONSULTANT: GOLDER

YYYY-MM-DD	2019-03-27
DESIGNED	DC
PREPARED	ANK
REVIEWED	DC
APPROVED	DC

PROJECT NO.	PHASE	REV.	FIGURE
1893542	8000	0	7

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 program is to determine if the number of caribou deaths or injuries associated with the Mine is greater than predicted. 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 (Appendix 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 2018, there were no Mine-related caribou injuries or mortalities recorded (Table 5). The only Mine-related caribou mortality reported to date occurred in 2004.

Table 5: Caribou Mortalities on East Island, Baseline to 2018

	Baseline[(a)]	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Natural Caribou Mortalities on East Island	8	7	1	1	0	2	0	0	1	0	0	0	1	1	1	1	0	0	1	0
Mine-related Mortalities	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	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 2018, caribou numbers on the East Island reported by staff ranged from 1 to approximately 85 animals. Caribou collar locations suggest these animals 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 five instances where groups of 150 caribou were observed away from site, once on 2 April south of Lac de Gras and four instances on the same day (10 October 2018, 65 km south of Diavik). In addition, a herd of 200 caribou were observed on 8 April 2018 south of Lac de Gras. In total there were 135 different incidental observations reported with 114 of those observations occurring before 1 June (Appendix H and I). The groups observed that exceeded 100 animals were observed off East Island generally south of Lac de Gras. Animals remained far from haul roads so elevation from “No Advisory” was not required for the protection of caribou in 2018. There were no reported incidents involving caribou in 2018. 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 2018, herding of caribou at the Mine was not required while caribou were observed on East Island.

4.8 Adaptive Management and Recommendations

DDMI will continue to focus monitoring of caribou activity budgets that describe changes to behaviour at distances between 2 and 30 km of 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 is recommending to no longer analyze collared caribou deflections during the northern and southern migrations. The lines of evidence indicate that 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 since and associated changes in seasonal range attributes (e.g., area, location, date below the treeline).

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).

Impacts to grizzly bears from mining may occur through direct habitat loss, habitat suitability reduction 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 km^2.

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 2 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 2018 was 8.44 km^2, which is below that predicted in the EER.

5.2 Presence and Distribution

Mining activities can impact 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 2014; Appendix J), 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 Rescan 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 Rescan (2014) and ERM (2018). Table 6 summarizes results from the hair snagging program.

Table 6: 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

*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). Data analysis indicated that there have been no negative impacts on the regional population of grizzly bears in the Slave Geological Province (populations are stable and increasing) due to the Ekati and Diavik mines; therefore, 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 90 reported instances of grizzly bears on East Island, and a total of 128 grizzly bears observed (Table 7; Appendix K). Grizzly bears were observed on East Island from 16 April to 17 October. These sightings were observed over 69 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 2018, there was an average of 578 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=-0.27, P=0.30); however, staff reporting incidental observations does foster an awareness of wildlife issues at the Mine (Table 7). Of the 128 grizzly bears seen (90 observation instances), 37 involved deterrent actions and 53 did not involve deterrent actions (Table 8). 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 L).

Table 7: Average Camp Population and Number of Incidental Grizzly Bear Observations, 2002 to 2018

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

In 2018, there were no grizzly bear mortalities or relocation events (Table 8).

Construction began at the Mine in the year 2000. The calculated Mine-related mortality rate over the 19-year monitoring period is 0.05 bears per year, which is below the range predicted in the EER.

Table 8: Grizzly Bear Deterrent Actions, Incidents and Mortalities, 2000 to 2018

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Days with Bear Visitations on East Island	15	14	5	15	24	34	20	34	5	22	44	41	77	47	59[a]	56[b]	94[c]	73[d]	70[e]
Days Deterrent Actions were Utilized	10	8	2	6	20	23	8	20	3	18	40	31	65	40	39	27	50	51	36
Relocations	0	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0
Mortalities	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	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.

5.4 Adaptive Management and Recommendations

DDMI 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 impacted by the Diavik and Ekati mines. The long-term monitoring frequency will be discussed at the next wildlife monitoring workshop and determined with partners.

6.0 WOLVERINE

Wolverine (*Gulo gulo*) are annual residents in the Lac de Gras region (DDMI 1998b). Wolverine in the NWT are listed as special concern by COSEWIC (COSEWIC 2018), and is not considered a species at risk, but has a general species rank of sensitive (NWT SAR 2018b).

Wolverine home ranges have been estimated at 126 km^2 for adult females and 404 km^2 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.

6.1 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 coordinated among Dominion Diamond Ekati Corporation 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
- incidental observations at site

6.1.1 Snow Track Surveys

6.1.1.1 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 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 km^2 area for wolverine tracks. 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), including heath tundra and heath tundra boulder habitats.

Historically, each transect was driven once by a snowmobile in March or April and all wolverine tracks and other sign (e.g., digs and dens) are recorded. Since 2015, each transect was surveyed twice so that detection probability could be estimated and incorporated into analyses of relative activity and distribution.

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 from the survey date since the mean hourly wind speed had reached 7.7 metres per second (m/s). A wind speed of 7.7 m/s is sufficient to move dry snow along the ground (Li and Pomeroy 1997). Track counts were adjusted for weather by using the minimum number of days since the most recent snowfall or threshold wind speed 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. Additional analysis on relative activity, which accounted for imperfect detection of snow tracks, was completed using the statistical analysis Program PRESENCE (Hines 2007). In this analysis, detection rates were derived as a function of the standardized number of days since weather threshold event.

6.1.1.2 Results

In 2018, Earnest (Patty) Lockhart from Lutsel K'e participated in the wolverine track surveys. Fourteen wolverine tracks were recorded during two surveys of 28 transects (12 transects were surveyed once) from 23 March to 22 April (Table 9). Snow tracks were observed on 21.2% of transects during the first survey and 15.2% of transects during the second survey. This resulted in a track index of 0.04 tracks per kilometre in the both the first and second surveys and a grand mean (± 2SE) track density index (TDI) of 0.041 ± 0.028 wolverine tracks per kilometre per days since last weather threshold (Table 9; Appendix M). One dig was observed during the second snow track survey.

The probability of snow track occurrence in the study area was determined by modelling snow track data to account for imperfect detection and weather. Comparative analyses completed previously show that detection rates have varied annually and support the need to complete the survey twice (Golder 2018c). Detection estimates for 2018 were modelled using the days since either snowfall or wind threshold event. This model generated a probability of snow track occurrence of 0.54 (95% CI: 0.11 to 0.92) with a detection rate of 0.29 (95% CI: 0.08 to 0.65).

Results from the most recent comprehensive analysis of snow track data indicate that TDI and occurrence of snow tracks have increased in the study area through time from 2003 to 2016 (Golder 2017b). These patterns appear unrelated to the Mine, although both TDI and occurrence were negatively correlated with the amount of waste rock production. However, the negative association with mine activity indices is not consistent with the expectation that wolverine are attracted to the Mine. Continued diligence with mitigation such as management of food waste and preventing access to on-site denning will be important to avoid and minimize Mine-related effects to wolverine.

Table 9: Wolverine Track Index and Mean Days Since Snow Fall, 2003 to 2018

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 (± 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

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

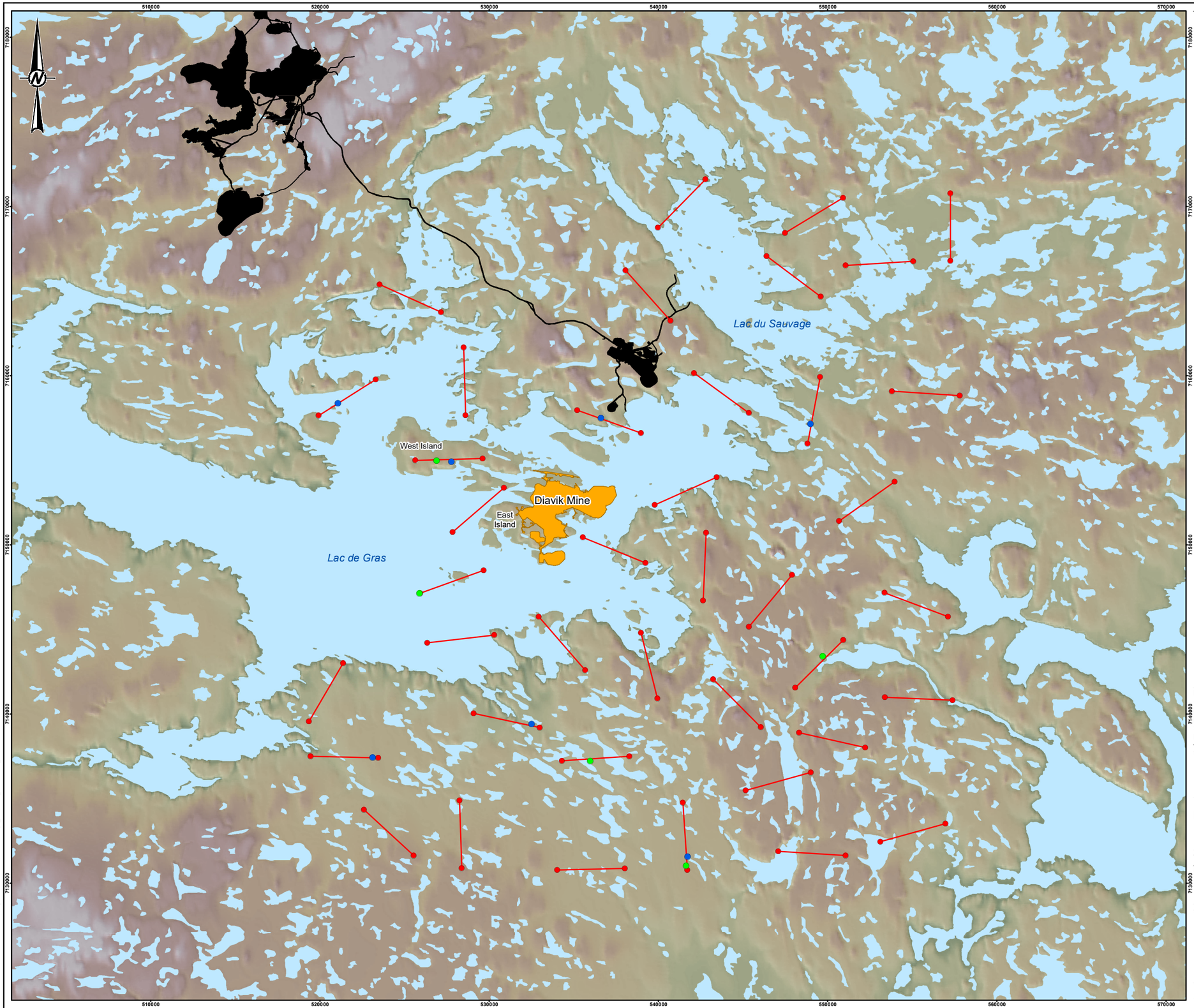
(b) For each transect, a track density index (TDI) was calculated as the number of wolverine tracks per transect length per number of days since recent snowfall or threshold wind speed. TDI is reported as mean Track Density Index ± 2 times the standard error (Appendix M).

(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.

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

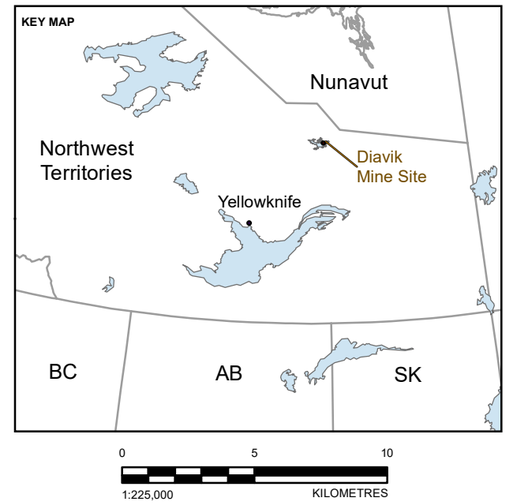
km = kilometres; tracks/km = tracks per kilometre; SE = standard error.



LEGEND

WOLVERINE TRACKS

- SURVEY 1
- SURVEY 2
- TRANSECT
- DIAVIK FOOTPRINT
- EKATI FOOTPRINT
- WATERBODY



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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, 2018

CONSULTANT

GOLDER

YYYY-MM-DD	2019-03-27
DESIGNED	LD
PREPARED	ANK
REVIEWED	DC
APPROVED	DC

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6.1.2 Hair Snagging

6.1.2.1 Methods

The wolverine hair snagging is a regional research program conducted in partnership with ENR and Dominion Diamond Ekati Corporation. 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.

6.1.2.2 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 and analysis of wolverine individuals detected by the hair snagging programs from 2004 to 2015 and collected by the Diavik, Ekati, Snap Lake and Gahcho Kué mines and at Daring Lake. A key finding of Efford and Boulanger (2018) 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. The authors showed that program frequency depends on the number of individuals identified and could be repeated every four to six years to detect 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.

6.2 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 operational period 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.

6.2.1.1 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 H and I). 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.

6.2.1.2 Results

In 2018, there were 28 reported instances when wolverines were observed at the Mine, and a total of 28 wolverines observed on East Island (Appendix N). These sightings were reported over 23 days from 15 January to 31 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 2018 from 2017. There is no correlation between the number of incidental observations of wolverine and the number of people on site (Spearman correlation r=-0.07, P=0.79); however, staff reporting incidental observations does foster an awareness of wildlife issues at the Mine (Table 10).

Table 10: Average Camp Population and Number of Incidental Wolverine Observations, 2002 to 2018

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

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

There were 28 observations of wolverines on East Island in 2018 and no incidents. No deterrent actions were used for these wolverine sightings. Since 2000, five wolverines have been relocated and five mortalities have occurred at the Mine (Table 11). No wolverine relocations or mortalities occurred in 2018. Relocations and mortalities continue to be uncommon at the Mine.

Table 11: Wolverine Observations, Deterrents, Relocations and Mortalities, 2000 to 2018

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

(a) Two wolverine mortalities occurred in 2012 at an off-site fish compensation program undertaken by DDMI.

(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.

6.3 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. The Environment Department will continue to encourage staff to report wolverine and other wildlife sightings as these build awareness at site and help to prevent or 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 impacts 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, in the study area, 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 40 Pit Wall / infrastructure inspections were completed from 20 May until 17 September to determine use by raptors (Appendix O). 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, one peregrine falcon nesting site was confirmed at the Site Services Building. In addition, a rough-legged hawk was observed building a nest at A418; however, it is unclear if any eggs or young were present in this nest. Although not considered “raptors”, common ravens were confirmed nesting at the South Tank Farm with two young that fledged around the 11 July (Table 12). A potential nest site on the pit wall for rough-legged hawk was observed at A154 but was not confirmed. Adults were observed in this area from 5 July to 31 July.

Table 12: Active Nests Observed on Mine Infrastructure and Open Pits in 2018

Area	Species	Date	Observations
A418	Rough-legged hawk	13 to 16 June	Rough-legged hawk observed building a nest 13 June and white-wash observed in area that nest was found 16 June.
Site Services Line Up Area	Peregrine falcon	13 June to 18 August	Confirmed active peregrine falcon nest 13 June. Three nestlings observed 16 July being fed by adult. Fledging of young began in early August and peregrine falcons left the area by 22 August.
South Tank Farm	Common raven	1 June to 13 July	One inactive common raven nest on Tank 103. Active common raven nest at Tank 106, pair observed at nest. Two nestlings observed at Tank 106. Common raven left area by 11 July.

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 2018.

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. DDMI will discuss options with ENR for future monitoring.

8.0 WASTE MANAGEMENT

DDMI 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
- 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. Version 2 of the Waste Management Plan was submitted to the WLWB on 8 December 2017 and was implemented in 2018 (WLWB 2018). 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. In addition, Environment Department staff conduct waste inspections at the Waste Transfer Area (WTA) and Landfill 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. Following the completion of A21 construction in late 2018, this frequency was reduced to weekly.

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 metre 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 awaiting 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 significantly less waste production in the area and inspections were reduced to weekly. 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 2018 yielded 5,954,971 tonnes of mined waste rock and 1,329,326 tonnes of overburden till and lake bottom sediment and 384,170 tonnes for the Underground and 2,867,000 tonnes of ore processed. The average daily population at the Mine in 2018 was 578 people, and weekly the population ranged from 441 to 636 people (Table 7). During 2018, the WTA and Landfill were surveyed on 121 and 119 occasions, respectively (3 January to 30 December). The A21 Area was surveyed 120 times (3 January to 30 December) and the Underground was surveyed 121 times (3 January to 30 December) (Table 13; Appendix P). A total of 335 misdirected waste items were found during WTA inspections, 927 items during Landfill inspections, 431 items at the A21 Area and 1,678 items at the waste segregation area of the Underground (Table 13). At the WTA, landfill, A21, and Underground, 55.7%, 66.4%, 58.8%, and 69.8% of the inspections had at least one item of misdirected waste, respectively.

In the WTA, the most common misdirected waste item was gloves (91 items), followed by food packaging (70 items) and food (41 items). In the Landfill, the most common misdirected item was also gloves (392 items found), followed by oily rags (197 items) and recyclable drink containers (80 items). In the A21 Area, the most common misdirected waste item was gloves (135 items), followed by oily rags (129 items) and drink containers (39 items). In the Underground area, the most common misdirected waste item was cigarette butts (1,294 items), followed by gloves (112 items) and oily rags (106 items).

Considering the total amount of waste disposed (317,562 kg incinerated and 5,320.1 tonnes landfilled), the amount of misdirected waste is considered negligible. Improperly disposed items at the WTA and Landfill were reported to Waste Management staff for immediate rectification.

Table 13: Misdirected Waste at the Waste Transfer Area, Landfill, A21 Area and Underground, 2018

Misdirected Waste Type	Waste Transfer Area (n=115 surveys)		Landfill (n=110 surveys)		A21 Area (n=114 surveys)		Underground (n=116 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	1	0.9	42	38.2	21	18.4	7	6.0
Batteries	16	13.9	12	10.9	9	7.9	1	0.9
Cigarette Butts	7	6.1	62	56.4	5	4.4	1294	1115.5
Cigarette Packaging	21	18.3	18	16.4	7	6.1	28	24.1
Drink Containers Recyclable	36	31.3	80	72.7	37	32.5	13	11.2
Food	41	35.7	18	16.4	6	5.3	3	2.6
Food Packaging	70	60.9	36	32.7	15	13.2	33	28.4
Gloves	91	79.1	392	356.4	135	118.4	112	96.6
Oil Contaminated Waste	6	5.2	25	22.7	27	23.7	22	19.0
Oil Products and Containers	0	0.0	4	3.6	1	0.9	1	0.9
Oily Rags	32	27.8	197	179.1	129	113.2	106	91.4
Other	14	12.2	41	37.3	39	34.2	58	50.0
Total	**335**	**55.7[1]**	**927**	**66.4[1]**	**431**	**58.8[1]**	**1,678**	**69.8[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 14.8% of inspections of the WTA, 3.6% of inspections of the Landfill, 0.9% of inspections of the A21 Area and 1.7% of inspections of the Underground (Table 14). Wildlife sign was observed on 28.7%, 22.7%, 9.6% and 16.4% of inspections at the WTA, Landfill, A21 Area and Underground, respectively. The most common wildlife species observed during inspections were red fox and common ravens. The most common wildlife sign observed were red fox and unspecified wildlife tracks.

Table 14: Wildlife and Wildlife Sign in the Waste Transfer Area, Landfill, A21 Area and Underground, 2018

Species	Waste Transfer Area (n=115 surveys)			Landfill (n=110 surveys)			A21 Area (n=114 surveys)			Underground (n=116 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	15	19	24	2	2	8	0	0	4	0	0	5
Wolverine	1	1	0	0	0	0	1	1	1	0	0	0
Common raven	1	1	0	2	3	2	0	0	0	2	2	0
Canine	0	0	0	0	0	1	0	0	0	0	0	0
Unspecified	0	0	9	0	0	14	0	0	6	0	0	14
Total	**17**	**21**	**33**	**4**	**5**	**25**	**1**	**1**	**11**	**2**	**2**	**19**

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 2018, 13,945 units of aluminum containers and 7,450 units of plastic containers were recycled and the total monetary value ($2,154.50). In total, $585 was donated to the Northwest Territories Special Olympics (Polar Dip) in May 2018, and $1,569.50 was donated to the Stanton Foundation (Mud Run) in October 2018. To date, the total proceeds since the inception of the employee-driven recycling program has generated $28,637.50.

During 2018, approximately 277,756 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, 1,218,969 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. DDMI 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
- absorbents

DDMI 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 that it would reduce Mine diesel consumption by 10%, as well as greenhouse-gas emissions by 12,000 tonnes of carbon dioxide annually. During the sixth year of operation, the wind farm generated 18,001,285 kilowatt hours (kWh) of power, which represents 9.2% of the total power generated in 2018 and an approximate diesel savings of 4.5 million litres (Figure 9).

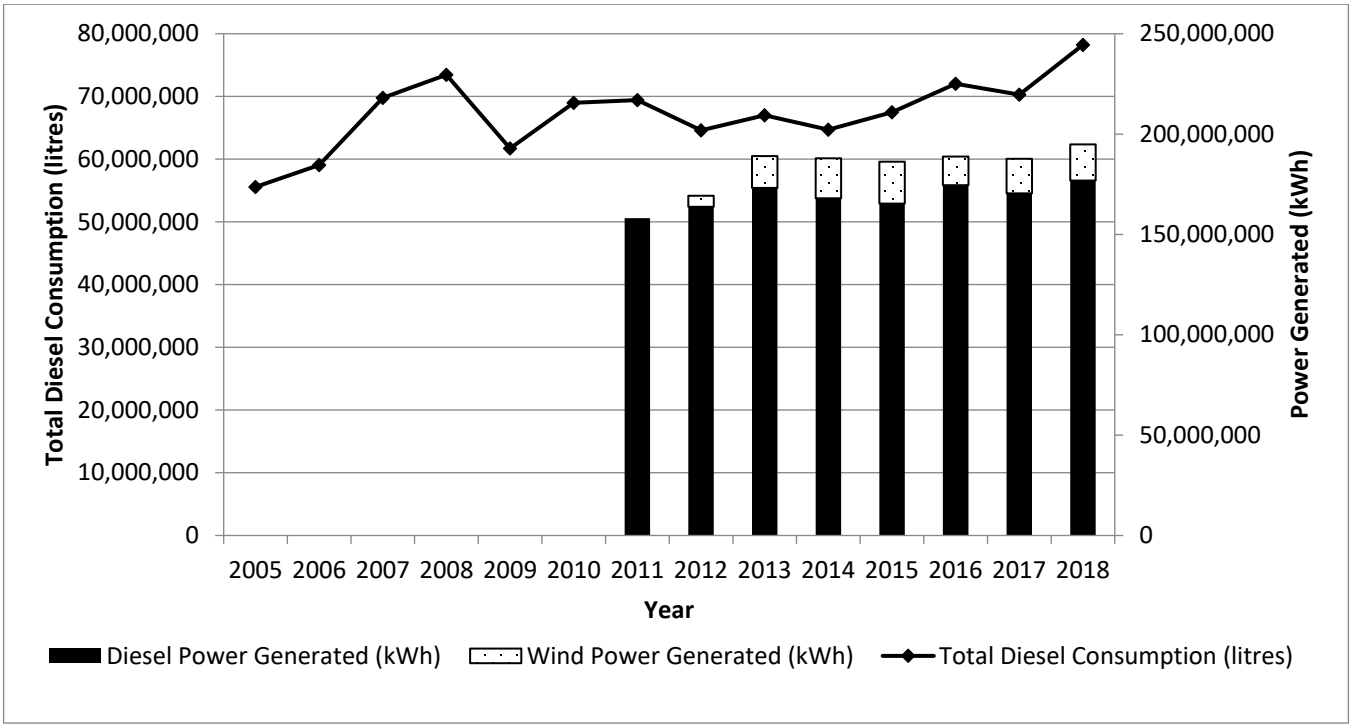

Figure 9: Annual Diavik Power Generation and Diesel Consumption

Table 15: Total Liters of Fuel \ Offset by the Wind Farm (2013-2018)

Year	2013	2014	2015	2016	2017	2018
Wind Farm Energy Generated (KWh's)	15,823,543	19,747,333	20,842,138	14,297,803	17,192,885	18,001,285
CO^2 Offset (tonnes)	12,000	14,068	14,403	9,030	10,478	12,063
Total CO^2 Offset by Windfarm (tonnes)						**72,042**

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 12,063 tonnes of carbon dioxide emissions in 2018 (Table 15). From 2005 through 2018, the annual diesel fuel consumption at the Mine has ranged from 55,573,00 litres to 78,231,394 litres. In 2018, the total fuel consumption was 78,231,394 litres, which is the highest consumption during this period. The total carbon dioxide emissions offset since 2013 by the wind farm is 72,042.

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 Mine's life. DDMI 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, the A21 Area and Underground once per week during the year. DDMI 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.

Signature Page

Golder Associates Ltd.

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TMS/DC/JV/cr/no

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APPENDIX A

Comments on the 2017 Wildlife Monitoring Report

TECHNICAL MEMORANDUM

DATE 26 October 2018

GOLDER Reference No. 1893542-1697-TM-Rev1-6000

DIAVIK WP No. 586 Rev. 1

DIAVIK PO No. D04138

TO Sean Sinclair
Diavik Diamond Mines (2012) Inc.

FROM Dan Coulton and John Virgl

EMAIL Daniel_Coulton@golder.com; John_Virgl@golder.com

RE RESPONSES TO COMMENTS BY EMAB ON 2018 WMP

On 29 August 2017, the Environmental Monitoring Advisory Board (EMAB) issued comments on the 2017 Wildlife Monitoring Program (WMP) report. The comments provided by EMAB included the review by Management and Solutions in Environmental Science (MSES) and included comments related to past reporting on the Vegetation and Lichen Monitoring program (Golder 2013), as well as the 2014 Wildlife Comprehensive Analysis Report (Golder 2014), which have either not been provided previously or have already been responded to. In order to move discussion forward, Diavik may wish to place a time limit on when new comments can be introduced on past reports. 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 and 2.

The comments provided in MSES (2018) included a summary table in Section 2.2 that indicated past comments/requests that were either satisfied or had an unspecified status. The responses provided in Table 1 are only for those comments with an unspecified status. All comments with a satisfied status are assumed complete and would require no further response by Diavik.

The report by MSES (2018) requested responses for comments in bold text provided in the body of their report. Bold comments have been copied in Table 2. Note that some of the comments in Table 2 are the same as those in Table 1.

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Table 1: Comments with an Unspecified Status in MSES (2018)

EMAB Recommendations/Questions in 2017	EMAB Proposed Action by DDMI	Response by Diavik
The 2013 Comprehensive Vegetation and Lichen Monitoring Program report stated that mercury concentrations were statistically lower near the Mine than farther away in both 2010 and 2014. No discussion on this finding was presented. Please discuss possible causes of this pattern in mercury concentrations and what effects this may have on caribou ingesting lichen far from the Mine.	A comprehensive analysis of vegetation and lichen data was last completed as an Appendix of the 2016 WMR. No discussion regarding this concern was provided and the results for mercury in Figure 3.3-2 appear to show that mercury is lower in the far field than near the Mine for 2010 (opposite of the results noted in the 2013 report). An explanation should be provided.	Mercury concentrations in lichen were not collected in 2014 but were in 2013. It is acknowledged that the scales shown in report graphs are different, but the results have not changed over time. The reports all communicate and show the apparent differences between estimates of Mine and far field sites are small in 2010, 2013, and 2016 and statistically similar for mercury as reported.
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.	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 2017a). Changes in vegetation structure may be a contributing factor to the observed caribou ZOI (14 km) 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.	Vegetation monitoring during post-closure will include reference sites that will determine whether reclaimed areas provide similar ecological function for caribou and other wildlife.
Discuss the implications of a larger than expected effect on caribou (ZOI: predicted 3-7 km; observed 14 km) for future environmental management.	No discussion was provided in the 2017 WMR. Although some discussion occurred during the 2018 SGP Wildlife Monitoring Workshop, no decisions were made, and more discussion regarding potential adaptive management actions was deferred to the future (unspecified timing). The discussion of potential adaptive management measures is still open.	At the time of the EER (1998) there was little to no information about how barren-ground caribou would respond to indirect effects from mines. The predictions were merely a best guess of what the extent indirect effects might be. Thus, those predictions came with uncertainty, which was addressed by follow-up monitoring. 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. The mechanism that causes this pattern is unclear because all sources of sensory disturbance operate simultaneously (noise, dust, lights, sound, smells, and presence of people) and experimental manipulation to determine which is key is not feasible. More recent environmental assessments for mines (De Beers 2010; Dominion Diamond 2014) have assumed that indirect effects from active mines extend to 15 km. The resulting cumulative indirect effects estimate that 98% of Bathurst seasonal ranges remain undisturbed by human activity. It is predicted that the effectiveness of adaptive management on the remaining 2% would not be measurable with respect to an observed response by caribou.
What is the actual size of the larger caribou ZOI, 14 or 28 km?	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.	Boulanger et al. (2012) estimated a 14 km ZOI from aerial survey data relative to Diavik and Ekati. An annual ZOI analysis for Diavik and Ekati (and other mines) based on collared caribou data was presented at the 2018 Slave Geological Province Wildlife Monitoring Workshop. The annual estimates ranged from 0 km to 11 km (ENR 2018). EMAB was present at the workshop and is assumed to be aware of these results. This amount of variation suggests that there is a high degree of uncertainty in whether a ZOI exists (not repeatable annually), or if it does exist then the duration of an effect is periodic, or that caribou may become habituated to mine activity. The latter two alternative hypotheses predict that the effect is not continuous, but was assumed to be continuous in the EER. The year-to-year variation also indicates that there is little value in ZOI monitoring for mitigation effectiveness. Diavik has already demonstrated that annual ZOI estimates are not correlated with a number of Mine activity indices (Golder 2011).

EMAB Recommendations/Questions in 2017	EMAB Proposed Action by DDMI	Response by Diavik
What is the effect of Mine closure on caribou range re-establishment? Are data collected to date sufficient to show a change of caribou distribution in light of the uncertainty of the size of the large ZOI? Also, current baseline (pre-disturbance) information is poor, rendering conclusions on changes from pre- to post-disturbance inconclusive. Does DDMI believe that the current data quality is sufficient to show a potential reversal of the effects after closure?	The issue was discussed verbally in 2013 and DDMI admitted that it is possible that the currently observed ZOIs (14 km; Boulanger et al. 2012) may have always existed. DDMI confirmed that true baselines do not exist. Using TK instead was suggested for discussion. No further discussion provided in the 2017 WMR. The topic should be addressed in the Mine closure plan and proposed reclamation activities.	Other factors besides the mine will influence use of caribou habitat post-closure. For example, climate warming may alter vegetation species richness and diversity, which would occur in the absence of development. Vegetation monitoring during post-closure that includes reference sites will determine whether reclaimed areas provide similar ecological function of vegetation communities for caribou and other wildlife. Some features of Diavik such as waste rock storage areas will not be reclaimed so complete reversal of effects is unlikely.
We recommend that the ideas to evaluate caribou health and to ask traditional knowledge holders about the behaviours that should be included in the observation protocol should be carefully considered, particularly from the point of view that the health of wide ranging animals are a result of many factors that occur in the region through which they range. Future discussions about these ideas could be fruitful.	No discussion was provided in the 2017 WMR.	Diavik regularly engages communities about the Wildlife Monitoring Program including at meetings and through reports, and participation in monitoring programs. Specific to caribou, Diavik has incorporated Traditional Knowledge into caribou behavioural monitoring protocols as a result of community member and Traditional Knowledge (TK) Panel engagement. This was presented by Natasha Thorpe at the 2018 Slave Geological Province Wildlife Monitoring Workshop. Diavik also tries to bring community members to the mine site so that they can see the mine and observe the surrounding environment with their own eyes. While it is impossible to bring everyone to site, the hope is that those who have been involved share their experience with others back home in the community. In 2016, Diavik ran a TK Panel that focused on Caribou monitoring. Some actions from this session are being incorporated into Management and Closure plans.
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.	No information is presented in the 2017 WMR regarding indirect caribou habitat loss, but there is also no prediction associated with indirect caribou habitat loss. DDMI indicated that the ZOI analysis for caribou captures the effect of indirect habitat loss (22 February 2018 conference call). It appears that indirect habitat loss is implicitly incorporated into the ZOI modelling, but not explicitly measured on the ground. The recovery of vegetation near the mine should be addressed within 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.	Indirect effects to caribou habitat were assessed in Section 6.3.1 of the ERR (1998). A 14 km ZOI buffer (Boulanger et al. 2012) applied around Diavik covers an area of 88,806.7 ha. Within a 14 km buffer area, existing disturbance from Diavik and Ekati mine infrastructure covers 1.9% (1,655.0 ha) (Table 3, Figure 1). Within 14 km deep water is the most abundant land cover type and covers 42.8% (38,037.6 ha) with a nil suitability ranking. Heath tundra is the second most abundant land cover at 24.1% (19,047.6 ha) and was considered highly suitable in the EER (1998). Nil and low value habitats combined comprise 62.0% (55,057.9 ha) of the area within 14 km of Diavik mine (Table 4). Assuming that high and moderate suitable habitats are reduced by one level (low and nil are unchanged) from sensory disturbances regardless of proximity to Diavik mine, then all 29.0% (25,727.3 ha) of high suitability habitat present is reduced to moderate suitability and moderate suitable habitat increases by 220.7% (25,727.3 ha) (Table 4). The area of low and nil suitability increases by 14.6% (63,079.4 ha) and would represent 71.0% (63,079.4 ha) of the total 14 km area. This assessment likely overestimates changes to habitat suitability because the magnitude of sensory disturbance is predicted to diminish with increasing distance from point sources (see Boulanger et al. 2012) and quality habitats like heath tundra are abundant beyond Lad de Gras and near the 14 km boundary (Figure 1). Deep water, which is a nil value habitat, dominates the area within 14 km and also represents a large area adjacent to Diavik Mine (Figure 1). There is existing Ekati mine infrastructure in this area making it problematic to assign all indirect changes to Diavik mine. Also, this area is predominantly marginal quality (i.e., nil and low suitability) in the absence of indirect changes so ecological effects to caribou are likely to be limited, particularly when considering the spatial scale of caribou seasonal ranges and the limited amount of time caribou are present in the area. Vegetation monitoring during post-closure will include reference sites that will determine whether reclaimed areas provide similar ecological function for caribou and other wildlife.

EMAB Recommendations/Questions in 2017	EMAB Proposed Action by DDMI	Response by Diavik
Regarding the 2014 WCAR (Golder 2014): A common concern with GPS collar data is that multiple samples from the same individual may not be statistically independent of each other. That is, one response from an individual affects the probability of another response from that same individual. Clarification is needed on how caribou GPS data independence was achieved.	No new information is presented regarding this specific analysis from the 2014 WCAR. GPS collar data independence should be addressed in all future analyses.	The analysis did not make assumptions about or evaluate whether caribou observations from the same individual were independent. Treating individual collared caribou as a random effect would account for dependence among observations from the same individual. However, random effects analysis only re-allocates variance from fixed effects to random effects. This typically improves estimate precision (i.e., reduces the standard error) of the fixed effects. In this analysis the global model was the top ranked model and only the Oestrid fly index and direction of collared caribou movements relative to major lakes were non-significant parameters (variation included a value of zero). If these became significant, it would only alter the conclusions for how caribou move in response to natural factors. DDMI will consider mixed effects models of collar data in future analyses.
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)).	We expect that ENR will recommend that in 2019, formal ZOI monitoring will resume given that Diavik will be commencing 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 should confirm that status and form of caribou ZOI monitoring once ENR makes their recommendation.	Diavik will determine the appropriate method of ZOI monitoring when required, and discuss with EMAB.
We recommend DDMI provide a more detailed explanation and justification as to why they propose postponement of aerial surveys “in favour of other studies”. DDMI should also indicate what “other studies” would examine regarding mechanisms that may cause caribou to avoid the Mine.		Diavik responded to comments about other studies previously (Golder 2016).
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?	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 Diavik should consider using the GPS collar data approach to analyze ZOI for the 2018 season. Given that aboveground mining in the A21 pit will commence in 2018, EMAB recommends that Diavik should resume ZOI monitoring in 2019. Diavik should confirm the status and form of caribou ZOI monitoring prior to the 2019 WMP monitoring season	Diavik will determine whether collar, aerial survey data or an alternative method will be used for ZOI monitoring when required, and discuss with EMAB.
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.	No further information on this analysis has been presented in the 2017 WMR. DDMI indicated that a new analysis that considers habitat and population size, among other factors, is underway and will be reported when complete (Golder 2017a). We anticipate this analysis will present information on the distribution of the data and the residuals, justification of the statistical methods used, and will consider a variety of confounding factors.	Linear regression is fairly robust against the violation of the normality assumption (Zar 1999), particularly when sample sizes are large (Li et al. 2012). The sample size in this analysis was greater than 142,000 units, which is exceptionally large. The new analysis that is underway assumes a negative binomial distribution. Diavik agrees and indicated that additional factors such as habitat and population size will be considered in the new analysis.
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.		

EMAB Recommendations/Questions in 2017	EMAB Proposed Action by DDMI	Response by Diavik
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.	Analysis of caribou behavioural data was last undertaken in 2010 using data from all years. We understand that Ekati prioritized the collection of focal scan information between 2011 and 2013, while Diavik prioritized the collection of group scan information. We also understand that Ekati will be shifting their data collection to include more group scans in future years (14 June 2018 conference call1). This will allow for a combined analysis of behavioural data from both the Ekati and Diavik mine in the future. The discussion on adaptive management is still open.	As requested by EMAB in February 2018, behaviour data collected in the regional study area to date was summarized, within and beyond 15 km and relative to Bathurst caribou data collected by other researchers in Golder (2018). The results of the summary indicate there is little change in feeding behaviour, the source of energy and protein intake by caribou. It is important to note that changes measured by monitoring do not necessarily represent ecological effects. Ecological effects are those that alter population demography. For adaptive management actions to be effective, effects must be measurable on the ecological scale, otherwise whether or not the adaptive management action achieved the desire result cannot be determined.
Please clarify whether or not Ekati and Diavik are using the same behavioural data collection methods and, if so, indicate when the mines began coordinating their methods.		Diavik and Ekati use the methods for collecting group-level behaviour data, which was verified in the June, 2018 meeting with EMAB and ENR.
Given that the two mines have agreed to cooperate, please provide the current sample sizes for near and far behavioural observations for DDMI and Ekati combined. Please provide a summary of caribou group size near and far from the mine (this could assist in the interpretation of the caribou density analysis).	During the 22 February 2018 conference call, DDMI accepted that the new data can be added to the old data to update the analysis. The data would be heavily skewed toward “far from mine” categories. During a 6 June 2018 teleconference, DDMI presented some results for this analysis. More detailed information will be provided to EMAB.	Groups size by distance is shown in Figure 2. Of note is that the caribou density analysis includes densities of value zero, where as group behaviour cannot. Group scans are not collected along transects but are observed wherever caribou groups are detected in the study area. Groups size is also not standardized to unit area. Golder (2018) provides sample sizes of caribou behaviour group scans. Sample sizes were also provided in Table 2.6-1 of Golder (2011) and Figure 3. Since 2010, the collection of caribou group scan observations has occurred at distances greater than 20 km from the Diavik and Ekati mines. On an annual scale, caribou behaviour is influenced by all factors (natural and anthropogenic [mine-related]) in the environment. Analysis of data from only far distances will not provide any new information about mine-related effects. This is because behaviour patterns at close distances that reflect the same response to natural factors as far distances are not represented. For example, insect harassment reduces the amount of time caribou spend foraging. If in a low insect harassment year, caribou were only observed at distances greater than 20 km, then these far field data in comparison to years when insect harassment was higher and data were collected at both close and far distances would suggest that caribou are spending less time foraging near the mines. This would be a confounded conclusion because had caribou been observed closer to the mine their foraging time would have been higher (due to lower annual insect harassment) relative to years during higher insect harassment and perhaps show no change in behaviour. Therefore, until caribou behaviour data can be collected at near and far distances annually, there is little value in analysis of data that only represent far distances because it will likely produce misleading or spurious results.
Please describe if and how non-parametric statistics have or could be used in the analysis of the behavioural data.	No response has been provided in the 2017 WMR.	Diavik has responded to this comment previously in December 2017, which was included in the 2017 Wildlife Monitoring Program report in Appendix J. Non-parametric statistics were not used in the most recent comprehensive analysis of the behaviour data (Golder 2011). A number of different analyses could be used including non-parametric statistics; however, the approach used is consistent with methods used in the scientific literature (e.g., Duquette and Klein 1987). Golder (2018) also summarized behaviour data among different distance strata as requested by EMAB in February, 2018. Non-parametric statistics were not used in this analysis.

EMAB Recommendations/Questions in 2017	EMAB Proposed Action by DDMI	Response by Diavik
The analysis used by DDMI to test the hypotheses about caribou movement during the northern and southern migrations is potentially flawed. We recommend that DDMI provide more information on the pool of collared caribou used over the course of this study. How many separate caribou were collared? How many times did collaring occur? How many times do the same animals appear in annual counts? We recommend that DDMI utilize statistical techniques that account for the independence (or lack of independence) of samples and interannual variation in migration movements.	No response was provided in the 2017 WMR. We reiterate our recommendation.	From 1996 to 2014, the GNWT had up to 20 collars in service on Bathurst cows annually. Since 2015, the number of collars deployed has been approximately 50, including 10 on bulls. Collars are deployed by the GNWT in late winter annually and are designed to provide from 3 to 6 years of service, depending on location frequency. The number of years with the same individuals ranges from 1 to 6 years. It is possible that individual-based decisions may influence the variation in the direction that cohorts move around Lac de Gras. The 2017 WMP indicates that 45.2% (95%CI: 39.3% – 51.0%) of collared caribou moved east around Lac de Gras during the southern migration from 1996 to 2017. Use of mixed model logistic regression (east deflection = 1, west deflection = 0) with the animal identification number treated as a random effect yields an estimate of 48.0% (95%CI: 41.5% - 54.6%). These were derived through back transformation from logit to probability scales, multiplied by 100. Comparison of these rates show statistical similarity so accounting for individual caribou variation is not important and supports that the original analysis is not flawed. Diavik certainly appreciates EMAB's attention to detail on this monitoring relative to EER predictions. Ultimately, whether the results are partially autocorrelated or not, the evidence from caribou deflections around Lac de Gras indicate that mining in the area has not resulted in the Bathurst caribou herd becoming a fragmented population (Virgl et al. 2017). As well, Virgl et al. (2017) showed that since 2007 the annual range of Bathurst caribou has shifted north and west from when collars were first deployed (and when the herd was near peak abundance). It is reasonable to expect that if the range has contracted in a north and westerly direction over time, that collared caribou may be more likely to move west around Lac De Gras during the fall and spring. These types of changes are natural and show no adverse ecological effects to Bathurst caribou.
For the 2016 southern migration (and 2015; and 2014 for female caribou; July to 30 November), collared caribou travelled west around Lac de Gras, which does not support the prediction in the EER. We request that DDMI discuss their adaptive management process and their response action in light of this unanticipated, potential effect of the Project. DDMI should discuss the triggers for adaptive management (e.g., how many consecutive years without support for the prediction are necessary to trigger adaptive management?). If another tool is used to evaluate the importance of deviations from predictions, such as fragmentation of the caribou herd or changes to seasonal range use year to year, please describe how this evaluation is conducted. Please comment on the possibility that the change in the southern migration could be an Ekati effect or a cumulative effect of industrial activities within the Bathurst caribou range.	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 2017a). 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.	Diavik disagrees that the presence of diamond mines is not considered in the analysis of Bathurst caribou collar data and changes in seasonal range attributes. The collar locations from 1998 to 2017 reflect caribou interactions with their environment, which includes the time when Ekati, Diavik, Snap Lake, Gahcho Kué, Lupin and Jericho mines were constructed and operating. In the context of caribou deflection patterns, the results from Virgl et al. (2017) show that whether caribou move west or east around Lac de Gras does not result in herd fragmentation (i.e., an ecological effect), which was part of the basis for measuring Lac de Gras deflections. High range fidelity also means that cumulative interactions with six mines has not resulted in herd fragmentation. During the June 2018 meeting with EMAB, EMAB (MSES) committed to recommending adaptive management strategies to mitigate caribou deflections around Lac de Gras. Diavik looks forward to reviewing these strategies and would also request that EMAB indicate how the reduced ecological effect from their proposed adaptive management strategies will be measured and identify thresholds for assessing strategy effectiveness.
We recommend that the hair sampling program be continued, even if other mines do not commit to it.		The grizzly bear hair snagging program is designed to assess cumulative effects on the regional population and not incremental effects by the Diavik mine. Offsite grizzly bear monitoring was removed as a mine monitoring requirement following consensus by communities, mine agencies, regulators and the mines (Handley 2010). It is unnecessary for Diavik to continue this monitoring if other mines decline to participate.

EMAB Recommendations/Questions in 2017	EMAB Proposed Action by DDMI	Response by Diavik
Please give careful consideration to the possibility that bears may be becoming habituated and their presence on the site may be on the rise.	Although there appears to be an increasing trend in the number of incidental grizzly bear observations and a corresponding increase in deterrent actions, grizzly bear mortality predictions have not been exceeded and there does not appear to be any population-level effect. In addition, it appears as though a single bear is responsible for the majority of the observations and has a home range that includes the mine. The 2012 and 2013 data analysis indicated a stable or increasing abundance of grizzly bears around the Ekati and Diavik mines. No discussion regarding the effectiveness of the deterrent system was provided. We recommend DDMI investigate if there is something in particular that is attracting grizzly bears to the site that could be determined by evaluating the location and timing of the incidental observations and, in turn, whether some mitigation could be applied to remove any attractants.	Diavik has already responded to this comment that grizzly bears, particularly females with cubs, may recognize the Mine site as safe habitat. Deterrent actions are reasonably effective at reducing grizzly bear-worker interactions and limiting grizzly bear mortalities over time. Of note is that Diavik believes the majority of grizzly bear sightings include the same individual that has been observed at the mine site since it was a cub.
Given the increase in grizzly bear observations near the Mine, DDMI should increase vigilance and future years of data collection should be used to evaluate whether the re-instated deterrent system is effective at reducing grizzly bear presence near the Mine.		
Regarding the 2014 WCAR (Golder 2014), it was not clear why caribou herd size was related to wolverine occurrence and how this specifically relates to objective of the WCAR “to examine indirect Mine-related effects”. We recommend a brief explanation be provided.	No discussion was provided. We assume DDMI was evaluating whether or not caribou herd size, rather than the Mine itself, might explain the occurrence of wolverine.	The analysis included both natural and mine-related variables to test effects predictions and to place mine-related effects into context of natural factors. Caribou carrion is likely an important food resource for barren-ground wolverines and so may influence their regional abundance and distribution.
The WMP evaluates the prediction that Mine-related mortalities, if they occur, are not expected to alter wolverine population parameters in the Lac de Gras area. We recommend DDMI elaborate on how they are testing this particular prediction given the absence of data on population size.	The 2017 WMR reported zero mortalities for wolverine on-site. Given that there have only been five Mine-related wolverine mortalities reported since 2000, there appears to be support for the prediction that mining related mortalities are not expected to alter wolverine population parameters in the Lac de Gras area. We recommend that DDMI use the new information provided by Efford and Boulanger (2018) to support their conclusion in the 2019 WMP report regarding the alteration of wolverine population parameters.	Efford and Boulanger (2018) results indicate that population growth rate (lambda) is approximately stable through time and similar across study areas, except for Daring Lake, which showed a slight decline. Apparent survival was similar across study areas. These data support the conclusion that mine-related wolverine mortalities are unlikely influencing population parameters.
While fox observations looked to be steadily increasing in the WTA since 2009, they appear to have levelled off in 2013 (the tabular presentation of data in the 2013 WMR makes it difficult to confirm). We recommend DDMI evaluate whether this levelling-off of fox observations in the WTA persists in future years.	In 2017, there appeared to be a high number of misdirected food items for the WTA and Landfill Areas relative to the other inspected areas and observations of fox and wolverine were highest for the WTA. DDMI should explore reasons for the higher levels of misdirected food waste in the WTA in 2017 as this may be contributing to wildlife presence and possible habituation near the Mine site.	At the conclusion of weekly (or twice weekly in winter) inspections, misdirected waste is reported and sorted correctly by the Waste Management staff. The primary reason waste is misdirected is because occasionally Mine workers forget how waste items are to be sorted. Diavik also notifies area managers to remind and follow-up with workers. As well, Environment staff complete waste management training.

Table 2: Comments Provided in Bold Text in MSES (2018)

Comment	Response by Diavik
DDMI should complete an analysis of the indirect (in addition to the currently presented direct) footprint effect on caribou habitat for understanding the true effects on caribou and for determining future mitigation measures. The recovery of vegetation near the mine should be addressed within the Mine closure plan and proposed reclamation activities, ensuring that forage species palatable to caribou be part of the mix of species (at a natural ratio) in the reclaimed landscape.	A response is provided in Table 1.
DDMI should confirm the status and form of caribou ZOI monitoring prior to the 2019 WMP monitoring season.	A response is provided in Table 1.
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?). ■ 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.	Diavik has included temporal mine activity indices as covariates in analyses of caribou, wolverine and raptors since 2011 (Golder 2011; 2014; 2017b). To date, none of these analyses have demonstrated a statistically significant relationship between mine activity and indirect effects. The mechanism of caribou ZOIs is unknown at this time and therefore cannot be adaptively managed. As was presented at the 2018 SGP Wildlife Monitoring Workshop, annual estimates of ZOI range from 0 km to 11 km for collar data, which indicates ZOI monitoring is unlikely to be adequate for assessing mitigation effectiveness. Diavik considers Traditional Knowledge as an additional stream for identification of effects, and monitoring and mitigation design through regular engagement activities with the Diavik Traditional Knowledge Panel and site visits from community members.
We understand that Ekati prioritized the collection of focal scan information between 2011 and 2013, while Diavik prioritized the collection of group scan information. We also understand that Ekati will be shifting their data collection to include more group scans in future years (14 June 2018 conference call3). This will allow for a combined analysis of behavioural data from both the Ekati and Diavik mine in the future. If possible, please confirm that this coordination of survey types will happen for the next reporting period.	Diavik will continue to collect caribou behaviour data. As noted in the comment, Ekati indicated in 2018 they would begin spending more time collecting the same type of group-level behaviour data as collected by Diavik. While Diavik and Ekati have on-going discussions about wildlife monitoring, Diavik has no control over Ekati monitoring priorities.
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.	Behaviours observed other than feeding time include time spent bedded, trotting, running, walking and alert. A summary of these behavioural types is provided in annual WMP reports and in Golder (2011).
Given that the feeding data presented by DDMI (DDMI's Response on 14 June 2018) do not appear to show the same pattern, we recommend DDMI comment on why there might be a difference in the pattern between 2011 and 2018 and discuss whether they implemented a change to mine protocol that may have minimized the impacts on caribou behaviour.	Golder (2018) was requested by EMAB (MSES) to show pooled behaviour data across different spatial strata. These include the same data as analysed in Golder (2011). The behaviour analyses in Golder (2011) did not evaluate the data the same way as Golder (2018). For example, Golder (2011) considered behaviour by nursery and non-nursery group status independently, whereas Golder (2018) did not. Golder (2011) also considered 10 different distance categories whereas Golder (2018) considered two distance categories. It is not surprising that behaviour patterns may be different.
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	Diavik will provide the requested summary table in the next WMP report. The table will include a summary of Ekati data, pending a data sharing agreement. Since Diavik does not collect focal scans, these will not be included in the table. Note that data available have been summarized previously in Golder (2011; 2018) and in Figure 3.
Please analyze a DDMI-Ekati combined dataset for the next reporting period, using all behavioural data available to date, to test how caribou behaviour changes as a function of distance from the Mine. This is particularly relevant given the change to above-ground mining at the Diavik mine.	Since the last analysis of behaviour data in 2011, observations since this time have been from caribou groups that were at least 20 km from the Ekati and Diavik mines (Figure 3). From 1998 through 2010, the highest numbers of observations occurred annually within 5 km of the mines. Observations at 15 km to 25 km (i.e., intermediate distances) have been sporadic over time. Note that in 2014, 2015 and 2017 caribou were not detected within the RSA during the post-calving period and in 2015 and 2017 were recorded during winter. Caribou were monitored during winter because they were visible from the Diavik mine.
Please describe if and how non-parametric statistics have or could be used in the analysis of the behavioural data.	A response is provided in Table 1.

Comment	Response by Diavik
During the 2018 SGP Wildlife Monitoring Workshop, ENR presented information on their caribou behaviour pilot project. The intention was for the government to standardize protocols, share/pool datasets on behaviour, and coordinate field efforts; however, no timelines were provided for the development of guidelines / protocols. In the absence of standardized protocols, we recommend Ekati and Diavik independently move forward on collaboration and coordination of efforts, including both data collection and analysis, on the caribou behaviour monitoring program. In particular, to avoid bias in behavioural data, please ensure that Ekati and Diavik are coordinating their methods for duration of group scans such that they cover the average caribou activity cycle. In general, it appears there will more consistency between data collected by Ekati and Diavik in the future.	Diavik and Ekati already use the same methods to collect data on group-level behaviour. As noted by Karin Clark of the Department and Natural Resources and Environment (ENR) (EMAB 2018), the methods used by the mines are similar and are appropriate for meeting their respective monitoring objectives. The behaviour data collected by the mines spans caribou active and rest cycles, which are implicit in the data.
Please consider the use of TK to help uncover causes for unanticipated impacts on caribou behaviour and to develop adaptive mitigation measures.	A response is provided in Table 1.
Clearly state the assumption of no yearly variation in caribou behaviour if the data are insufficient to detect annual variation.	The assumption about duration of effects to caribou behaviour in the EER (1998) was that adverse effects would be continuous (i.e., a precautionary approach). This means that the effect would always be present and detectable. Detecting intermittent annual effects as demonstrated in the Golder (2011) behaviour analysis, implies that duration is periodic and less than assumed in the EER.
In the event that collaboration on/sharing of behaviour data between operators occurs, please be explicit about all assumptions made in future analyses.	Diavik will include assumptions related to future analyses.
Reconcile behavioural observations with the occurrence of caribou: does behaviour change with distance as occurrence does, i.e., is behaviour “normalized” past the zone of influence of 14 km?	Patterns of behavioural activities (e.g., feeding and resting) cannot be reconciled with patterns of occurrence because they represent two different scales of distribution and associated levels of behaviour. The occurrence distribution (change in movement behaviour) operates at a larger scale, whereas, changes to caribou activities (time spent feeding) within the assumed ZOI occurs at a smaller scale. Understanding the feeding behaviour gets us closer to identifying when the change might cause an ecological effect or demographic consequence (i.e., point where a decrease in amount of time spent feeding may result in a decrease in survival or fecundity). The observed pattern after a distance break-point (i.e., the extent of a ZOI) in the distribution represents reference behaviour is an implicit assumption in the analysis. This is because there are no pre-development data on caribou behaviour that were collected using similar study designs and sampling methods during construction and operation of the Diavik and Ekati mines. This also is the case with the aerial survey data used to estimate the ZOI for caribou occurrence. For example, when Boulanger et al. (2012) evaluated a ZOI distance, larger distances than that being tested were fixed to a constant value. This approach assumes no slope for the reference line because only a y-intercept is estimated. Whether this is representative of the natural pattern inherent in the data was not demonstrated.
How can the information gained from the various caribou analyses be used to adjust or develop mitigation measures if there is a larger than predicted effect of the Mine on caribou?	Adaptive management resulting from caribou analyses would require strong linkage between an activity and the changes detected. Mitigation would also have to measurably reduce the change and the associated effect.
We recommend that DDMI provide more information on the pool of collared caribou used over the course of this study. How many separate caribou were collared? How many times did collaring occur? How many times do the same animals appear in annual counts? We recommend that DDMI utilize statistical techniques that account for the issues noted above.	A response is provided in Table 1
We request that DDMI discuss their adaptive management process and their response action in light of this unanticipated, potential effect of the Project.	The adaptive management process including examples of when and where past adaptive management of the WMP has taken place are provided in Section 1 of the 2017 WMP report. A response to this comment about caribou deflections is provided in Table 1.

Comment	Response by Diavik
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).	There is no evidence that the ecological effect of population fragmentation has occurred to caribou resulting from deviations from the EER (1998) predictions regarding caribou movements around Lac de Gras during the southern migration. Given that in several years (2011, 2013 and 2015) all collared caribou moved opposite as predicted, there may not be a threshold level that would result in population fragmentation. Its Diavik's conclusion that this prediction in the ERR was inaccurate but conservative. Alternatively, 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.
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.	A response to the consideration of Traditional Knowledge (TK) is provided in Table 1. TK has identified the importance of Lac De Gras narrows to caribou movements. The collar data support that caribou continue to use the Lac De Gras narrows. This was demonstrated in Figure 6 of the 2016 WMP where the movement path of a collared caribou crossed the narrows twice. This was also shown in the southern migration maps of collared caribou in annual WMPs and the Golder (2012) movement analysis.
We support DDMI's continued involvement in the grizzly bear hair-snagging program which is designed to address the new, regional scale question about the bear population and distribution and we look forward to seeing the results of 2017 data analyses.	No response required.
In terms of grizzly bear management, we recommend DDMI investigate if there is something in particular that is attracting grizzly bears to the site that could be determined by evaluating the location and timing of the incidental observations and, in turn, whether some mitigation could be applied to remove any attractants.	All incidents are reported and investigated by the Environment Department (see 2017 WMP report, Appendix K). As Appendix D of the 2017 WMP indicates, the same bear has repeatedly been interacting with the mine site. As reported, this bear was relocated 80 km away by ENR and returned to site within 10 days. This bear has been interacting with the mine site since it was a cub and may be adapted to the mine or recognize the mine site as safe habitat.
We commend Diavik for their ongoing efforts to mitigate impacts on wolverine and the reduction in wolverine visitations despite the increase in track occurrence over time.	No response required.
We support DDMI's continued involvement in the wolverine hair-snagging program which is designed to address the new, regional scale question about the wolverine population. We also support DDMI's continued involvement in the wolverine winter tracking program which is designed to evaluate project-specific impacts to wolverine distribution and occurrence.	No response required.
We recommend DDMI use this new information to support their conclusion in future WMRs regarding the alteration of wolverine population parameters.	A response to this comment is provided in Table 1.
We concur with DDMI's recommendation to continue Pit Wall/Mine Infrastructure monitoring for nesting raptors.	No response required.
DDMI should explore the reasons for the higher levels of misdirected food waste in the WTA in 2017 as this may be contributing to wildlife presence and possible habituation near the Mine site.	A response to this comment was provided in Table 1.
We are in agreement with the recommendation to discontinue the waterbird/shorebird monitoring program and concur with the CWS recommendation regarding reinstating the waterbird/shorebird monitoring program at the Mine reclamation stage.	No response required.
We agreed with DDMI's recommendation to discontinue monitoring the wind farm using 2013 methods and to instead monitor for bird mortalities as part of the overall site compliance monitoring program.	No response required.

Table 3: Changes to Caribou Habitat Suitability Among Land Cover Types Due to a 14 km Zone of Influence around Diavik-Ekati Mines

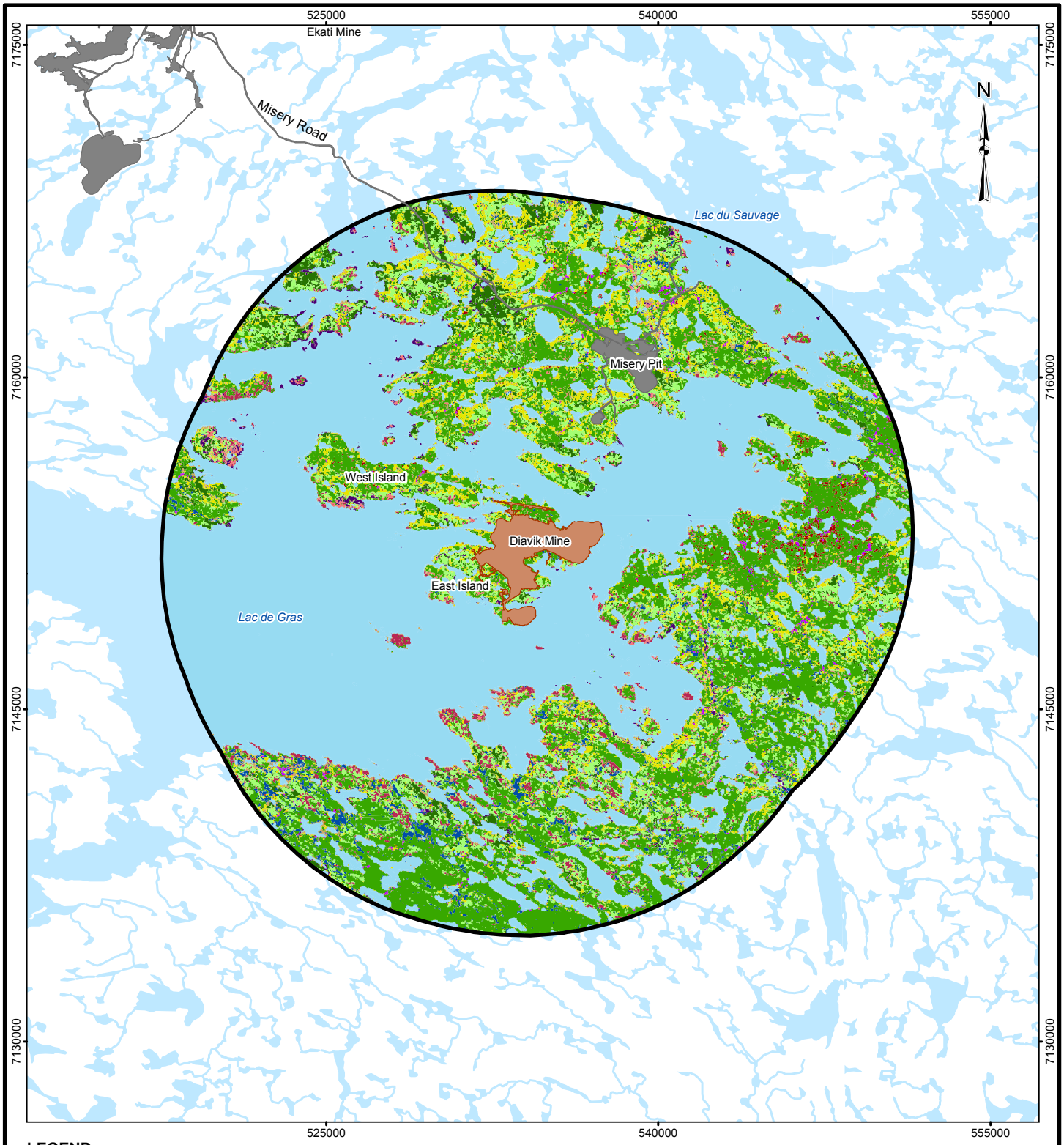
Land Cover Type	Habitat Suitability	Area (ha)	Percent Area	Predicted Zone of Influence Change
Unclassified	nil	5.2	0.0%	nil
Disturbance	nil	1,655.0	1.9%	nil
Shallow Water	nil	7,653.4	8.6%	nil
Deep Water	nil	3,8037.6	42.8%	nil
Bedrock Association	nil	1,665.2	1.9%	nil
Birch Seep	low	390.7	0.4%	low
Boulder Association	low	674.4	0.8%	low
Esker	moderate	722.1	0.8%	low
Heath Tundra	high	1,9047.6	21.4%	moderate
Heath/Bedrock	low	3,359.6	3.8%	low
Heath/Boulder	high	6,258.4	7.0%	moderate
Lichen Veneer	nil	1,497.2	1.7%	nil
Peat Bog	nil	0.1	0.0%	nil
Sedge Wetland	moderate	1,501.4	1.7%	low
Spruce Forest	nil	119.5	0.1%	nil
Tall Shrub	high	421.4	0.5%	moderate
Tussock/Hummock	moderate	5,798.0	6.5%	low
Total		**88,806.7**	**100.0%**	

(a) habitat suitability at base case predicted in EER (1998).

Table 4: Changes to Caribou Habitat Suitability Categories Due to a 14 km Zone of Influence around Diavik-Ekati Mines

Suitability Category	No Zone of Influence		Zone of Influence Changes[a]	
	Area (ha)	Percent Area	Area (ha)	Percent Area
High	25,727.3	29.0%	0.0	0.0%
Moderate	8,021.4	9.0%	25,727.3	29.0%
Low	4,424.7	5.0%	12,446.1	14.0%
Nil	50,633.3	57.0%	50,633.3	57.0%
Total	88,806.7		88,806.7	

(a) Zone of Influence change = high reduced to moderate, moderate reduced to low, low and nil remain the same. Changes applied regardless of proximity to either Diavik or Ekati mines.



LEGEND

- DIAVIK FOOTPRINT
- DIAVIK FOOTPRINT 14 KM BUFFER
- EKATI FOOTPRINT

LANDCOVER TYPE

- WATER
- LICHEN VENEER
- ESKER
- SEDGE WETLAND
- TUSSOCK/HUMMOCK
- HEATH TUNDRA
- SPRUCE FOREST
- BEDROCK ASSOCIATION
- TALL SHRUB
- BIRCH SEEP
- HEATH/BOULDER
- HEATH/BEDROCK
- BOULDER ASSOCIATION
- PEAT BOG

10 0 10

SCALE 1:250,000 KILOMETRES

REFERENCE

LANDCOVER DATA: WEST KITIKMEOT/SLAVE STUDY REGION VEGETATION CLASSIFICATION, APRIL 2001
BASE DATA: NTDB 1:250,000. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE – CANADA.
DATUM: NAD83 PROJECTION: UTM ZONE 12

PROJECT

RioTinto

DIAVIK DIAMOND MINES INC.

TITLE

LAND COVER TYPES WITHIN 14 KM OF DIAVIK MINE

GOLDER

PROJECT		1893542	FILE No.	
DESIGN	DC	04 Oct. 2018	SCALE AS SHOWN	REV. 0
GIS	ANK	04 Oct. 2018		
CHECK	DC	04 Oct. 2018		
REVIEW	DC	04 Oct. 2018		

FIGURE: 1

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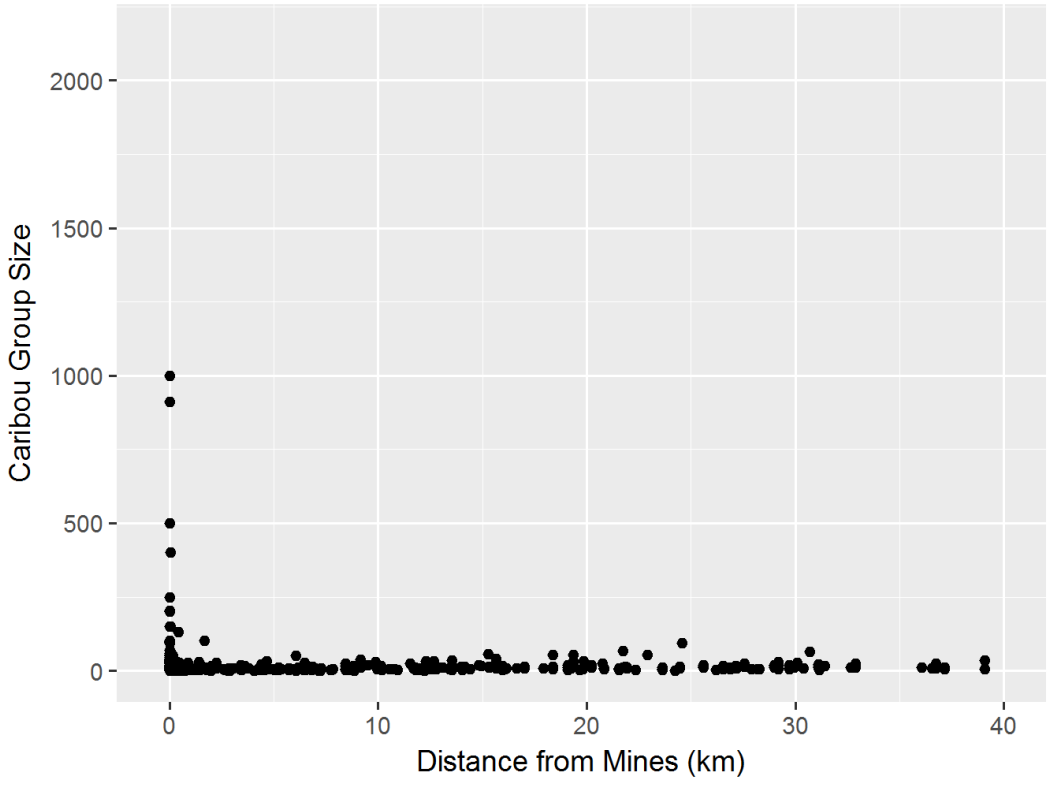
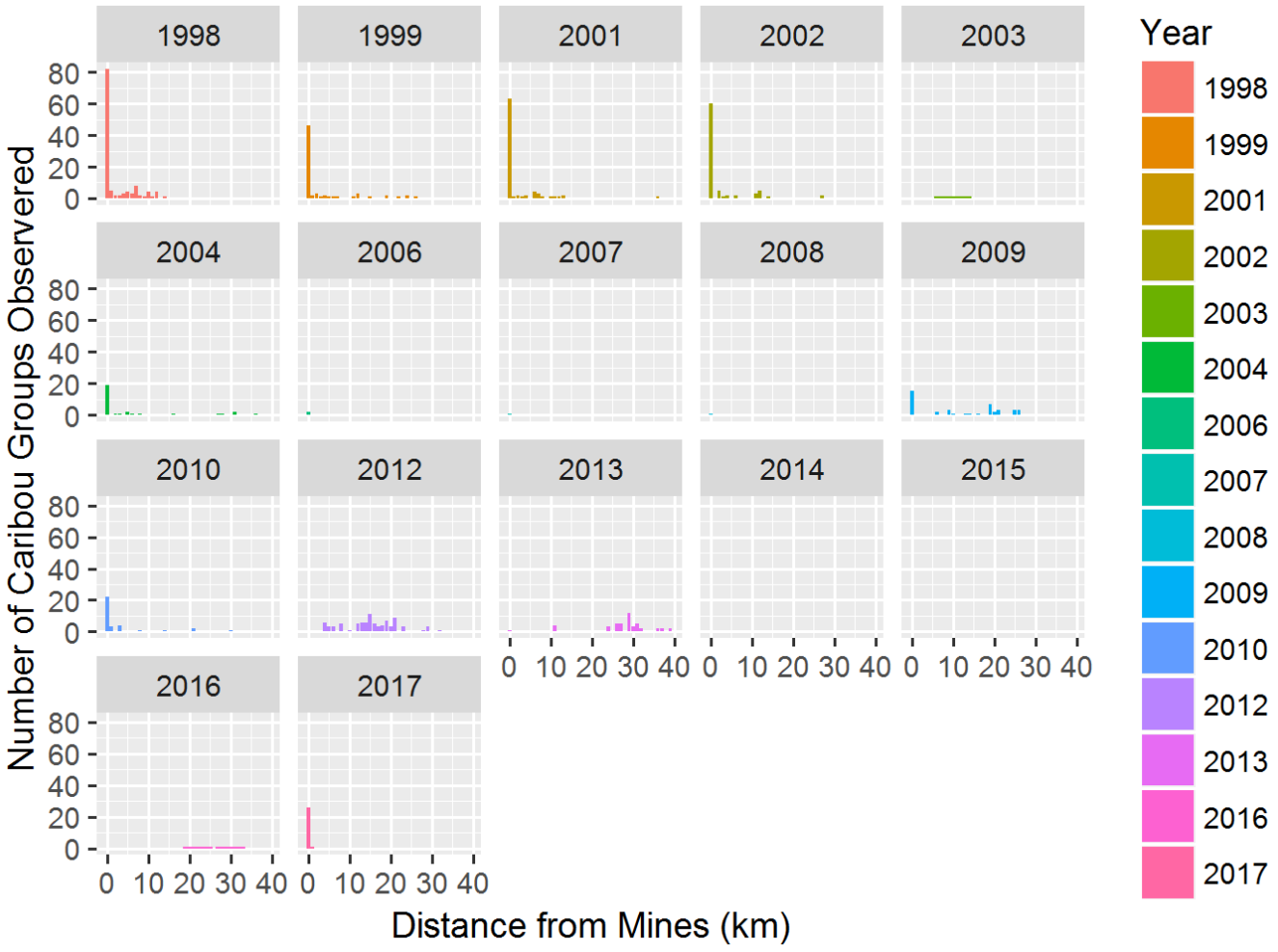


Note does not include Ekati scan data since 2010 (n = 10 groups).

Figure 2: Caribou Group Size of Behavioural Scan Data, 1998 to 2017



Note does not include Ekati scan data since 2010 (n = 10 groups).

Figure 3: Frequency of Caribou Behaviour Group Scans by Distance from Mines, 1998 to 2017

CLOSURE

We trust that the above proposed responses meet your needs. If you have any questions, please contact Dan or John directly.

Golder Associates Ltd.

Daniel Coulton, Ph.D., R.P.Bio.
Wildlife Biologist

John Virgl, Ph.D.
Principal, Senior Ecologist

DWC/JAV/cmm/rs/no

https://golderassociates.sharepoint.com/sites/22344g/deliverables/issued/1697-tm-rev1-6000-response to emab/1893542-1697-tm-rev1-6000-response to emab comments 2018 wmp 26oct_18.docx

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APPENDIX B

Caribou Behavioural Summary

Table 1: Caribou Behaviour Group Scan Data Collected by the Diavik and Ekati Mines within Study Areas, 1998 to 2018

Year	Mine	Season	Number of Groups		Distance (km) to Mine (minimum and maximum)	
			Diavik	Ekati	Diavik	Ekati
1998	Ekati	Post-calving	0	168	-	0.0 – 32.0
1999	Ekati	Post-calving	0	90	-	0.0 – 41.6
2000	-	-	-	-	-	-
2001	Ekati	Post-calving	0	97	-	0.0 – 38.3
2002	Ekati	Post-calving	0	127	-	0.0 – 32.0
2003	Diavik / Ekati	Post-calving	5	22	0.0 – 18.6	0.0 – 15.6
2004	Diavik / Ekati	Post-calving	2	37	0.0 – 5.2	0.0 – 35.9
2005	Diavik / Ekati	Post-calving	4	49	0.0 – 19.4	0.0 – 20.2
2006	Diavik / Ekati	Post-calving	1	2	14.7	0.0 – 0.2
2007	Diavik / Ekati	Post-calving	1	1	0.0	0.7
2008	Diavik / Ekati	Post-calving	1	0	25.9	-
2009	Diavik / Ekati	Post-calving	49	43	6.5 – 26.7	0.0 – 20.3
2010	Diavik / Ekati	Post-calving	43	32	0.0 – 34.3	0.0 – 20.4
2011	Ekati	Winter	-	1	-	0.1
2012	-	-	-	-	-	-

Year	Mine	Season	Number of Groups		Distance (km) to Mine (minimum and maximum)	
			Diavik	Ekati	Diavik	Ekati
2013	-	-	-	-	-	-
2014	Diavik / Ekati	Post-calving / Winter	9[1]	1	0.0	1.0
2015	Diavik	Winter	0[1]	-	-	-
2016	Diavik	Spring / Post-calving	2	30	23.0 - 30.0	0.0 – 0.3
2017	Diavik	Spring / Post-calving / Fall / Winter	32	21	0.0 – 2.7	0.0 – 1.0
2018	Diavik / Ekati	Spring / Post-calving / Fall / Winter	60	25	0.0 – 2.2[2]	0.0 – 1.0

[1] Caribou were not present in the Diavik-Ekati study area during the post-calving period. Diavik collected 8 observations 84 to 98 km from Diavik in 2014 and 38 observations 50 to 55 km from Diavik and outside of the study area in 2015.

[2] Of the 60 total caribou groups observed, there were also 4 caribou groups observed approximately 80 km from the Diavik Mine.

APPENDIX C

Trigger for Vegetation Monitoring

GOLDER

DIAVIK DIAMOND MINES (2012) INC.

TECHNICAL MEMORANDUM

DATE 26 March 2019

GOLDER REFERENCE No. 19115664-1723-TM-Rev0-2000

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

DUST TRIGGER FOR VEGETATION AND LICHEN MONITORING

Following the most recent Vegetation and Lichen Monitoring Program (VLMP) report (Golder 2017), DDMI adaptively managed the program frequency from every three years (next in 2019) to every five yeas (next in 2021) because no large adverse changes have been detected in vegetation and lichen communities. Importantly, the data show no trajectory towards a divergence in the previous and current observed temporal and spatial patterns of plant species abundance and composition. In 2018, the Environmental Monitoring Advisory Board (EMAB) and DDMI discussed and agreed that the upper 95% confidence limit of dustfall reference sites should be used as the trigger for changing the frequency of the VLMP back to a three-year frequency (e.g., Golder 2018). In the most recent comprehensive vegetation and lichen monitoring report (Golder 2017), the reference upper 95% confidence limit was reported as 115 mg/dm^2/yr and was discussed as the trigger value based on 2002 to 2016 dustfall measurements. Dustfall monitoring represents a repeated measures design where dustfall is measured at the same sites through time. Hence the 115 mg/dm^2/yr value includes both variation within and across dust monitoring sites and a sample size of 38 site-years. This is appropriate for describing the full range of recorded temporal and spatial variation in dustfall measurements since implementation of the program. However, it is not appropriate for use as a trigger to determine whether fugitive dust deposition at nearfield Mine sites exceed the upper 95% confidence limit of reference sites. The variation within a site through time will be influenced by attributes of the location, which would influence dustfall (e.g., microtopography and the type of vegetation present). Thus, the measures through time at a site are not independent and so cannot be used to inform on the influence of fugitive dust deposition from the Mine. The comparison of nearfield to reference is a spatial comparison so an appropriate trigger should consider only the variation among reference sites. This would change the sample size from 38 to three regardless of which monitoring year was being evaluated (i.e., sites Dust 09, Dust C1 and Dust C2; Golder 2017). Focussing the trigger on the spatial variation will capture the appropriate precision for evaluating whether fugitive dust deposition from the Mine is exceeding reference conditions.

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For any given year the mean and variation of the three reference sites should reflect natural changes in total suspended particulates (TSP) through time. In other words, the upper 95% confidence interval trigger for 2018 is calculated from dustfall observations of three reference sites from 2003 to 2018. Dustfall at reference sites was not collected in 2002. It is important to note that particulates collected by dustfall apparatus include all particle sizes and the values reported are reflective of TSP and not dust specifically, which has a larger particle size (e.g., > 100 µ). Thus, TSP is likely a conservative measure of dust deposition.

To evaluate whether fugitive dust deposition has exceeded the reference trigger, the average dust observations at nearfield sites (Dust 05, Dust 07, Dust 08) are compared to the upper 95% confidence interval of the reference average. The nearfield sites are approximately 1 km from the Mine footprint, so exceedance of the trigger value at these sites would suggest fugitive dust deposition beyond the footprint at this distance may cause vegetation communities to exhibit changes in species richness and abundance. The 1 km distance is consistent with the extent of dustfall distribution reported at the Ekati mine by Chen et al. (2017). Since the trigger is being evaluated for a VLMP implementation in 2019, the cumulative average of dustfall from 2017 and 2018 at nearfield sites was estimated and compared to the trigger value. The purpose of only considering 2017 and 2018 dustfall observations at nearfield sites (and Mine sites) is to capture the change since 2016 when the last report was completed (Golder 2017).

In addition to estimating the nearfield average, the average dustfall at Mine sampling sites (Dust 01, Dust 03, Dust 04, Dust 10; Golder 2017) from 2017 to 2018 was estimated to provide an additional line of evidence should the nearfield values exceed the trigger. An increase in dustfall at nearfield sites from the Mine should be associated with a correspondent increase in dust measured at Mine sampling sites. Otherwise, the observed increase in nearfield sites could be due to other factors.

As described in Golder (2017), the geometric mean is an appropriate measure to characterize the distribution of dustfall data. Therefore, all comparisons will be based on geometric quantities. Geometric statistics use the natural logarithm of original values to generate the mean and standard deviation. The student's t-distribution critical value with degrees freedom of n-1 is applied to calculate 95% confidence intervals. Estimates and confidence interval values on the natural log scale are back-transformed by exponent to the original scale. Geometric means and 95% confidence intervals were generated using the Rmisc package in R (version 3.5; RCDT 2015).

The geometric mean and 95% confidence limits among three reference sites from 2003 to 2018 was 110 mg/dm^2/yr (95%CI: 45 to 265 mg/dm^2/yr). Thus, the value of the monitoring trigger is 265 mg/dm^2/yr. The geometric mean value of nearfield sites from 2017 to 2018 was 178 mg/dm^2/yr (95%CI: 31 to 1,012 mg/dm^2/yr) (Table 1). The nearfield mean value does not exceed the upper 95% confidence interval trigger value, so the VLMP will not be implemented in 2019 (i.e., expected to occur next in 2021). From 2017 to 2018, the Mine site dustfall has averaged 362 mg/dm^2/yr (95%CI: 110 to 1,196 mg/dm^2/yr).

Additional summaries of dustfall estimates by Mine phase are provided in Table 1. The changes through time associated with different degrees of surface activity generally show that rates of dust deposition have decreased at the Mine dustfall sampling sites with the change to underground mining. At nearfield sites, dustfall has been fairly constant based on overlapping mean and 95% confidence interval values, which may partially explain why small changes in vegetation communities adjacent to the Mine (i.e., mine plots) have been observed (Golder 2017). As expected, reference sites have lower rates of dustfall relative to the Mine site but do not track patterns of dustfall observed at the Mine site relative to phase, which indicates that reference sites are functionally independent of fugitive dust from the Mine. Observed values of dustfall at DDMI monitoring stations used in the calculations are provided in Table 2.

Table 1: Geometric Mean (±95%CI) of Dustfall by Mine Phase, 2002 to 2018

	Mine Phase Dustfall ($mg/dm^2/yr$)			
Dustfall Strata	**Construction and Open Pit Mining (2002 to 2005)**	**Open Pit Mining (2006 to 2009)**	**Underground Mining (2010 to 2016)**	**A21 Pit Development (2017 to 2018)**
Mine site	950 (491 – 1,839)	912 (528 – 1,577)	370 (216 – 635)	362 (110 – 1,196)
Nearfield	213 (94 – 481)	227 (104 – 496)	170 (55 – 189)	178 (31 – 1,012)
Reference	66[a]	156 (45 – 536)	102 (56 – 189)	68 (35 – 133)

a) Sites C1 and C2 were the only reference sites for this period so the 95% confidence interval was not estimated because n = 2.

Table 2: Observed Dustfall Deposition, 2002 to 2018

Location	Site	Observed Dustfall Deposition (mg/dm^2/yr)																
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Reference	Dust 09	-	-	-	-	40	31	187	352	93	206	242	102	89	88	63	37	149
Reference	Dust C1	-	26	38	52	31	40	199	114	101	95	55	49	105	98	45	34	85
Reference	Dust C2	-	46	46	245	90	549	239	158	130	122	83	67	61	112	185	37	78
Nearfield	Dust 05	113	47	1,433*	279	136	103	245	155	148	151	110	107	110	103	81	102	156
Nearfield	Dust 07	-	131	166	442	134	153	326	563	433	135	157	192	385	458	213	128	667
Nearfield	Dust 08	-	43	237	524	142	211	338	303	221	127	128	95	157	121	199	92	127
Mine	Dust 01	905	308	514	834	1,051	521	774	420	501	281	430	262	353	391	462	480	642
Mine	Dust 03	810	1,415	2,062	4,046	1,605	2,345	2,335	1,672	1,169	995	430	315	480	582	721	286	796
Mine	Dust 04	369	179	338	1,283	519	1,195	500	686	257	210	371	122	140	148	134	85	152
Mine	Dust 10	-	-	-	-	-	-	215	137	237	152	31	122	133	282	799	318	645

- =Site was not monitored.
*Value that was omitted per Golder (2017).

CLOSURE

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

Golder Associates Ltd.

Dan Coulton, Ph.D., R.P.Bio.
Wildlife Biologist

John Virgl, Ph.D.
Principal, Senior Ecologist

DWC/JAV/ah/hg/cmm

https://golderassociates.sharepoint.com/sites/102648/06-deliverables/issued/1723-tm-rev0-2000-2018 dust trigger/19115664-1723-tm-rev0-2000-2018_dust_trigger_26mar_19.docx

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APPENDIX D

Analyses Requested by EMAB

GOLDER

DIAVIK DIAMOND MINES (2012) INC.

TECHNICAL MEMORANDUM

DATE 14 March 2018

GOLDER REFERENCE NO. 1771843-1645-TM-Rev0-5000

WORK PLAN NO. 547 Rev.0

DIAVIK PO NO. D03808

TO Sean Sinclair
Diavik Diamond Mine (2012) Inc.

CC David Wells

FROM Dan Coulton and John Virgl

EMAIL Daniel_Coulton@golder.com; John_Virgl@golder.com

ANALYSES REQUESTED BY EMAB, 22 FEBRUARY 2018

At the conclusion of a conference call with the Environmental Monitoring Advisory Board (EMAB) and their technical consultant (MSES), Diavik committed to provide the following information to EMAB.

1) dust deposition rates predicted in the EER (DDMI 1998)

2) summary of caribou behaviour observations greater than 15 km from the Mine

3) analysis of distance from Mine to the annual autumn range centroid of Bathurst collared caribou

The EER prediction for dust deposition was requested by EMAB (and MSES) to provide further clarification on the proposed adaptive management trigger for dust deposition of 400 mg/dm^2/yr. Exceedance of the proposed trigger was to increase the frequency of the lichen and vegetation monitoring program from the recommended change of every five years to every three years. EMAB (and MSES) also requested that that caribou behaviour data collected since the last comprehensive analysis (Golder 2011) be summarized relative to an assumed zone of influence (ZOI) for occurrence of 15 km. Finally, during the discussion of Bathurst caribou range contraction during the decline phase of this herd as reported in Virgl et al. (2017), EMAB (and MSES) commented that it would be helpful to understand what range contraction means relative to the Diavk Mine.

Dust Deposition Predictions

A maximum dust deposition rate of 125 mg/dm^2/y was predicted in the EER (DDMI 1998). However, during the environmental assessment, the air quality model predictions focussed on conservatively estimating effects to air quality to address human health concerns during the operating phase of the Mine. The model predictions assumed relatively small particulate matter sizes for dust, which tends to predict higher concentrations in air, and consequently lower rates of dust deposition (i.e., more dust remains suspended longer). The predictions also did not account for construction activities, which occurred in parallel with mining activities in 2005 through 2010. In general, these were the years with the highest recorded dust deposition rates from monitoring. Therefore, the predicted dust deposition rate in the EER represents an underestimate that would not be useful as an adaptive management trigger.

Caribou Behaviour Observations

During the meeting with EMAB and MSES, it was agreed that it would be useful to summarize caribou group behaviour metrics that have been collected beyond 15 km from Diavik (outside the assumed caribou zone of influence; Boulanger et al. [2012]) and since the last comprehensive analysis of monitoring data (Golder 2011). Feeding behaviour was selected because it has a large influence on a maternal cow's energy balance and a pregnant female's ability to produce a calf in the subsequent spring (i.e., ecological effect on the rate of body mass loss [Cameron and Ver Hoef 1994]). Observations of caribou groups occurred during the post-calving period in the Mine study area from 1998 to 2010, in 2014, and 2016. In 2014 and 2016, caribou groups available for observation were greater than 15 km (range 22 km to 98 km) from the Mine. In 2015 and 2017, caribou group behaviour was recorded during winter because this was the time when animals were present in the study area. Results from Witter et al. (2012) were also collected during the post-calving period from 2007 to 2009 and included observations generally ranging from 6 km to 150 km from Diavik Mine. The coordinates of locations were not reported provided in Witter et al. (2012).

Table 1 summarizes the percent time caribou groups were feeding from 1998 to 2017 within and outside of 15 km of the Diavik-Ekati mines. The results indicate that feeding behaviour is generally consistent across various spatial and temporal strata (i.e., within the range of variation of each strata).

Table 1: Rates of Caribou Feeding Behaviour Inside and Outside the Diavik Study Area, 1998 – 2017

Behaviour	Diavik-Ekati Study Area (1998-2010)	Less than 15 km from Diavik-Ekati Mines	Greater than 15 km from Diavik-Ekati Mines (1998-2010)	Greater than 15 km from Diavik Mine (2011-2017)	Witter et al. (2012) (2007-2009)
Percent Time Feeding (± 1SE)	46.4 (1.8)	46.6 (2.0)	45.6 (4.3)	40.2 (11.6)[(a)]	44.2 (1.6)
Distance from Diavik Mine (min-max km)	0 – 41 km	0 – 14.9 km	15 – 41 km	50 – 99 km	6 – 150 km
Sample size (number of caribou groups)	774	638	136	18	NA[(b)]

(a) Observations were recorded in fall during 2014 and 2016 (35.4% [± 15.1%] and winter during 2015 and 2017 (46.3% [± 17.6%]).

(b) Witter et al. (2012) reported the number of behviour scans and not the number of caribou groups observed.

NA = Not Available.

Analysis of Bathurst Caribou Autumn Range

During the meeting with EMAB, the results of Virgl et al. (2017) were discussed in the context of natural range contraction of Bathurst caribou herd based on collar data. EMAB requested that a similar analysis of autumn range centroid and distance to Diavik regression be performed to confirm an apparent seasonal delay in caribou interaction with the Diavik Mine. If a delay is confirmed it would support Diavik's conclusion that sensory disturbance effects to caribou may have lower ecological significance because effects would occur later in the year when caribou calves would be less dependent on maternal cows.

Annual autumn ranges for the Bathurst caribou herd were calculated using satellite collar data (courtesy of GNWT-ENR) and a 95% kernel density (i.e., probability density) estimate. Autumn range estimates for the Bathurst herd included satellite collared caribou cow locations from September 1 to October 31 from 1996 to 2017. Each 95% kernel for each season in each year was edited to remove small outlier polygons, leaving a single polygon for each season in each year.

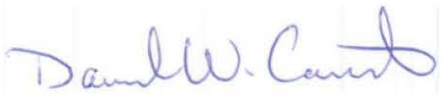
To determine if there were trends in autumn migration patterns, the distance between the autumn range centroid and the nearest shoreline of East Island was measured for each year. East Island was used to simplify the analysis because the Mine footprint has changed over time, however, it remains confined to East Island. Linear regression was used to test for a temporal trend.

Autumn range centroids have varied through time with more southerly located centroids occurring in earlier years of the study period and generally shifted north through time as the Bathurst herd declined (Figure 1; Virgl et al. 2017). Relative to East Island, where the Mine is located, there was no temporal trend ($t = -0.95$, $P = 0.45$) between the distance from annual autumn range centroids and the nearest shoreline of East Island (Figure 2). This result is not surprising considering that East Island is located north of the treeline and more centrally located within the Bathurst annual range. East Island is also approximately 70 km south of Contwoyto Lake where Bathurst collared caribou have been concentrated during recent summers (Golder 2014). As the results of the collared Bathurst caribou and recent WMP reports (Golder 2016, 2018) indicate, Bathurst caribou are currently arriving in the Mine study area in late October and November, which is later than early July during the late 1990's when the herd was much more abundant.

Closure

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

GOLDER ASSOCIATES LTD.



Daniel Coulton, Ph.D.
Wildlife Biologist

John Virgl, Ph.D.
Principal, Senior Ecologist

DWC/JAV/it

Attachment: Figures 1 and 2

o:\final\2017\3 proj\1771843 ddmi_2017_environmental projects\1771843-1645-tm-rev0-5000\1771843-1645-tm-rev0-5000-emab requests 14mar_18.docx

References

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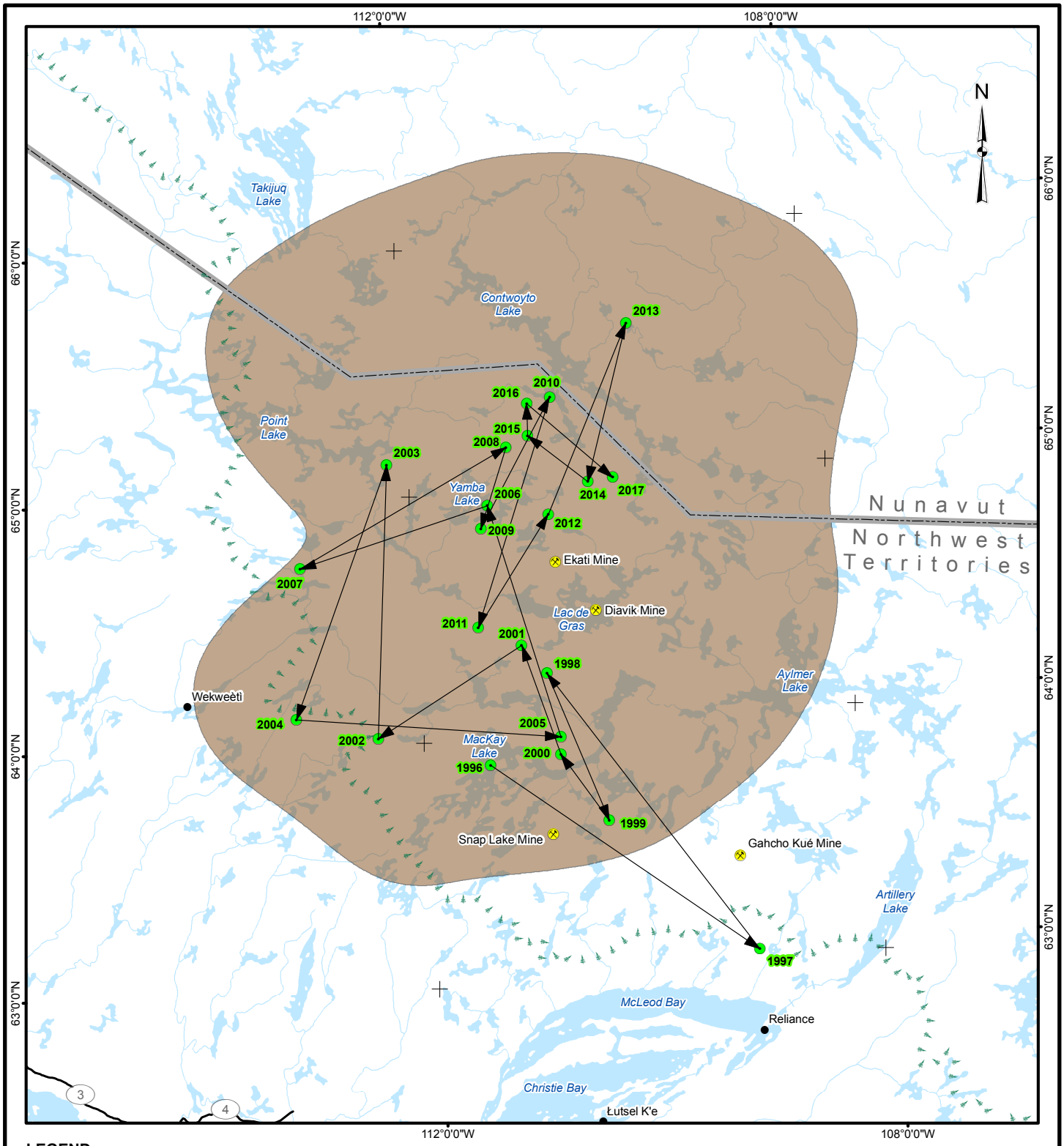
Virgl JA, Rettie WJ, Coulton DW. 2017. Spatial and temporal changes in seasonal range attributes in a declining barren-ground caribou herd. Rangifer 37:32-46.

Witter, LA, Johnson, CJ, Croft, B, Gunn, A, and Gillingham, MB. 2012. Behavioural trade-offs in response to external stimuli: time allocation of an Arctic ungulate during varying intensities of harassment by parasitic flies. Journal of Animal Ecology 81:284-295.



LEGEND

- EXISTING MINE
- ALL WEATHER ROAD
- TERRITORIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- CENTROID
- CENTROID CONNECTOR
- MULTI-ANNUAL AUTUMN RANGE, SEPTEMBER 1 TO OCTOBER 31, 1996 TO 2017

100 0 100

SCALE 1:2,500,000 KILOMETRES

REFERENCE

1. CARIBOU DATA SUPPLIED BY ENVIRONMENT AND NATURAL RESOURCES. 2018. CENTROIDS DERIVED FROM BATHURST CARIBOU SATELLITE COLLAR LOCATIONS, SEPTEMBER 1 TO OCTOBER 31, 1996 – 2017. NWT WILDLIFE MANAGEMENT INFORMATION SYSTEM. GOVERNMENT OF THE NORTHWEST TERRITORIES, YELLOWKNIFE, NT.
2. 1:2 MILLION SCALE BASE DATA FROM THE ATLAS OF CANADA; CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE – CANADA.
DATUM: NAD83 PROJECTION: NWT LAMBERT CONFORMAL CONIC

PROJECT

RioTinto

DIAVIK DIAMOND MINES INC.

TITLE

ANNUAL AUTUMN RANGE CENTROIDS FOR THE BATHURST CARIBOU HERD 1996 TO 2017

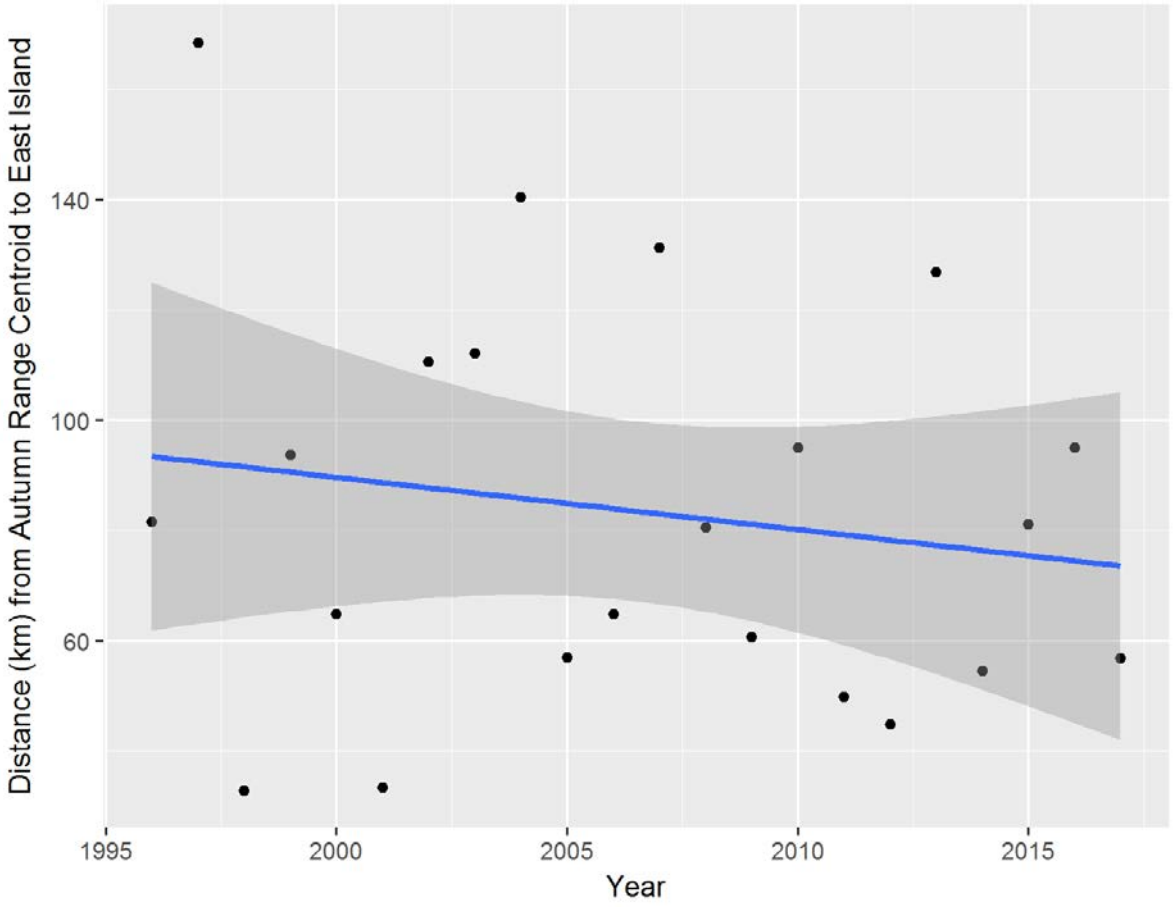
GOLDER

PROJECT		1771843	FILE No.	
DESIGN	DC	12 Mar. 2018	SCALE AS SHOWN	REV. 0
GIS	ANK	13 Mar. 2018		
CHECK	DC	13 Mar. 2018		
REVIEW	DC	13 Mar. 2018		

FIGURE: 1

I:\CLIENTS\DIAVIK\1771843\Mapping\MXD\Wildlife\Caribou_Bathurst_Autumn_CentroidDistanceAnalysis\Fig1_BathurstCaribou_AutumnRange_Centroids_Rev0.mxd

Figure 2: Distance (km) between East Island and Annual Bathurst Caribou Autumn Range Centroids, 1996 to 2017



APPENDIX E

Wildlife Mortality Incident Reports 2018

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Ptarmigan- 2018-02-14 - Zone 1 A21

Document No.
WildlifeReport000083

14 Feb 2018

Completed on
14 Feb 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Mortality	
Wildlife Mortality		
Enter Initial Time of Report	14 Feb 2018 11:07 AM	
Department/Individual Who Reported Mortality:	A21	
Environment On Scene		
Environment at Call-out Location	14 Feb 2018 03:07 PM	
Location	A21 Zone 1	
Animal Type		
Description of Animal/Scene	Ptarmigan carcass spotted near piping in Zone 1	
Photo of Scene  Appendix 1  Appendix 2  Appendix 3		
Estimated Time of Death	Days	
Environment Off Scene		
End of Environment Call-out	14 Feb 2018 03:09 PM	
Final Location of Carcass	Zone 1	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Question		Response	Details
Signature	Shelby Skinner	14 Feb 2018 03:09 PM	

Media

Appendix 1

Appendix 2

Appendix 3

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Green winged teal -2018-06-07 - lube storage

Document No.
WildlifeReport000253

07 Jun 2018

Completed on
07 Jun 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Mortality	
Wildlife Mortality		
Enter Initial Time of Report	07 Jun 2018 03:00 PM	
Department/Individual Who Reported Mortality:	Site Services	
Environment On Scene		
Environment at Call-out Location	07 Jun 2018 03:10 PM	
Location	Lube storage building	
Animal Type	Other	
Description of Animal/Scene	Green winged tea eaten and decapitated	
Photo of Scene  Appendix 1		
Estimated Time of Death	Hours	
Environment Off Scene		
End of Environment Call-out	07 Jun 2018 03:16 PM	
Final Location of Carcass	Shallow bays	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Don Roberts	07 Jun 2018 03:16 PM 

WildlifeReport000253
Green winged teal -2018-06-07 - lube storage
Score (1/1) 100.00%

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Duck - 2018-09-05 - Light vehicle road

Document No.
WildlifeReport000014

05 Sep 2018

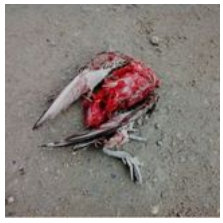
Score
0/1.0 - 0.00%

Audit - 0/1 0.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Mortality	
Wildlife Mortality		
Enter Initial Time of Report	05 Sep 2018 09:45 AM	
Department/Individual Who Reported Mortality:	Environment	
Environment On Scene		
Environment at Call-out Location	05 Sep 2018 09:45 AM	
Location	Light vehicle road by the Truck shop	
Animal Type		
Description of Animal/Scene	The bird has been identified as a duck by the webbed feet and feathers. It was half eaten and a raven was spotted near by.	
Photo of Scene		
Estimated Time of Death	Hours	
Environment Off Scene		
End of Environment Call-out	05 Sep 2018 10:00 AM	
Final Location of Carcass	Environment freezer	
Closure & Sign-off		Score (0/1) 0.00%
Wildlife Report Complete	Off	


Appendix 1


Appendix 2


Appendix 3


Appendix 4

Media

Appendix 1

Appendix 2

Appendix 3

Appendix 4

APPENDIX F

General Wildlife Reports

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-02-06 - East of A21 South Dike

Document No.
WildlifeReport000080

06 Feb 2018

Completed on
09 Feb 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	5 males and females, walking on ice	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	06 Feb 2018 11:45 AM	
Department/Individual Who Reported Wildlife:	Nuna/Ben	
Environment On Scene		
Environment at Call-out Location	06 Feb 2018 12:00 PM	
Chronological Events		
	11:45 Caribou called in on ice near A21 S Dike 12:00 ENV has visual of 5 Caribou 2 km E of the S Dike 12:04 ENV begins observations 12:15 ENV loses visual of Caribou in blowing snow 12:45 still no visual of Caribou, ENV off scene	
Movement Map (Import NotePlus Site Map)		
Environment Off Scene		
End of Environment Call-out	06 Feb 2018 12:45 PM	
Final Location of Wildlife	Unknown	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Shelby Skinner	09 Feb 2018 04:14 PM

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-02-10 - North Winter Road Approah

Document No.
WildlifeReport000081

10 Feb 2018

Completed on
12 Feb 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	4 males/females	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	12 Feb 2018 03:30 PM	
Department/Individual Who Reported Wildlife:	Dwayne/Site Services	
Environment On Scene		
Environment at Call-out Location	10 Feb 2018 04:00 PM	
Chronological Events		
	1530 Dwayne called in 4 Caribou near north winter road approached 1600 ENV on scene and located Caribou 1627 ENV moved to look out spot and began observations 1636 winter road trucks began coming into the area, very little response 1706 convoy of 2 trucks pass, no response 1718 ENV off scene	
Movement Map (Import NotePlus Site Map)		

Appendix 1

Question	Response	Details
Environment Off Scene		
End of Environment Call-out	10 Feb 2018 05:17 PM	
Final Location of Wildlife	Tundra near North Winter Road Approach	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	12 Feb 2018 04:18 PM	

Media

Appendix 1

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-02-11 - West of A154 Dike

Document No.
WildlifeReport000082

11 Feb 2018

Completed on
12 Feb 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	3 males/females	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	11 Feb 2018 03:40 PM	
Department/Individual Who Reported Wildlife:	Shelby Skinner	
Environment On Scene		
Environment at Call-out Location	11 Feb 2018 03:40 PM	
Chronological Events		
	1540 When leaving NI Water Treatment Plant ENV spotted three Caribou on the ice near A154 Dike, began observations 1556 Caribou trotting towards Tundra near NI/runway, began feeding 1604 ENV off scene	
Movement Map (Import NotePlus Site Map)  Appendix 1		
Environment Off Scene		
End of Environment Call-out	11 Feb 2018 04:04 PM	

Question	Response	Details
Final Location of Wildlife	Tundra near NI/runway	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	12 Feb 2018 04:25 PM	

Media

Appendix 1

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-02-16 - Veggie Plot Road

Document No.
WildlifeReport000084

16 Feb 2018

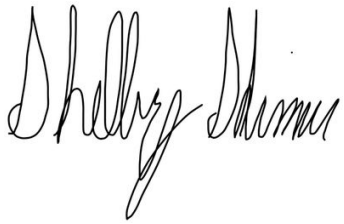
Completed on
19 Feb 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	5 males/females	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	14 Feb 2018 09:14 AM	
Department/Individual Who Reported Wildlife:	UG Maintenance/Ron	
Environment On Scene		
Environment at Call-out Location	19 Feb 2018 09:27 AM	
Chronological Events		
	0915 5 Caribou called in on Tundra near UG haul road 0930 ENV has visual of 3 Caribou 0932 UG haul truck passes, 1 looked p, 1 jumped and 1 remained bedded down 0946 UG haul truck passes, only 2 in sight, little reaction 0956 UG haul truck passes, only 2 in sight, little reaction 1009 UG haul truck passes, only 2 in sight, little reaction, 1 more walked in sight 1018 1 eating willows, 2 bedded down	
Movement Map (Import NotePlus Site Map)  Appendix 1		

Question	Response	Details
Environment Off Scene		
End of Environment Call-out	16 Feb 2018 10:20 AM	
Final Location of Wildlife	On Tundra near veggie plot Road	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	19 Feb 2018 09:23 AM	

Media

Appendix 1

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou-2018-03-09 - north winter road approach

Document No.
WildlifeReport000224

09 Mar 2018

Completed on
12 Mar 2018

Score
1/1.0 - 100.00%

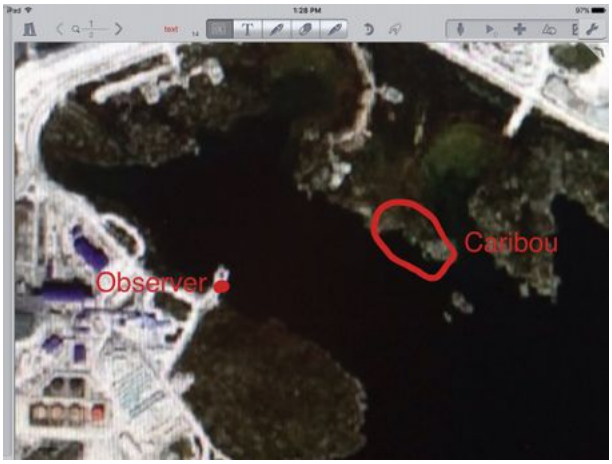
Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	13 caribou	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	09 Mar 2018 10:31 AM	
Department/Individual Who Reported Wildlife:	James - backfill	
Environment On Scene		
Environment at Call-out Location	12 Mar 2018 10:50 AM	
Chronological Events		
	10:50- environment at scene 13 caribou feeding 11:02- light vehicle drove by 100m away 1 caribou looked at vehicle 11:08- semi and marshal drove by no reaction 11:16-11:40 caribou continued to feed 11:40 environment completed scans left the scene	
Movement Map (Import NotePlus Site Map)  Appendix 1		
Environment Off Scene		
End of Environment Call-out	09 Mar 2018 11:40 AM	

Question	Response	Details
Final Location of Wildlife	Shallow bays area	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Don Roberts	12 Mar 2018 01:29 PM	

Media



Appendix 1

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-03-12 - Comunication building

Document No.
WildlifeReport000223

04 Mar 2018

Completed on
12 Mar 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	Herd of 12	
Photo (If Possible)  Appendix 1		
Enter Initial Time of Wildlife Sighting	04 Mar 2018 11:45 AM	
Department/Individual Who Reported Wildlife:	HSE	
Environment On Scene		
Environment at Call-out Location	04 Mar 2018 11:55 AM	
Chronological Events		
	11:55- environment on scene all caribou feeding, 2 light vehicles passed by no reaction from herd Caribou continued to graze till ~12:30 when they bedded down 13:14- 2 light vehicles drove by no reaction	
Movement Map (Import NotePlus Site Map)		
Environment Off Scene		
End of Environment Call-out	04 Mar 2018 01:14 PM	
Final Location of Wildlife	East of communication building	

Question	Response	Details
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Don Roberts	12 Mar 2018 01:13 PM	

Media

Appendix 1

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou-2018-03-12 - north winter road approach

Document No.
WildlifeReport000225

12 Mar 2018

Completed on
12 Mar 2018

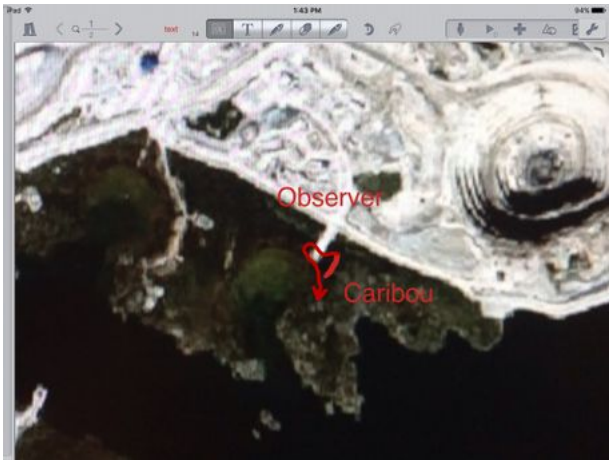
Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	10	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	12 Mar 2018 07:45 AM	
Department/Individual Who Reported Wildlife:	Robbie	
Environment On Scene		
Environment at Call-out Location	12 Mar 2018 08:18 AM	
Chronological Events		
	8:18 - environment on scene conducting scans 10 individuals feeding 8:34- 1 caribou beds down 8:39- 2 light vehicles turn at intersection 75 meters away 08:43- marshalled semi drive by ~25 meters away. 2 caribou run from truck towards herd 3 others look alerted 8:51- caribou cross winter road north approach west to east 8:59- caribou cross over road west to east. 9:07-9:23 caribou feeding 1 still bedded down 09:23 - environment completed scans left scene	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 1		
Environment Off Scene		
End of Environment Call-out	12 Mar 2018 09:23 AM	
Final Location of Wildlife	North winter road approach area	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Don Roberts	12 Mar 2018 01:45 PM 

Media



Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-03-14 - AN Pad

Document No.
WildlifeReport000227

14 Mar 2018

Completed on
24 Mar 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	12 males/females grazing and bedded down	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	14 Mar 2018 09:16 PM	
Department/Individual Who Reported Wildlife:	Environment/Shelby	
Environment On Scene		
Environment at Call-out Location	14 Mar 2018 09:16 AM	
Chronological Events		
	0916 9 caribou spotted grazing and bedded down behind Met Station Power shack 0920 ENV pulled forward a it and saw 3 more caribou, 2 bedded down one grazing 0922 whole heard got up and trotted SW	
Movement Map (Import NotePlus Site Map)  Appendix 1		
Environment Off Scene		
End of Environment Call-out	14 Mar 2018 09:25 PM	
Final Location of Wildlife	Unknown	

Question	Response	Details	
Closure & Sign-off			Score (1/1) 100.00%
Wildlife Report Complete	On		
Signature	Shelby Skinner	14 Mar 2018 06:26 PM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-03-14 - AN Pad

Document No.
WildlifeReport000227

14 Mar 2018

Completed on
14 Mar 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	12 males/females grazing and bedded down	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	14 Mar 2018 09:16 PM	
Department/Individual Who Reported Wildlife:	Environment/Shelby	
Environment On Scene		
Environment at Call-out Location	14 Mar 2018 09:16 AM	
Chronological Events		
	0916 9 caribou spotted grazing and bedded down behind Met Station Power shack 0920 ENV pulled forward a it and saw 3 more caribou, 2 bedded down one grazing 0922 whole heard got up and trotted SW	
Movement Map (Import NotePlus Site Map)  Appendix 1		
Environment Off Scene		
End of Environment Call-out	14 Mar 2018 09:25 PM	
Final Location of Wildlife	Unknown	

Question	Response	Details	
Closure & Sign-off			Score (1/1) 100.00%
Wildlife Report Complete	On		
Signature	Shelby Skinner	14 Mar 2018 06:26 PM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-03-14 - Emulsion Plant Road

Document No.
WildlifeReport000226

14 Mar 2018

Completed on
14 Mar 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	5 males/females feeding 50 m from road	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	14 Mar 2018 09:33 AM	
Department/Individual Who Reported Wildlife:	Environment/Shelby Skinner	
Environment On Scene		
Environment at Call-out Location	14 Mar 2018 09:33 AM	
Chronological Events		
	0933 5 caribou spotted on tundra graving on S side of emulsion road 0941 LV drove by all 5 caribou looked up 0957 1 caribou out of sight, other 4 still feeding 0959 3 caribou trotted 50 m after 3 haul trucks dumped rock at South Country Rock Pile 1007 2 caribou out of sight, ENV out	
Movement Map (Import NotePlus Site Map)  Appendix 1		
Environment Off Scene		
End of Environment Call-out	14 Mar 2018 10:08 AM	

Question	Response	Details
Final Location of Wildlife	South side of Emulsion Plant Road	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	14 Mar 2018 06:03 PM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-03-15 - Wind Tower 2

Document No.
WildlifeReport000228

15 Mar 2018

Completed on
20 Mar 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	11 males/females, mostly white	
Photo (If Possible)  Appendix 1		
Enter Initial Time of Wildlife Sighting	15 Mar 2018 02:50 PM	
Department/Individual Who Reported Wildlife:	Environment/Shelby	
Environment On Scene		
Environment at Call-out Location	15 Mar 2018 02:50 PM	
Chronological Events		
	1450 ENV spots herd of 11 caribou feeding near Wind Tower 2 1522 one caribou tries to mount another caribou 1523 blast goes off, caribou jump and run about 20 m, stop and begin to feed again	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 2		
Environment Off Scene		
End of Environment Call-out	15 Mar 2018 03:40 PM	
Final Location of Wildlife	Wind Tower 2	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Shelby Skinner	20 Mar 2018 12:22 AM

Media

Appendix 1

Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-03-16 - Emulsion Plant road

Document No.
WildlifeReport000229

16 Mar 2018

Completed on
24 Mar 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	12 males/females	
Photo (If Possible)  Appendix 1		
Enter Initial Time of Wildlife Sighting	16 Mar 2018 07:33 AM	
Department/Individual Who Reported Wildlife:	Site Services/Jonathon Beaverho	
Environment On Scene		
Environment at Call-out Location	16 Mar 2018 08:20 AM	
Chronological Events		
	0820 9 feeding and 3 alert males/females on S side of road 0827 LV drove by, 5 feeding, 3 alert, 2 caribou entangling antlers 0830 Vac truck drove by, 9 trotted 20 m away, 3 alert	
Movement Map (Import NotePlus Site Map)		
Environment Off Scene		
End of Environment Call-out	20 Mar 2018 08:35 AM	
Final Location of Wildlife	Wind tower area	

Question	Response	Details
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	SS2		

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
2018-03-22

Document No.
WildlifeReport000230

22 Mar 2018

Completed on
26 Mar 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	15 caribou. Males/ females	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	22 Mar 2018 10:00 AM	
Department/Individual Who Reported Wildlife:	UG	
Environment On Scene		
Environment at Call-out Location	22 Mar 2018 10:30 AM	
Chronological Events		
	Legend Bedded, Feeding, Standing, Walking 10:30 1B 5F 4S 10:38 6F 4W 10:46 10F 10:54 10F 11:02 5B 5F 11:10 10S 5W stressor (fox) distance 2m response 2. 5 more caribou showed up 11:18 5B 10F 11:26 5B 10F 11:34 9B 6F 11:42 12B 3F Traffic on A418 road doesn't seem to bother the caribou	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 1		
Environment Off Scene		
End of Environment Call-out	22 Mar 2018 11:05 AM	
Final Location of Wildlife	By veggie plots	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	JG	26 Mar 2018 09:06 AM 

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-03-29 - By Emulsion Plant

Document No.
WildlifeReport000231

29 Mar 2018

Completed on
02 Apr 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	20 caribou	
Photo (If Possible)  Appendix 1  Appendix 2		
Enter Initial Time of Wildlife Sighting	29 Mar 2018 10:10 AM	
Department/Individual Who Reported Wildlife:	UG blasters	
Environment On Scene		
Environment at Call-out Location	29 Mar 2018 10:22 AM	
Chronological Events		
	Watch caribou for about 20 min with a sample size of 17. 13 were Bedded the whole time. 4 were feeding. There was one stressor (staff on foot) which two caribou started walking	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 3		
Environment Off Scene		
End of Environment Call-out	29 Mar 2018 10:30 AM	
Final Location of Wildlife	250m East of the Emulsion Plant	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	JG	02 Apr 2018 08:28 PM 

Media

Appendix 1

Appendix 2

Appendix 3

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou 2018-03-29 - On the side of AN Road

Document No.
WildlifeReport000232

29 Mar 2018

Completed on
02 Apr 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	7 caribou	
Photo (If Possible)  Appendix 1		
Enter Initial Time of Wildlife Sighting	02 Apr 2018 08:40 AM	
Department/Individual Who Reported Wildlife:	Blasters	
Environment On Scene		
Environment at Call-out Location	29 Mar 2018 09:20 AM	
Chronological Events		
	Watched caribou for about a half hour and there were 3 different stressors, the ENV truck, staff on foot and another truck. Caribou were mainly feeding and walking	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 2		
Environment Off Scene		
End of Environment Call-out	29 Mar 2018 10:03 AM	
Final Location of Wildlife	On the side of the AN Road 500m east of the WTA	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	JG	02 Apr 2018 08:18 PM 

Media

Appendix 1

Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-03-29 - South of the airport

Document No.
WildlifeReport000233

29 Mar 2018

Completed on
30 Mar 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	6 caribou	
Photo (If Possible)  Appendix 1		
Enter Initial Time of Wildlife Sighting	29 Mar 2018 11:22 AM	
Department/Individual Who Reported Wildlife:	ENV	
Environment On Scene		
Environment at Call-out Location	29 Mar 2018 11:25 AM	
Chronological Events		
	11:22 6 caribou feed south of the airport	
Movement Map (Import NotePlus Site Map)  Appendix 2		

Question	Response	Details
Environment Off Scene		
End of Environment Call-out	29 Mar 2018 11:25 AM	
Final Location of Wildlife	South of the airport	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	JG	30 Mar 2018 11:23 AM	

Media

Appendix 1

Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-04-01

Document No.
WildlifeReport000234

01 Apr 2018

Completed on
01 Apr 2018

Score
1/1.0 - 100.00%

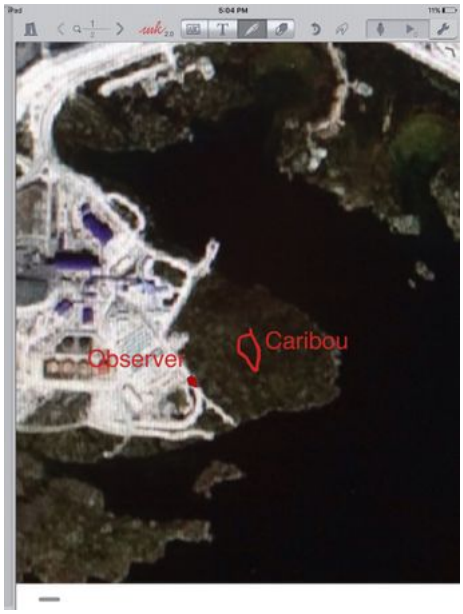
Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	Mixed herd near the manual weather station	
Photo (If Possible)  Appendix 1		
Enter Initial Time of Wildlife Sighting	01 Apr 2018 04:30 PM	
Department/Individual Who Reported Wildlife:	Don environment	
Environment On Scene		
Environment at Call-out Location	01 Apr 2018 04:30 PM	
Chronological Events		
	16:30 caribou feeding total 8 mixed sexes 16:38 caribou continue to feed 16:46 4 caribou bed down 1 feeds 3 move over hill in out of sight 16:50 snow removal truck passes 100m away 1 feeding 4 bedded 16:58 4 feeding 1 Bedded 17:05 3 light vehicles drive by 100m 4 feeding 1 Bedded 17:13 4feeding 1 Bedded 17:19 light vehicle drives by 100m away, 4 feeding 1 Bedded 17:27 5 feeding 1 Bedded 1 caribou came up from other side of hill	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 2		
Environment Off Scene		
End of Environment Call-out	01 Apr 2018 05:27 PM	
Final Location of Wildlife	Near manual weather station	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Don Roberts	01 Apr 2018 05:24 PM 

Media

Appendix 1



Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-04-09 - Waste Transfer

Document No.
WildlifeReport000236

09 Apr 2018

Completed on
15 Apr 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

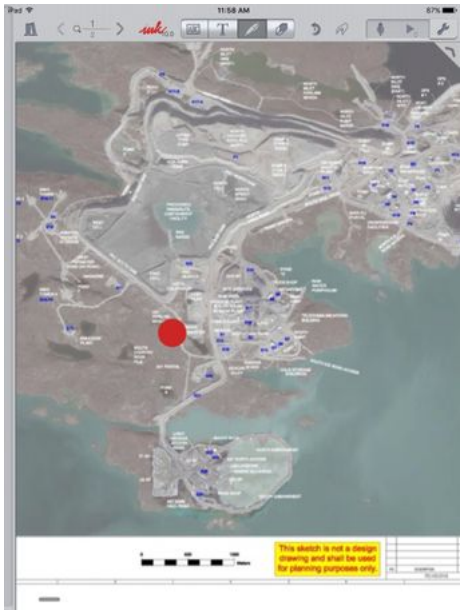
Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	11 males/females	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	09 Apr 2018 04:00 PM	
Department/Individual Who Reported Wildlife:	Survey/Brian	
Environment On Scene		
Environment at Call-out Location	09 Apr 2018 04:12 PM	
Chronological Events		
	1612 9 Bedded 2 feeding 1620 no changes 1628 no changes 1636 10 Bedded, 1 feeding, incinerator running 1644 no changes 1652 11 feeding 1700 no changes 1708 no changes	
Movement Map (Import NotePlus Site Map)		

Appendix 1

Question	Response	Details
Environment Off Scene		
End of Environment Call-out	09 Apr 2018 05:08 PM	
Final Location of Wildlife	South of Waste Transfer	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	15 Apr 2018 11:59 AM	

Media



Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-04-14 - A418

Document No.
WildlifeReport000235

14 Apr 2018

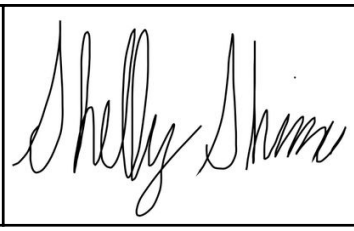
Completed on
15 Apr 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	30 males/females	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	14 Apr 2018 10:33 AM	
Department/Individual Who Reported Wildlife:	Survey/Brian	
Environment On Scene		
Environment at Call-out Location	14 Apr 2018 11:40 AM	
Chronological Events		
	1140 30 caribou Bedded down on the ice 1148 no change 1150 ENV left 1218 ENV returned, no change 1226 no change 1234 27 Bedded down, 3 standing 1242 24 bedded, 5 standing, 1 walking 1250 24 Bedded, 3 standing, 3 walking, ENV left	
Movement Map (Import NotePlus Site Map)  Appendix 1		

Question	Response	Details
Environment Off Scene		
End of Environment Call-out	14 Apr 2018 12:50 PM	
Final Location of Wildlife	South of 418, heading towards tundra	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	15 Apr 2018 11:45 AM	

Media

Appendix 1

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-04-15 - An road

Document No.
WildlifeReport000085

15 Apr 2018

Completed on
15 Apr 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	28 Caribou. Males/ females	
Photo (If Possible)  Appendix 1  Appendix 2		
Enter Initial Time of Wildlife Sighting	15 Apr 2018 03:10 PM	
Department/Individual Who Reported Wildlife:	ENV	
Environment On Scene		
Environment at Call-out Location	15 Apr 2018 03:10 PM	
Chronological Events		
	28 Caribou spread out in the area along the An road. 7 monitored for activity budget 15:10 7 Caribou feeding on the side of the road. Stressor (ENV truck 10-15m) 2 Caribou crossed the road 15:08 7 Caribou feeding 15:16 2 walking 5 feeding 15:24 2 walking 1 bedded 4 feeding	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 3		
Environment Off Scene		
End of Environment Call-out	15 Apr 2018 03:33 PM	
Final Location of Wildlife	An road	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	JG	15 Apr 2018 03:52 PM 

Media

Appendix 1

Appendix 2

Appendix 3

Wildlife Report - 2017

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou- 2018-04-15 - By pond 3

Document No.
WildlifeReport000086

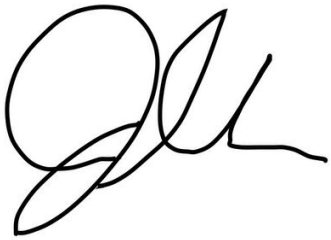
15 Apr 2018

Completed on
15 Apr 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	32 Caribou. Males/ females	
Photo (If Possible)  Appendix 1		
Enter Initial Time of Wildlife Sighting	15 Apr 2018 04:25 PM	
Department/Individual Who Reported Wildlife:	ENV	
Environment On Scene		
Environment at Call-out Location	15 Apr 2018 04:25 PM	
Chronological Events		
	32 Caribou by pond 3. 20 monitored for activity budget 16:20 18 feeding 2 sparing 1 bedded 16:28 18 feeding 2 sparing 1 bedded 16:36 16 feeding 1 bedded 1 walking 16:44 19 feeding 1 bedded	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 2		
Environment Off Scene		
End of Environment Call-out	15 Apr 2018 04:48 PM	
Final Location of Wildlife	By pond 3	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	JG	15 Apr 2018 04:48 PM 

Media

Appendix 1

Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-05-04 - Ice SE of Diavik

Document No.
WildlifeReport000242

04 May 2018

Completed on
05 May 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	17 males and females	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	05 May 2018 11:00 AM	
Department/Individual Who Reported Wildlife:	Site Services/Daniel	
Environment On Scene		
Environment at Call-out Location	05 May 2018 11:24 AM	
Chronological Events		
	1124 17 caribou on lake heading towards mainland SE of Diavik. Sample size (5) walking 1132 5 caribou walking 1140 5 caribou walking 1148 5 caribou walking, most of herd on mainland	
Movement Map (Import NotePlus Site Map)  Appendix 1		
Environment Off Scene		
End of Environment Call-out	04 May 2018 11:50 AM	
Final Location of Wildlife	Mainland SE of Diavik	

Question	Response	Details
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	05 May 2018 08:34 AM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-05-04 - Shallow Bays

Document No.
WildlifeReport000243

04 May 2018

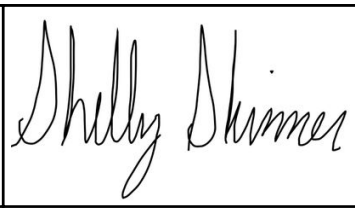
Completed on
05 May 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	12 males/females	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	04 May 2018 11:00 AM	
Department/Individual Who Reported Wildlife:	Site Services/Daniel	
Environment On Scene		
Environment at Call-out Location	04 May 2018 11:23 AM	
Chronological Events		
	1123 2 caribou on tundra grazing and 1 crossing shallow bays 1131 3 caribou grazing on tundra (one more appeared) and 1 crossing shallow bays out of sight 1139 3 caribou on tundra walking on shallow bays 1141 8 more caribou joined from shallow bays near Pond 10, did not include in scan 1147 3 caribou walking, almost at dust 2A peninsula	
Movement Map (Import NotePlus Site Map)  Appendix 1		

Question	Response	Details
Environment Off Scene		
End of Environment Call-out	04 May 2018 11:50 AM	
Final Location of Wildlife	Peninsula near Dust 2A	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	05 May 2018 08:43 AM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-05-15 - A21 Lakeside

Document No.
WildlifeReport000248

19 May 2018

Completed on
19 May 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	12 caribou on lake near A21 Lakeshore Blvd	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	15 May 2018 06:02 PM	
Department/Individual Who Reported Wildlife:	Environment	
Environment On Scene		
Environment at Call-out Location	15 May 2018 06:02 PM	
Chronological Events		
	18:02 ENV starts caribou scan. 3 Bedded, 8 feeding, 1 walking 18:10 2 light vehicles pass, caribou do not notice. 3 Bedded, 3 feeding, 3 standing, 3 walking 18:18 a Haul Truck and a Utility Truck drive by. 1 caribou gets up and walks away when Haul Truck drove by 18:26 2 Haul Trucks drive by; 4 caribou looked up then resumed Bedded position 18:34 3 Haul Trucks drove by; 3 caribou got up and walked towards the others, other caribou stood up, 2 layer back down, 1 jumped onto hind legs, 2 left heading North on ice 18:35 ENV left	
Movement Map (Import NotePlus Site Map)		
Environment Off Scene		
End of Environment Call-out	15 May 2018 06:35 PM	
Final Location of Wildlife	A21 Lakeside Tundra	

Question	Response	Details
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Atikin Hehn	19 May 2018 06:05 PM	

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-05-15 - Environment Snow Gauge

Document No.
WildlifeReport000247

Completed on
19 May 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	2 caribou near snow gauge	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	15 May 2018 02:49 PM	
Department/Individual Who Reported Wildlife:	Environment	
Environment On Scene		
Environment at Call-out Location	15 May 2018 04:49 PM	
Chronological Events		
	14:49 ENV arrives to collect snow gauge. Caribou are present. ENV leaves. 17:00 ENV returns to collect snow gauge. Caribou are gone	
Movement Map (Import NotePlus Site Map)		
Environment Off Scene		
End of Environment Call-out	15 May 2018 05:00 PM	
Final Location of Wildlife	Unknown	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Atikin Hehn	19 May 2018 05:53 PM

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-05-29 - Shallow Bays

Document No.
WildlifeReport000091

29 May 2018

Completed on
29 May 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	Group of ten ran onto ice then walked back to shore	
Photo (If Possible)  Appendix 1  Appendix 2 Appendix 3		
Enter Initial Time of Wildlife Sighting	29 May 2018 03:10 PM	
Department/Individual Who Reported Wildlife:	Don - ENV	
Environment On Scene		
Environment at Call-out Location	29 May 2018 03:10 PM	
Chronological Events		
	15:10 - Caribou spotted running onto ice from north side of Shallow Bays 15:18 - Caribou standing on ice in middle of the Shallow bay 15:26 - Caribou walking west as a tight group 15:32- Caribou continued to walk west arriving at the west shoreline 15:40 - Caribou feeding on the west bank 15:48 - Caribou moved over hill out of site need to relocate 16:03 - Caribou feeding in the north side of rose garden environment left scene	

Question	Response	Details
Movement Map (Import NotePlus Site Map) Appendix 4		
Environment Off Scene		
End of Environment Call-out	29 May 2018 04:05 PM	
Final Location of Wildlife	West vegetation plot	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Don Roberts	29 May 2018 04:07 PM 

Media

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Caribou - 2018-06-01 - North Haul Road

Document No.
WildlifeReport000093

01 Jun 2018

Completed on
03 Jun 2018

Score
1/1.0 - 100.00%

Audit - 1/1 100.00%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Caribou	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	Single caribou	
Photo (If Possible)  Appendix 1  Appendix 2		
Enter Initial Time of Wildlife Sighting	01 Jun 2018 12:50 PM	
Department/Individual Who Reported Wildlife:	Site Services	
Environment On Scene		
Environment at Call-out Location	01 Jun 2018 01:15 PM	
Chronological Events		
	1250 site services called in Caribou holding up traffic on North Haul Road, issue wildlife alert 1315 ENV on scene, Caribou near ring road entrance 1330 Caribou went down Till Pile, crossed airport road heading towards NI	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 3		
Environment Off Scene		
End of Environment Call-out	01 Jun 2018 01:30 PM	
Final Location of Wildlife	Tundra near North Inlet	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Shelby Skinner	03 Jun 2018 10:21 AM 

Media

Appendix 1

Appendix 2

Appendix 3

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Wolverine-2018-12-15-waste transfer

Document No.
WildlifeReport000289

2018-12-15

Score
1/1 - 100%

Completed on
2018-12-16, 4:43 PM

Audit - 1/1 - 100%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	General sighting / Other	
Report Type	Sighting	
General Wildlife Sighting		
Animal Type	Wolverine	
Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)	Single wolverine, unknown age. Dark, wolverine-like	
Photo (If Possible)		
Enter Initial Time of Wildlife Sighting	2018-12-15, 9:45 AM	
Department/Individual Who Reported Wildlife:	Loader on ROM pile	
Environment On Scene		
Environment at Call-out Location	2018-12-15, 10:15 AM	
Chronological Events		
	845Wolverine spotted crossing ROM, environment announced 945 Wolverine spotted in waste transfer, environment mobilized 1015 ENV on site, eyes on Wolverine, used truck and air horn to little effect. Wolverine chewed bags of oily rags (properly stored). 1040 Wolverine eventually left waste transfer. 1330 Wolverine spotted near underground mine dry, environment unavailable to check due to ice testing 17:30 spotted on south haul road by pond 5, announcement made, ENV out to check, not confirmed.	
Movement Map (Import NotePlus Site Map)		
Environment Off Scene		
End of Environment Call-out	2018-12-15, 5:40 PM	

Question	Response	Details
Final Location of Wildlife	Unknown	
Closure & Sign-off		Score (1/1) 100%
Wildlife Report Complete	On	

Signature	Gordon C	2018-12-16 4:42 PM	

Overview

Complete

Wolverine-2018-12-15-waste transfer

Wildlife Report - 2018 Conducted on 15th Dec, 2018 By Environment Department

Audit score	Failed items	Created actions
100.00%	0	0

Wildlife Report

Audit Title (Animal - yyyy-mm-dd - Location)

Wolverine-2018-12-15-waste transfer

Document No.

WildlifeReport000289

Completed On

15th Dec, 2018

Audit

100.00%

Wildlife Report

Type of Wildlife Report

General sighting / Other

Report Type

Sighting

General Wildlife Sighting

Animal Type

Wolverine

Description of Individual / Activity (eg. number of individuals, colour, age, size, etc.)

Single wolverine, unknown age. Dark, wolverine-like

Photo (If Possible)

Unanswered

Enter Initial Time of Wildlife Sighting

15th Dec, 2018 09:45 AM MST

Department/Individual Who Reported Wildlife:

Loader on ROM pile

General Wildlife Sighting / Environment On Scene

Environment at Call-out Location

15th Dec, 2018 10:15 AM MST

General Wildlife Sighting / Chronological Events

845Wolverine spotted crossing ROM, environment announced
945 Wolverine spotted in waste transfer, environment mobilized
1015 ENV on site, eyes on Wolverine, used truck and air horn to little effect. Wolverine chewed bags of oily rags (properly stored).
1040 Wolverine eventually left waste transfer.
1330 Wolverine spotted near underground mine dry, environment unavailable to check due to ice testing
17:30 spotted on south haul road by pond 5, announcement made, ENV out to check, not confirmed.

Movement Map (Import NotePlus Site Map)

Unanswered

General Wildlife Sighting / Environment Off Scene

End of Environment Call-out

15th Dec, 2018 17:40 PM MST

Final Location of Wildlife

Unknown

Closure & Sign-off

100.00%

Wildlife Report Complete

Off

Signature

Gordon C

16th Dec, 2018 4:42 PM MST

APPENDIX G

Site Wildlife Photos 2018

Photograph 1: Red Fox by Burn Pit

Photograph 2: Wolf

Photograph 3: Grizzly with Cubs

Photograph 4: Grizzly Cubs

Photograph 5: Caribou

Photograph 6: Caribou near Emulsion Plant 25 November 2018

Photograph 7: Male Common Mergansers

APPENDIX H

Caribou Incidental Observations Summary 2018

Date	Number	Location	Comments
26/01/2018	30	South of the A21 Dike	-
06/02/2018	5	East of A21 South Dike	-
06/02/2018	1	Near Pond 1	-
06/02/2018	1	On tundra near windfarm	-
10/02/2018	4	On ice near N winter road approach	Moved inland along winter road approach
11/02/2018	4	On ice near S winter road approach	-
11/02/2018	4	On ice on lake side of S Haul Road	-
11/02/2018	3	On ice near A154 dike	Moving towards tundra at the end of the runway
12/02/2018	3	On ice near A154 (DPS Well 3)	-
12/02/2018	4	On tundra near N winter road approach	-
14/02/2018	3	Spotted in shallow bays	-
16/02/2018	5	West Shallow Bays near veggie plot road entrance	-
21/02/2018	1	By the lake south of Old Mine Dry0	-
23/02/2018	3	Spotted by explosives magazine	-
25/02/2018	7	Spotted between COM shack and the raw water intake	-
04/03/2018	12	Spotted by the COM Shack	-
09/03/2018	13	Spotted near N. winter road approach at 10:30	-
12/03/2018	10	Spotted near N. winter road approach at 07:30	-
14/03/2018	5	South side of the emulsion road	One herd observed
14/03/2018	12	Behind Met Station power shack	-
15/03/2018	11	On tundra between wind towers	-
16/03/2018	12	North side of Emulsion road	-
17/03/2018	1	North winter road approach	-
18/03/2018	15	Tundra near COM Shack	-
18/03/2018	12	North side of Emulsion road	-
18/03/2018	5	Tundra near COM Shack	-
22/03/2018	15	By Veg plots across from C portal	-
22/03/2018	15	Vegetation plots across from C portal	-
29/03/2018	20	Tundra near emulsion plant	-
29/03/2018	7	Tundra near waste transfer	-

Date	Number	Location	Comments
01/04/2018	8	Tundra near COM Shack	-
02/04/2018	16	Shallow bays area	-
03/04/2018	30	West of airport	-
04/04/2018	14	West side of shallow bays	-
05/04/2018	14	Veggie plot road	-
06/04/2018	17	Caribou bedded down in the shallow bays	-
08/04/2018	6	AN road by waste transfer	-
09/04/2018	10	On lake and tundra between A21 Dike and South Tank farm	-
09/04/2018	11	Tundra between AN rad and Waste Transfer area, south of the incinerator	-
10/04/2018	12	South of 154	-
12/04/2018	9	Waste Transfer	-
12/04/2018	18	AN building	-
12/04/2018	15	South dike A21, on lake	-
14/04/2018	30	South of 418	-
15/04/2018	32	Tundra near Pond 3	-
15/04/2018	28	Tundra along AN road	-
16/04/2018	6	Near S approach of 418	-
16/04/2018	20	Near N winter road approach	-
18/04/2018	15	Shallow bays area	-
23/04/2018	7	150 of A21 dike	-
25/04/2018	17	On lake near South winter road approach	-
26/04/2018	2	On hill behind comm shack	-
27/04/2018	20	East end of the shallow bays	-
28/04/2018	9	East of north winter road approach	small herd
28/04/2018	8	150 M east of 418 dike	small group
30/04/2018	15	Herd near the north winter road entrance on tundra	-
30/04/2018	24	On ice south of the winter road staging area	-
02/05/2018	21	Herd near the field daily station	-
03/05/2018	15	Herd in shallow bay area	-
04/05/2018	17	Lake southeast of Diavik	-

Date	Number	Location	Comments
04/05/2018	12	Shallow bays	-
05/05/2018	4	Shallow bays	-
05/05/2018	5	Emulsion plant road, north side	-
05/05/2018	15	SCRP	-
05/05/2018	23	On tundra on lake side of Pond 11 road	-
06/05/2018	11	On the AN building Pad north side and tundra just east	-
06/05/2018	9	On tundra by the emulsion plant road	-
07/05/2018	15	Shallow bays	-
07/05/2018	85	On the way to LDG 48	-
09/05/2018	25	AN Road	Feeding
09/05/2018	5	On tundra across from South Tank Farm	Feeding
10/05/2018	26	Entrance to magazine storage road	Crossing road
10/05/2018	41	Emulsion plant road near gate/sign	Crossing road
10/05/2018	20	On ice and tundra in shallow bays	-
11/05/2018	14	South of SCRP	-
11/05/2018	3	On tundra across from South Tank Farm	-
11/05/2018	10	Dailys	-
12/05/2018	11	On tundra across from South Tank Farm	-
12/05/2018	55	North winter road approach	-
12/05/2018	38	AN road	-
13/05/2018	19	Tundra near Lakeshore Blvd	-
15/05/2018	2	Tundra near snow gauge	-
15/05/2018	12	On lake near Lakeshore Blvd	-
16/05/2018	3	On tundra near Lakeshore Blvd	-
16/05/2018	20	Tundra near Emulsion plant	-
16/05/2018	5	Tundra near cafeteria	-
16/05/2018	15	Near Lakeshore Drive on Tundra	-
16/05/2018	3	At snow gauge	-
16/05/2018	30	On tundra, lake near A21 dyke	-
17/05/2018	37	On lake near tundra near A21	-

Date	Number	Location	Comments
17/05/2018	3	Tundra near A21 Portal	-
17/05/2018	3	On Tundra 100+ m from air strip	-
17/05/2018	30	On ice by South winter road approach	-
18/05/2018	8	Tundra between A21 portal and AN road	-
18/05/2018	14	Tundra near Lakeshore Blvd	-
19/05/2018	11	Tundra near Lakeshore Blvd	-
19/05/2018	20	Tundra near Lakeshore Blvd	-
19/05/2018	5	Tundra between SCRP and WTA	-
20/05/2018	12	South of 418 dyke on tundra	-
20/05/2018	19	Tundra near Lakeshore Blvd	-
21/05/2018	20	South of 418 dyke on tundra	-
21/05/2018	14	South of 418 dyke on tundra	-
23/05/2018	Unspecified	Shallow bays	Observed during other work
23/05/2018	4	Main camp	-
26/05/2018	1	Near Truck Shop	-
26/05/2018	2	Tundra near Shallow Bays	-
27/05/2018	13	Near Main Camp	2 caribou on ice headed toward Main Camp
29/05/2018	10	Shallow bay area	-
31/05/2018	7	By the daily field sampling area	-
01/06/2018	7	Shallow bays area	-
01/06/2018	1	South Haul road near north haul road	-
01/06/2018	1	Shallow Bays	-
22/10/2018	1	Southeast of Field Dailies - arrived from LDG Ice	-
23/10/2018	1	LDG Ice West of Airport terminal heading towards N17 laydown	-
23/10/2018	1	Shallow bays	-
24/10/2018	2	Windfarm	-
29/10/2018	1	A154 heading S	-
05/11/2018	9	On tundra near Pond 3	-
06/11/2018	9	On tundra near Pond 3	-
07/11/2018	7	On tundra near Pond 3	-

Date	Number	Location	Comments
11/11/2018	7	West of A21 Zone 1 Stockpile	-
16/11/2018	18	On ice near A21 zone 1	-
20/11/2018	18	Emulsion Plant	-
21/11/2018	11	AN building tundra	-
23/11/2018	9	Emulsion Plant near wind tower	-
24/11/2018	13	On tundra next to AN road	-
25/11/2018	13	On tundra next to Emulsion Plant road	-
20/12/2018	Unspecified	On tundra near South Country Rock Pile	Observed during other work
23/12/2018	7	On tundra next to Emulsion Plant road	-

APPENDIX I

Caribou Behavioural Observations Summary 2018

Date	Time	Location	UTM (12W NAD 83)		Group Size	Composition
			Easting	Northing		
2018-02-06	12:04	2.2 km southwest of Diavik	536624	7149361	5	Males / Females
2018-02-10	16:27	365 m northwest of Diavik	535255	7151325	4	Males / Females
2018-02-11	15:40	76 m southeast of Diavik	536051	7153471	3	Males / Females
2018-02-16	9:27	19 m northeast of Diavik	535041	7152131	5	Males / Females
2018-03-04	11:55	At Diavik mine site	534446	7150729	12	Males / Females
2018-03-09	10:50	277 m northwest of Diavik	535221	7151427	13	Males / Females
2018-03-12	8:18	20 m northwest of Diavik	535626	7151791	10	Males / Females
2018-03-14	9:16	28 m southeast of Diavik	531707	7151979	12	Males / Females
2018-03-15	9:33	42 m northwest of Diavik	532537	7151087	5	Males / Females
2018-03-15	14:50	41 m southeast of Diavik	531835	7152149	11	Males / Females
2018-03-16	8:20	24 m southeast of Diavik	532319	7151066	12	Males / Females
2018-03-18	14:30	34 m northwest of Diavik	534510	7150839	5	Males / Females
2018-03-22	10:30	43 m northwest of Diavik	535114	7151787	15	Males / Females
2018-03-29	10:10	20 m northeast of Diavik	531901	7150898	17	Males / Females
2018-03-29	9:25	46 m northeast of Diavik	533085	7150952	7	Males / Females
2018-04-01	16:30	123 m southwest of Diavik	534591	7150770	8	Males / Females

Date	Time	Location	UTM (12W NAD 83)		Group Size	Composition
			Easting	Northing		
2018-04-04	17:15	27 m northwest of Diavik	534427	7152023	14	Males / Females
2018-04-09	16:12	At Diavik mine site	533338	7150627	11	Males / Females
2018-04-14	11:40	264 m northeast of Diavik	536078	7151368	30	Males / Females
2018-04-16	10:02	-	-	-	7	Males / Females
2018-04-30	17:00	300 m northwest of Diavik	535267	7151455	15	Males / Females
2018-05-02	17:47	150 m southwest of Diavik	534680	7150702	15	Males / Females
2018-05-03	11:05	471 m northeast of Diavik	535474	7151310	15	Males / Females
2018-05-04	11:24	635 m northwest of Diavik	537027	7151185	5	Males / Females
2018-05-04	11:23	214 m northwest of Diavik	534757	7151042	3	Males / Females
2018-05-04	15:40	117 m northeast of Diavik	532472	7150271	34	Males / Females
2018-05-05	15:09	80 m northwest of Diavik	534657	7152047	4	Males / Females
2018-05-05	16:35	40 m southeast of Diavik	532330	7151085	4	Males / Females
2018-05-05	17:19	173 m southwest of Diavik	534709	7150709	14	Males / Females
2018-05-06	11:08	At Diavik mine site	531936	7151880	10	Males / Females
2018-05-09	15:00	At Diavik mine site	533039	7150421	3	Males / Females
2018-05-11	15:12	At Diavik mine site	533942	7150581	3	Males / Females

Date	Time	Location	UTM (12W NAD 83)		Group Size	Composition
			Easting	Northing		
2018-05-11	15:30	82 m southwest of Diavik	534539	7150771	10	Males / Females
2018-05-13	8:12	75 m northwest of Diavik	533642	7150059	6	Males / Females
2018-05-15	18:02	110 m southeast of Diavik	533238	7149555	12	Males / Females
2018-05-16	15:00	155 m northwest of Diavik	533624	7149949	3	Males / Females
2018-05-17	13:26	197 m northwest of Diavik	534453	7150237	16	Males / Females
2018-05-17	17:46	At Diavik mine site	533373	7150179	3	Males
2018-05-18	16:20	At Diavik mine site	533367	7150546	3	Males
2018-05-18	15:38	70 m northwest of Diavik	533536	7150002	14	Males
2018-05-19	10:44	234 m northwest of Diavik	533810	7149964	3	Males
2018-05-19	14:29	22 m northwest of Diavik	533671	7150124	5	Males
2018-05-20	10:38	58 m northwest of Diavik	533633	7150074	9	Males
2018-05-21	9:25	108 m northwest of Diavik	536184	7151515	5	Males
2018-05-29	15:10	313 m northwest of Diavik	535028	7151251	10	Males / Females
2018-05-31	14:09	110 m southwest of Diavik	534576	7150770	7	Males / Females
2018-10-10	14:50	80 km northwest of Diavik	579874	7083037	8	Males / Females
2018-10-10	14:50	80 km northwest of Diavik	579874	7083037	16	Males / Females / Calves

Date	Time	Location	UTM (12W NAD 83)		Group Size	Composition
			Easting	Northing		
2018-10-10	15:15	80 km northwest of Diavik	579874	7083037	8	Males / Females
2018-10-10	15:16	80 km northwest of Diavik	579874	7083037	8	Males / Females
2018-11-05	9:54	107 m northeast of Diavik	532384	7152562	5	Males
2018-11-05	10:18	107 m northeast of Diavik	532384	7152562	5	Males
2018-11-06	13:45	836 m southeast of Diavik	531656	7153156	9	Males
2018-11-07	14:23	327 m southeast of Diavik	532093	7152819	7	Males / Females
2018-11-11	14:38	445 m southeast of Diavik	532506	7149552	7	Males
2018-11-21	11:10	16 m southeast of Diavik	531923	7151210	10	Males / Females
2018-11-23	14:25	16 m southeast of Diavik	531923	7151210	9	Males / Females
2018-11-24	14:58	109 m northeast of Diavik	532344	7151414	13	Males / Females
2018-11-25	14:30	43 m southwest of Diavik	532283	7151072	13	Males / Females
2018-12-23	14:43	45 m northwest of Diavik	532524	7151079	7	Males / Females

F = adult female; M = adult male; C = Calves; km=kilometres; m=meters.

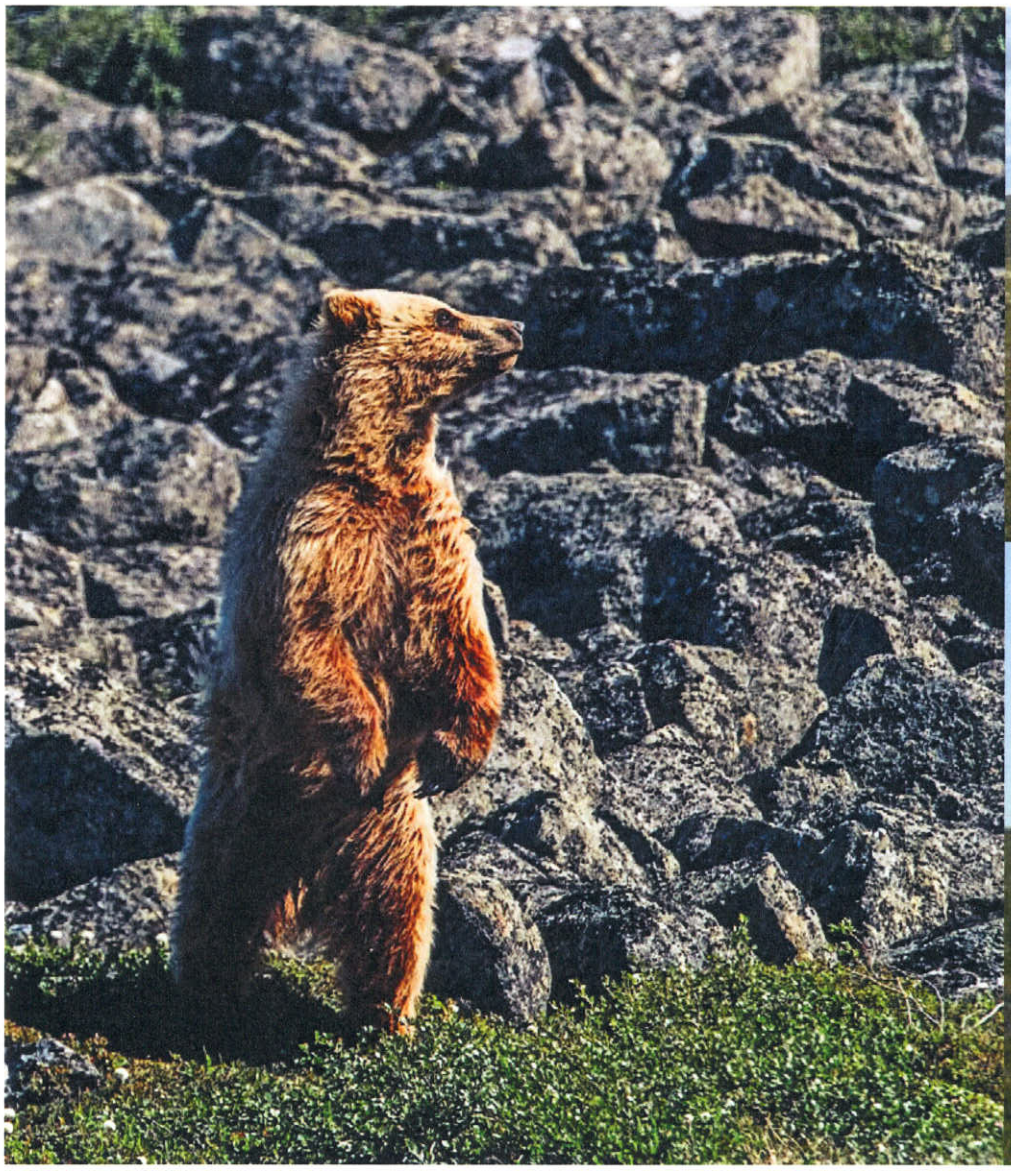
Note: Distances from the Mine estimated in the field.

APPENDIX J

Ekati and Diavik Grizzly Bear Population Assessment 2018

Ekati Diamond Mine and Diavik Diamond Mine

Grizzly Bear Population Assessment in the Lac de Gras Region, Northwest Territories - Final Report



RioTinto

Dominion Diamond Mines

Diavik Diamond Mine

Dominion Diamond Mines

Dominion Diamond Ekati ULC and Diavik Diamond Mine (2012) Inc.

EKATI DIAMOND MINE AND DIAVIK DIAMOND MINE

Grizzly Bear Population Assessment in the Lac de Gras Region, Northwest Territories - Final Report

November 2018

Project #0211136-0058

DRAFT

Citation:
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. by ERM Consultants Canada Ltd.: Vancouver, British Columbia.

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EXECUTIVE SUMMARY

This report presents final results from the joint Ekati Diamond Mine/Diavik Diamond Mine Regional Grizzly Bear DNA study as part of the 2012 to 2017 wildlife monitoring programs. The objective for the study was to evaluate population trends to determine whether industrial development has impacted grizzly bear populations in the regional study area surrounding the mines. Further, the analysis provides a baseline population dataset that could support management; however, population management is the mandate of the Northwest Territories Department of Environment and Natural Resources and outside the scope of this study.

The regional DNA study area is centred on the Ekati and Diavik Diamond Mines and contains 113 cells used for sampling grizzly bear hair in 2012, 2013, and 2017. Each cell was 12 km by 12 km (144 km^2) for a total study area size of approximately 16,000 km^2. A total of 1,902 hair samples were collected during the 2012 survey period. From these samples, 112 grizzly bear individuals were identified through DNA hair analysis, including 42 males and 70 females. DNA from an additional five samples from 2012 was extracted in 2013, which identified four individuals (1 male and 3 females), two of which were new to the 2012 dataset (1 male and 1 female). During the 2013 field program, 4,709 samples were collected. A total of 136 grizzly bears were identified (60 males and 76 females), including 39 that had no previous detections in the regional database (22 males and 17 females). Eight grizzly bears identified in the study area were also detected in other DNA study areas in Nunavut. In 2017, 3,657 samples were collected, from which 136 grizzly bears were identified (55 males and 81 females), including 62 with no previous detections in the regional database (33 males and 29 females).

Across all monitoring years, the mean capture probability in the Regional Grizzly Bear DNA Study Area was 0.21 (range 0.14 to 0.34) in 2012, 0.36 (range 0.28 to 0.44) in 2013, and 0.29 (range 0.21 to 0.42) in 2017. Based on Spatially Explicit Capture Recapture (SECR) analysis of the individuals detected, the estimated number of male grizzly bears in the region was 59 (95% Confidence Interval (CI) 43 to 81) in 2012 and 87 (95% CI 67 to 113) in 2013. The estimated number of female grizzly bears was 102 (95% CI 85 to 122) for both years. In 2017, the estimated number of male grizzly bears was 93 (95% CI 70 to 122), and the estimated number of females was 136 (95% CI 104 to 178).

Female density was estimated as 3.6/1,000 km^2 (95% CI 2.9 to 4.6) in 2012 and 4/1,000 km^2 (95% CI 3.2 to 5) in 2013. Male density was estimated as 2/1,000 km^2 (95% CI 1.4 to 2.7) in 2012 and 2.9/1,000 km^2 (95% CI 2.2 to 3.7) in 2013. The 2017 density of both males (3/1,000 km^2) and females (4.7/1,000 km^2) continued to show an increasing trend in comparison to the previous monitoring years. The results of this regional study indicate a stable to growing population in the central barrens of the Northwest Territories relative to estimates for the Slave Geological Province in the late 1990's (3.5 grizzly bears/1,000 km^2).

ACKNOWLEDGEMENTS

This work was conducted for Dominion Diamond Ekati ULC (Dominion Diamond) and Diavik Diamond Mines (2012) Inc. (DDMI) by ERM Consultants Canada Ltd (ERM). The program was designed by Brian Milakovic, Ph.D. (ERM), and managed by Harry O'Keefe (Dominion Diamond, Team Leader - Environment Projects), Laura Meinert (Dominion Diamond, Wildlife Advisor), Darcy Bourassa (DDMI Environment Supervisor), David Wells (former DDMI Environment Superintendent) and Sean Sinclair (current DDMI Environment Superintendent). Field logistics was managed by Christine Rock, M.Sc. (ERM) and conducted by field technicians employed by Dominion Diamond and DDMI. DNA analysis was conducted by Wildlife Genetics International. The report was written by Brian Milakovic. Statistical analysis was conducted by Joanna Zhao, M.Sc. (ERM) and Laurie Ainsworth, Ph.D. (ERM). The report was reviewed by Tonia Robb, Ph.D. (ERM), Harry O'Keefe, Christine Rock, and Sean Sinclair.

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GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

CESCC	Canadian Endangered Species Conservation Council
COSEWIC	Committee on the Status of Endangered Wildlife in Canada - A federal committee of experts that assesses and designates the level of threat to wildlife and vegetation species in Canada.
Carnivore	An animal that feeds on flesh
DDMI	Diavik Diamond Mine (2012) Inc.
DNA	Deoxyribonucleic acid. A molecule that contains genetic information.
Ecosystem	A volume of earth-space that is composed of non-living parts (climate, geologic materials, groundwater, and soils) and living or biotic parts, which are all constantly in a state of motion, transformation, and development. No size or scale is inferred.
Ecozone	The ecozone lies at the top of the ecological hierarchy, and therefore it defines, on a subcontinental scale, the major physiographic features of the country
GPS	Global Positioning System
Habitat	Land and water surface used by wildlife. This may include biotic and abiotic aspects such as vegetation, exposed bedrock, water and topography.
Hectare (ha)	10,000 m^2 or 0.01 km^2 or 2.47 acres
Inadequate samples	Samples that lacked material suitable for DNA extraction
Non-target samples	Samples that did not appear to be from grizzly bears
NWMB	Nunavut Wildlife Management Board
NWT	Northwest Territories
Mixed samples	Samples that showed evidence of ≥ 3 alleles per marker
SCR	Spatial Capture Recapture analysis
SECR	Spatially Explicit Capture Recapture analysis
SGP	Slave Geological Province

Sub-selected samples	Samples that were excluded due to sub-selection rules
Superpopulation ($\widehat{N}$)	The total number of bears that are expected to use the study area over the sampling period and is based on the relative probabilities of detecting and recapturing individuals.
Topography	The configuration of a surface, including its relief and the position of its natural and person-made features
X-bombs	Samples that failed during microsatellite analysis

1. INTRODUCTION

The Ekati Diamond Mine, owned and operated by Dominion Diamond Ekati ULC (Dominion Diamond), is located in the Slave Geological Province (SGP) of the Northwest Territories, approximately 300 km northeast of Yellowknife between Yamba Lake and Lac de Gras (Figure 1-1). The Diavik Diamond Mine (Diavik) is located approximately 30 km southeast of the Ekati Diamond Mine on a 20 square kilometre island, informally called East Island, in Lac de Gras (Figure 1-1).

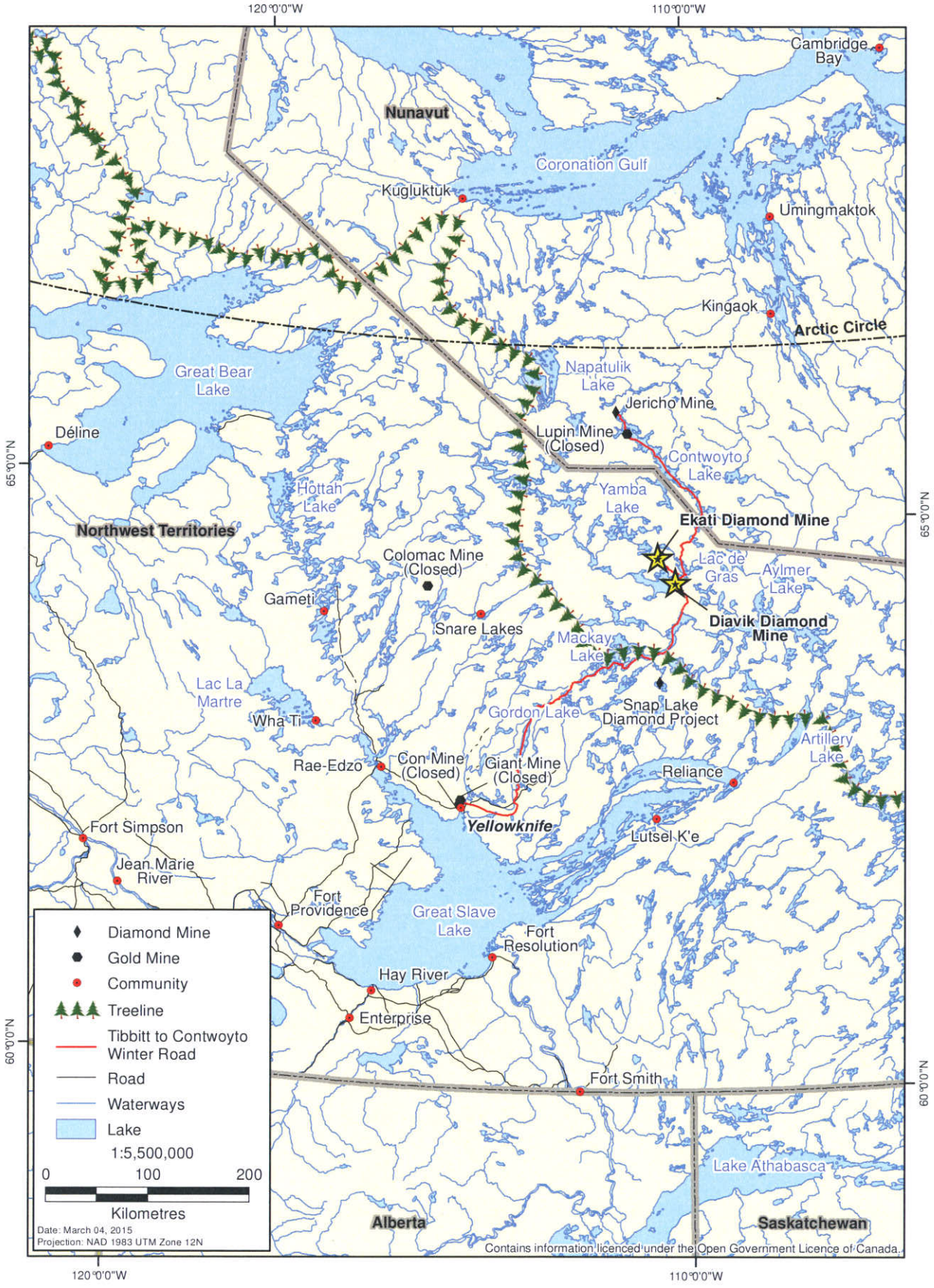
The Ekati Diamond Mine and Diavik are located approximately 150 km north of the treeline where the predominant vegetation type is heath tundra. The region is characterized as semi-arid with short, cool summers and long, cold winters. Several large esker systems in the region provide travel routes for caribou and denning habitat for wolves and grizzly bears. Numerous grass and sedge wetland areas provide food for grizzly bears in the spring and breeding habitat for migrating shorebirds, waterfowl, and some songbird species. Rocky cliffs and outcrops near lakes provide nesting areas for falcons and hawks. Other species known to inhabit the study area throughout or part of the year include wolverine, Arctic ground squirrel, fox (Arctic and red), lemming, hare, ptarmigan, and occasionally muskox and moose.

The grizzly bear (*Ursus arctos*) was assessed as Special Concern by the Committee on the Status of Endangered Wildlife in Canada in 2012 (COSEWIC 2012), and was listed as Special Concern on Schedule 1 of the federal *Species at Risk Act 2002* on May 29, 2018. In the Northwest Territories, the grizzly bear is ranked as Sensitive under the Northwest Territories General Status Ranking Program (2016 to 2020). In 2017, the NWT Species at Risk Committee (SARC 2017) assessed the grizzly bear as Special Concern. Barren-ground grizzly bears occur at low densities and roam over larger areas, with home ranges that average 2,100 km^2 for females and 7,200 km^2 for males, which are the largest home ranges for grizzly bears in North America (McLoughlin et al. 1999; McLoughlin et al. 2003). In general, barren-ground grizzly bears select home ranges with a large proportion of eskers for denning (McLoughlin et al. 2003). The esker dens typically are associated with adjacent tussock tundra, lichen veneer, birch seep, and tall shrub plant communities that can provide suitable forage. Barren-ground grizzly bears can also be carnivorous and caribou (*Rangifer tarandus*) can make up a large part of their annual diet (Gau 1998). Other available protein sources in the region are northern red-backed voles (*Myodes rutilus*), ptarmigan (*Lagopus* spp.), Arctic ground squirrel (*Uroceitellus parryii*), and fish. The bears supplement their diet with succulent vegetation in early summer and berries in the late summer and fall (Gau 1998).

Barren-ground grizzly bears are at the most northern and eastern limits of the continental grizzly bear range, thereby reducing overall population connectivity (McLoughlin and Messier 2001). Genetic diversity has been demonstrated to be comparatively low for grizzly bears in the Northwest Territories as a result of this relative isolation from other bears (Paetkau et al. 1998). Furthermore, the sub-Arctic tundra environment consists of harsh climates and low productivity that contribute to low reproductive rates and smaller average litter sizes (McLoughlin and Messier 2001; McLoughlin et al. 2003), which may make northern grizzly bear populations particularly sensitive to human disturbance.

Figure 1-1

Location of the Ekati and Diavik Diamond Mines, Northwest Territories



To census bears, researchers have used live captures to mark bears and then recaptured bears using camera stations (Mace 1994), aerial surveys (Larsen and Markel 1989), and hair removal and deoxyribonucleic acid (DNA) fingerprinting analysis (Proctor et al. 2005). Most recently, hair removal and DNA fingerprinting have been used to mark and recapture bears (Woods et al. 1999; Mowat and Strobeck 2000; Poole, Mowat, and Fear 2001; Boulanger et al. 2002; Proctor et al. 2005; Apps and McLellan 2006; Rescan 2011). This latter method has several benefits because live capture of bears is unnecessary, individuals can be identified with a small risk of error, and hair removal sites are faster to set up and are checked less often than live-capture sites (Mowat and Strobeck 2000). In addition the roots of mammalian hair contain sufficient DNA for analysis (Higuchi et al. 1988). In mark-recapture studies, an initial population sample is captured, marked, and released. The population is then resampled during ≥ 1 additional sessions (Woods et al. 1999). The ratio of newly captured animals to recaptures is then used to compute a population estimate (White et al. 1982).

This report summarizes the final population estimates from three years of grizzly bear mark-recapture DNA sampling conducted jointly by the Ekati and Diavik Diamond Mines in fulfillment of requirements for additional baseline studies to monitor the status and distribution of grizzly bears in a regional study area around the mines.

2. OBJECTIVES

Potential impacts to grizzly bears in the SGP associated with mining activities are predicted to be minimal, but without detailed information about population status, testing this prediction is difficult. At technical and community workshops held on June 28, 2010 and October 5 to 6, 2010, it was determined that an important objective for grizzly bear monitoring was to determine the abundance and distribution of grizzly bears in a larger regional context. It was agreed at these meetings that a DNA mark-recapture design was the best approach to meet this objective. Regulators, monitoring agencies, and community members recommended that the mining industry collaborate on a large scale regional grizzly bear program to assess population status and monitor trends over time. In response, Dominion Diamond and DDMI agreed to work together on a large scale grizzly bear mark-recapture study surrounding their diamond mine properties in the central barrens of the Northwest Territories. At a technical workshop in November 2011, Dominion Diamond and DDMI introduced a study design for a joint regional DNA-based grizzly bear population estimate. This program was implemented in 2012, repeated in 2013, and concluded in 2017. The main objectives for the study were to:

- estimate the density of grizzly bears in the Regional DNA Study Area (RDSA) to support the management of grizzly bears in the Northwest Territories, including cumulative effects assessment on potential changes to grizzly bear populations in the SGP in response to development;
- describe the spatial and temporal distribution of grizzly bears in the RDSA; and
- provide recommendations regarding a standard grizzly bear monitoring protocol for the Northwest Territories.

3. METHODS

3.1 STUDY DESIGN

The RDSA is located within the Southern Arctic Ecozone, which extends across much of the southern portion of continental Nunavut, and is bordered by the Northern Arctic Ecozone to the North. The northern area of the Southern Arctic Ecozone is characterized by stunted forms of tree species, such as dwarf birch (*Betula nana*) and green alder (*Alnus viridis* spp. *crispa*). Many species of willow (*Salix* sp.) grow throughout the ecozone, with stunted white (*Picea glauca)* and black spruce (*P. mariana)* present more towards the south. Much of the area is dominated by sedge fens, cottongrass tussock tundra, and heath. Sparsely vegetated areas, such as the wind-swept crests of eskers and boulder fields, are also common (NRC 2007). The Ekati and Diavik Diamond Mines are located approximately at the centre of the RDSA as the focal point to examine shifts in abundance and distribution over time relative to these mine sites.

3.1.1 Traditional Knowledge

Elders, land users, and youth from Kugluktuk, Lutsel K'e Dene, Yellowknives Dene, and the North Slave Metis Alliance participated in several site visits during the initial planning phases of the grizzly bear DNA program. During these visits, they were invited to share their Traditional Knowledge (TK) regarding grizzly bear habitat preferences and movement patterns to inform the overall study design.

In September, 2010, a pilot grid of eight 10 x 10 km cells was established surrounding the Ekati mine site. To maximize capture probabilities, sampling site locations within cells were initially based on a desktop exercise that examined seasonal habitat suitability models (see Rescan 2010). Community members were taken to these sites to confirm that each location was suitable to detect grizzly bears. If community members felt a sampling site was not suitable, they were asked to select an alternate location.

In 2010, barbed-wire tripods were relocated between each of three sessions. Different scented lures (combinations of commercial bear bait, fish oil, beaver castor, anise oil, and vanilla extract) were tried during each session. In 2011, the pilot study was expanded to 13 10 x 10 km cells. There were six sampling sessions between June 18 and August 27. Once again, community members were asked to confirm the suitability of sampling locations, and tripods were relocated between sessions. The same lures that were used in 2010 were applied in 2011 and subsequent years of study. One additional lure, "bear tease" was applied in 2017.

TK provided by Elders and land users identified eskers as favored movement paths and riparian areas that contain high quality forage and access to fish resources as areas most likely to encounter grizzly bears. In cells where these locations were limited, recommended sites included upland meadows and heath tundra areas away from extensive boulder fields. This information was used as site selection criteria during all three years of sampling. Community members were invited during implementation and participated in site selection during 2012 and 2013. In 2017, tripod locations were consistent with 2013 locations. Community members also participated during the hair collection sessions.

3.1.2 Regional Study Area

The regional DNA Study Area is centred on the Ekati and Diavik Diamond Mines and contains 113 cells used for sampling grizzly bear hair in 2012, 2013, and 2017 (Figure 3.1-1). Each cell was 12 km by 12 km (144 km^2) for a total study area size of approximately 16,000 km^2. Cell size was dependent on several factors, including the need to maximize capture probabilities (i.e., the likelihood of obtaining a hair sample, targeting a minimum of 0.20), minimize capture heterogeneity (i.e., variation in capture rates by sex and age class), and logistics. The cell size was selected so that it was not larger than the expected area used by an individual bear over a sampling period, and it was assumed that a bear traveling through a cell had an equal probability of encountering a tripod as any other bear (Apps 2010).

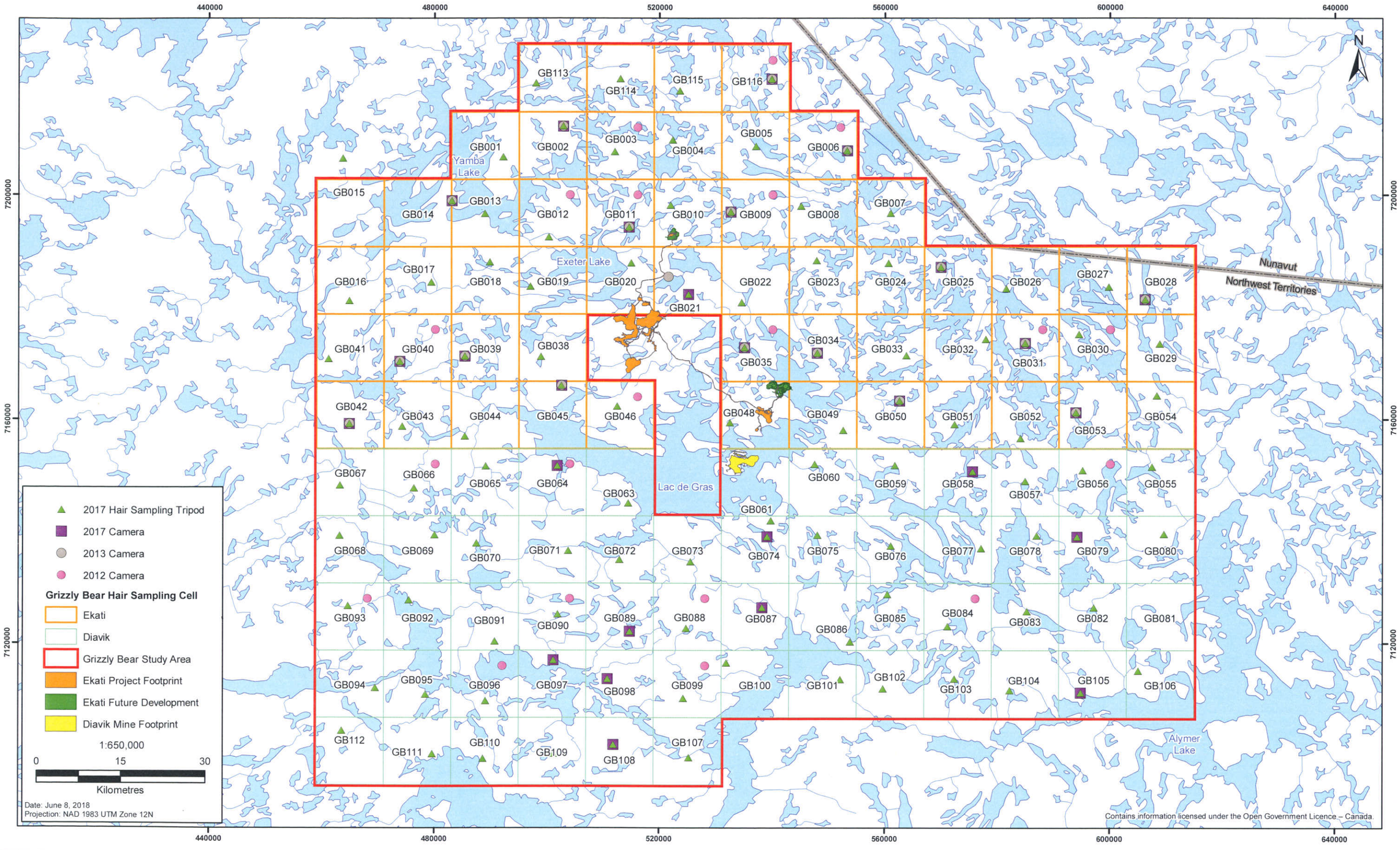
3.2 HAIR COLLECTION

One wooden tripod wrapped in barbed wire was used to collect grizzly bear hair (Plate 3.2-1) at each selected site within a given cell, and the tripod remained at that location for the duration of the sampling season. Tripod locations were recorded by a handheld GPS. The sampling locations were informed by traditional knowledge. Within each cell, the tripod was located in an area of high quality grizzly bear habitat (e.g., esker, riparian area, upland meadow, wetland meadow) to increase the likelihood of "capturing" a bear. Short-distance, non-reward lures (e.g., cured cow's blood, fish oil, castor oil, seal oil, 'bear tease', and sweeter scents like anise oil and bergamot oil) were used to attract bears to the tripods. The lures were poured on the top of the tripods, down the legs (posts), and in the centre on the ground to encourage a bear to squeeze between the legs.

Plate 3.2-1. Example of barbed wire tripod used to collect grizzly bear hairs during DNA study.

Figure 3.1-1
Ekati/Diavik Grizzly Bear DNA Study Area, 2012, 2013, 2017

ERM



There were six sampling periods (sessions) at approximately 9-13 day intervals to provide sufficient captures and recaptures of individuals for population analyses. The higher number of sessions relative to studies in southern latitudes (e.g. British Columbia) that use three to four sessions (Apps 2010) is designed to take into account the comparatively low densities of grizzly bears in the Arctic, and their large home ranges (~2,000 km^2 for females) and movement patterns.

During field sample collection, the barbed wire along the posts of the tripod, the ground under the tripod, and vegetation adjacent to the tripod were all searched for bear hair. Each clump of hair that was found was placed in a separate labelled coin envelope. Samples were then air dried for 48 hours and stored in paper bags for subsequent analysis. For each tripod, the three posts were arbitrarily selected as post 1, 2, or 3. Hair samples were labelled according to which post they were found on, or if they were collected off the ground. For subsampling purposes, hair samples along a post were grouped into clusters. A cluster is defined as a series of hair samples from consecutive barbs and a new cluster is identified following an empty barb.

After hair samples were collected, all barbs on which hair was found were burned with a propane torch to prevent double counting in the following session. In addition, tripods were moved a few metres after the check, if hair had been collected from the ground so that grizzly hair from the current session would not contaminate future session samples.

Studies have suggested that relocating tripods to an alternate area within a cell every session improves precision in population estimates (Boulanger et al. 2004). The new location should be at least 1 km from the previous location, continuing to focus on high quality habitat. Relocating sampling stations between sessions was attempted during pilot studies in 2010 and 2011 (see Rescan 2012) and it was determined that it was not logistically feasible to move stations in larger northern study areas. As a result, tripods were re-baited with a novel scent lure after each collection event to minimize acclimation of bears to sampling locations.

3.3 REMOTE CAMERA STATIONS

Reconyx PC800 Professional digital cameras were placed facing the DNA tripods in 19 of the cells in the DNA study area in 2012, 20 cells in 2013, and 26 cells in 2017 (Figure 3.1-1). Remote cameras were used to determine capture failure (i.e., whether some grizzly bears visiting a tripod were not leaving behind hair samples), and for those posts with hair samples, to determine whether DNA analyses were recording the correct number of grizzly bears visiting tripods (i.e., number of individuals identified by DNA matched the number observed by camera to have rubbed against the posts).

Remote cameras were mounted on 2 x 4" wooden posts and anchored to a five-gallon bucket that was filled with rocks or mounted on a metal post. Motion in front of the camera would trigger the camera to take 10 photos at 1-second intervals. Along with each photo, the cameras would record the date, time, type of trigger (i.e., time [T] or motion [M]), number of triggered photos taken (i.e., 1/10 to 10/10), temperature, and camera number. Cameras were programmed to immediately record a second set of 10 photos upon re-triggering. Remote cameras and DNA tripods were set-up at the same time.

3.4 LABORATORY ANALYSIS

3.4.1 Database Management and DNA Extraction

Genetic analyses on collected hair samples were conducted by Wildlife Genetics International (WGI) in Nelson, British Columbia. Sub-selection rules were provided that attempted to balance sample size and hair sample quality with budgetary considerations. Three criteria were used to exclude samples from DNA extraction. First, samples containing less than two guard hair roots and/or less than 30 underfur hairs were excluded. This is a higher quality threshold than is typically used, and was applied in response to the lower extraction success rates experienced with other northern projects. Second, a sub-selection rule was applied, where the analysis was limited to one of every three samples from a series of adjacent samples, biasing towards samples of higher quality, or the three best samples per post from separate clusters and one ground sample. Finally, samples with an appearance inconsistent with grizzly bear hair were excluded. Leftover hair was archived at WGI.

DNA was extracted using QIAGEN's DNeasy Tissue kits, and followed the manufacturer's instructions (for details see http://www.qiagen.com). For each sample analysis, WGI aimed to use 10 guard hair roots where available. When underfurs were used, the number of roots used in the analysis was an estimate because entire clumps of whole underfur were extracted rather than clipping individual roots.

3.4.2 Microsatellite Genotyping

The analysis of individual identity was based on eight microsatellite markers that have been used in other northern grizzly bear projects in Nunavut and the Northwest Territories, and an additional gender marker. The 8-locus analysis of individual identity followed a 3-phase approach, which started with a first pass of all nine markers on all extracted samples. After the first pass, mixed and hopeless samples were set aside, with 'hopeless' being defined as having produced high-confidence data scores[1] for less than four of eight markers during the first pass. The first pass was followed by a clean-up phase in which data points that were weak or difficult to read the first time were re-analyzed. In some cases, multiple rounds of re-analysis were used when it appeared that there was potential to upgrade a sample to a high-confidence 8-locus score.[1]

The last phase of analysis was error-checking, which followed the published protocol for selective data re-analysis (Paetkau 2003). Genotyping errors, which can lead to false individuals being recognized, normally create pairs of genotypes that match at all but one or two markers. Typically, such 1MM- and 2MM-pairs are sought out and genotyping error can be ruled out by re-analyzing the mismatching markers in each pair.

[1] A combination of objective (peak height) and subjective (appearance) criteria are used to identify low-confidence genotypes, which are marked by removing the leading digit from the 3-digit allele score. 2-digit scores are treated as equivalent to missing data.

3.5 POPULATION ANALYSIS

3.5.1 Abundance

Statistical analyses were conducted in the R programming package (https://www.r-project.org/). Grizzly bear capture information from 2012, 2013, and 2017 was used to generate a population estimate for the DNA Study Area. A superpopulation ($\widehat{N}$) is defined as the total number of bears that are expected to use the study area over the sampling period and is based on the relative probabilities of detecting and recapturing individuals. For the purpose of this study, the superpopulation was modelled using a robust design with a Huggins estimator using the `RMark` library (https://cran.r-project.org/web/packages/RMark/index.html). The `RMark` library serves as an interface to the program MARK. The robust design assumes that the active sampling period within a season or year (i.e., secondary sessions) is short enough to approximate closed population dynamics (no births, deaths, immigration, or emigration), while an open population dynamic is assumed during the interval between sampling years (i.e., primary sessions). In addition to the superpopulation, the Huggins estimator also provides estimates of survival and emigration parameters between primary sessions.

Precision in population estimates require that all individuals have an equal likelihood of being detected, and that detection probabilities are sufficiently high to capture an adequate portion of the target population that is being sampled. For grizzly bears, the target detection probability is 0.20, although reliable abundance estimates can be obtained with an overall capture probability of 0.10 for the sampled individuals (White et al. 1982). However, each individual is unique and likely to have a unique capture probability. Behavioural differences, social status, age, sex, and other innate characteristics can make an individual more or less likely to be captured. Inclusion of capture heterogeneity in this study was limited to dividing the dataset into males and females. While unobservable heterogeneity can be estimated by the Huggins models, this suite of models may provide estimates with lower precision than models without covariates if heterogeneity effects are not fully explained by the covariates (Chao and Huggins 2005). Accounting for capture heterogeneity may be more important in low density populations with extremely low capture probabilities (< 0.10; Harmsen et al. 2010), or when the most recent and unbiased survival estimates from long term data sets are required for management purposes (Abadi et al. 2013). Capture heterogeneity was not considered to be a potential issue for this study as it was expected that the population density would be sufficiently high to yield capture probabilities >0.20. Further, the objective of this study was to generate a baseline population dataset that could support management; however, population management is the mandate of the Northwest Territories Department of Environment and Natural Resources and outside the scope of this study.

Candidate models were assessed for providing the best population estimate using Akaike's Information Criterion adjusted for small sample sizes (AICc), a metric that provides the relative likelihood of any model given the available data (Burnham and Anderson 2002).

3.5.2 Density

Statistical analyses were conducted in the R programming package (https://www.r-project.org/). Spatial capture-recapture (SCR) methods (Royle et al. 2014) extend standard mark-recapture models by accounting for the spatial nature of trap locations. This spatial information is included by modelling

the location of home range centers with a Poisson point process. The rate of occurrence provides an estimate of animal density across the study region. The probability of detecting an animal at any given locations is modelled as a function of the distance from home range centers to the trap.

The benefit of using a SCR model is that this type of modelling allows for the ability to incorporate covariates associated with individual animals, traps, trapping occasions, and trapping sessions to model both density and detection. For instance, covariates may include habitat, gender, age, reproductive status and/or time of year. Covariates may also vary over time.

Brochers and Efford's (2008) Spatially Explicit Capture-Recapture (SECR) models can be fit using full likelihood or conditional likelihood in the R*secr* library (https://cran.r-project.org/web/packages/secr/index.html). This library allows for a great deal of customization related to spatial covariates, which is an advantage of the spatial class of capture-recapture models over non-spatial variants such as the Huggins suite of models. For instance, unsuitable habitat can be excluded using 'masks' to define the relevant study area. Non-linear trends in density over space can be modelled using flexible splines which are straightforward to include in model statements using the *mgcv* library functions. A variety of shapes are available for the detection functions (e.g. exponential and half normal fits) and there are options to consider non-Euclidean distance metrics.

SECR methods were applied to the grizzly bear data using the *secr* library in R. Due to possible bias introduced by large differences between male and female home range size (Efford and Mowat 2014) models were run separately for males and females. As recommended by Royle et. al. (2014), AIC was used to compare models and an offset term was included to control for effort across occasions. Habitat classification data had very little variability across the sampled space and were therefore not useful for modelling purposes. Three plausible models were fit to the grizzly bear data:

- Model 1: Intercept model: no covariates
- Model 2: Density: Spline for location, Detection: Constant
- Model 3: Density: Spline for location, Detection: Time

Detection was modelled using a half normal distribution. The estimated radius of this bivariate model was used to obtain an estimate of the amount of space used by an individual 95% of the time, as is the standard approach for SECR (Royle et al. 2014).

4. RESULTS

4.1 SAMPLE COLLECTION

In all years, samples (e.g., Plate 4.1-1) were collected in the field during six sessions using four to five types of lures or lure combinations (Table 4.1-1). Generally, sampling occurred between July 2 and September 6, lasting approximately 9 to 13 days. In 2017, grid cell 36 was not sampled due to safety concerns (i.e., proximity to Ekati field personnel), reducing the number of sampled cells from 113 to 112. The total number of samples ranged from 1,902 to 4,709 (Table 4.1-1), all of which were submitted to WGI for DNA analysis. The classification of all samples during the DNA analysis screening process is summarized in Table 4.1-2.

Table 4.1-1. Summary of Grizzly Bear Hair Samples Collected in the Field (2012, 2013, 2017)

Session	Collection Date Range	Type of Bait Used	Number of Cells with a Capture # (%)	Number of Samples Taken
Set-up tripods				
2012	June 23 - 29	-	-	-
2013	June 10 - 19	-	-	-
2017	June 29 - July 3	-	-	-
Session #1				
2012	July 6 - 13	Blood	31 (27)	195
2013	June 20 – July 1	Blood	39 (35)	610
2017	July 2 – July 13	Seal oil	52 (46)	478
Session #2				
2012	July 16 - 24	Fish oil	23 (20)	149
2013	July 7 - 12	Fish oil	53 (47)	816
2017	July 13 - 23	Blood	55 (49)	705
Session #3				
2012	July 27 – Aug 6	Blood	49 (43)	280
2013	July 17 - 21	Blood	60 (53)	704
2017	July 22 - Aug 2	Trout Oil	70 (62)	626
Session #4				
2012	Aug 6 - 15	Fish oil + Anise oil	40 (35)	358
2013	July 27 - 31	Seal oil	60 (53)	789
2017	Aug 1 - Aug 11	Blood	66 (59)	707
Session #5				
2012	Aug 17 - 25	Blood	50 (44)	515
2013	Aug 6 - 11	Blood	64 (57)	1,005
2017	Aug 10 – 19	Bear Tease	50 (45)	405

(continued)

Table 4.1-1. Summary of Grizzly Bear Hair Samples Collected in the Field (2012, 2013, 2017; completed)

Session	Collection Date Range	Type of Bait Used	Number of Cells with a Capture # (%)	Number of Samples Taken
Session #6				
2012	Aug 29 – Sept 4	Cherry oil + Bergamot oil	32 (28)	371
2013	Aug 16 - 21	Sweet synthetics	52 (46)	785
2017	Aug 21 – Sept 6	Blood	66 (59)	736
Total				
2012	-	-	-	**1,902**
2013	-	-	-	**4,709**
2017	-	-	-	**3,657**

Plate 4.1-1. Example of a hair cluster sample collected during DNA surveys.

Successful DNA extraction of the grizzly bear hair samples was moderate in 2012 (68%) and 2013 (70%), and lower in 2017 (60%). Sample quality was similar across years, with a mean of 6.8 to 7.1 guard hairs per extraction. In all years, one underfur was treated as the equivalent to 0.2 guard hairs. The success of extracts from underfur alone (59 to 61%) was poor in comparison to the extracts that used ≥ 2 guard hair roots (63 to 78%). Ground samples had the lowest success rates (46% to 57%), but limiting analysis of ground samples to those with ≥ 2 guard hairs produced a marked increase in success (75%). Variation in success rates was also noted between specific sessions, ranging from 42% to 79%.

Table 4.1-2. Classification of All Grizzly Bear Hair Samples Collected (2012, 2013, 2017)

Sample Classification*	2012	2013	2017
Successful	649 (34%)	1180 (25%)	638 (17%)
Inadequate	444 (23%)	1197 (25%)	505 (14%)
Sub-selected	481 (25%)	1791 (38%)	2078 (57%)
X-bombs	284 (15%)	503 (11%)	429 (12%)
Mixed	25 (1%)	1 (0%)	5 (0%)
Non-target samples	19 (1%)	37 (1%)	2 (0%)

**Successful: samples that were assigned to individuals*
Inadequate: samples that lacked material suitable for DNA extraction
Sub-selected: samples that were excluded due to sub-selection rules
X-bombs: samples that failed during microsatellite analysis
Mixed: samples that showed evidence of ≥ 3 alleles per marker
Non-target: samples that did not appear to be from grizzly bears

4.2 DNA Analysis Results

A total of 114 grizzly bears (42 males, 72 females) were identified in 2012 (Table 4.2-1). Camera data from 2012 indicated that some grizzly bears may have been missed from the database. As a result, DNA from an additional five samples from 2012 was successfully extracted, which identified 4 individuals (1M, 3F), including two that were recaptures and two that were new (2F) to the regional database. A total of 136 individual grizzly bears were identified in both 2013 (60 males and 76 females, including 39 that had no previous detections in the regional database [22 males, 17 females]) and 2017 (55 males and 81 females, including 62 that had no previous detections in the regional database [33 males and 29 females]; Table 4.2-1).

Table 4.2-1. Number of Grizzly Bears Identified during DNA Analysis

Year	Total Samples	Successful Samples	Individuals		New to Database		# of Recaptures	# of Times Individual Bears Were Detected				
			Males	Females	Males	Females		2x	3x	4x	5x	6x
2012	1902	649	42	70	-	-	54	34	14	6	-	-
2013	4709	1180	60	76	22	17	117	43	26	14	7	2
2017	3657	638	55	81	33	29	73	34	23	9	6	1

Reliable population estimates require numerous recaptures over the sampling period (White et al. 1982). There were many bears that were detected across multiple sampling sessions, ranging from 54 to 117 occasions when a grizzly bear was detected more than once in a given sampling year (Table 4.2-1). In 2013 and 2017, some individual grizzly bears were detected in five (13 grizzly bears) or all six (three grizzly bears) sampling sessions. Twelve individuals (three females and nine males) were new captures during the last sampling session in 2012, compared to five individuals (four males and one female) in 2013 and 20 in 2017 (8 males and 12 females).

In all years, the highest grizzly bear capture frequencies tended to occur in the northeast half of the study area (2012 - Figure 4.2-1; 2013 - Figure 4.2-2; 2017 - Figure 4.2-3), corresponding to a higher coverage of water and extensive esker systems that are prevalent throughout the area. This pattern was generally consistent across sessions (2012 - Figures 4.2-4a to f; 2013 – Figures 4.2-5a-f; 2017 – Figures 4.2-6a-f).

In 2012, cell 48, on the northeast shoreline of Lac de Gras, and cell 58, on the northern shoreline west of Afridi Lake, detected the largest number of grizzly bears overall (N = 7; Figure 4.2-1). Cells 2, 9, 61, and 82 had the second largest number of grizzly bears detected (N = 6). The highest capture frequencies in the southwest portion of the study area occurred during sessions two (Figure 4.2-4b) and three (Figure 4.2-4c) with grizzly bears detected in five cells. In 2013, the highest capture frequency in the southwest portion of the study area occurred during session three (Figure 4.2-5c). Similar to 2012, the largest number of grizzly bears were detected in cell 58 (N = 6), along with cells 9, 10, 30, 52, 53, and 110 (Figure 4.2-2). Eight cells had five grizzly bears detected and 15 cells detected four grizzly bears. There were 14 cells that did not detect any grizzly bears. In 2017, cell 53 detected the largest number of grizzly bears overall (N = 7), relative to cell 58 in 2012 and 2013 (Figure 4.2-3). Eight cells (cells 24, 25, 27, 30, 34, 45, 50, and 60) had five grizzly bears detections and 10 cells captured four grizzly bears. There were 17 cells that did not detect any grizzly bears. Most grizzly bears that were detected at least twice during the same session were detected in adjacent cells, or nearby cells (Figure 4.2-6a-f).

Some grizzly bear individuals were detected in the same one or two sampling cells on multiple occasions. For example, one female (2011-158) was detected in adjacent cells 22 and 36 over four sessions. Similarly, female 2011-32 was detected in cells 46 and 48 and female 2012-1433 was detected in cells 82 and 83 over four sessions. Female 2011-25 was only detected in cell 46 and female 2012-229 was only detected in cell 1 over three sessions. Several grizzly bears were detected in the same cell in two different sessions. These multiple recaptures are possibly indicative of high habitat value in these cells within the respective grizzly bear home ranges.

Some grizzly bear individuals were detected together at the same cells during the same session, indicating possible family groups (Plate 4.2-1). For example, females 2012-551 and 2012-561 were detected at cells 84 and 102 during session three, and females 2012-711, 2012-714, and 2012-725 were all detected at cells 2 and 9 during session six. d

Most grizzly bears that were detected at least twice during the same session were detected in adjacent cells, or within two cells; however, some exceptional movements were noted (2012 - Figures 4.2-4a to f; 2013 - Figures 4.2-5a to f; 2017 - Figures 4.2-6a to f). For example, in 2012 female 2012-1826 moved between cells 58, 76, and 82 during session six, covering a straight line distance of approximately 58 km over 11 days. Females 2012-368 and 2012-49 covered approximately 55 km over 13 days between cells 8 and 45 during session five, and female 2012-711 travelled 40 km over 10 days between cells 22 and 115 during session four. Amongst males, the top movements were by male 2012-470 that travelled approximately 73 km between cells 48 and 54 during session five. In 2013, male 2011-79 moved between cells 34 and 115 during session four, covering a straight line distance of approximately 65 km over 10 days. Male 2011-92 covered approximately 85 km over 10 days between cells 16 and 35 during session five. The longest detectable female movements in 2013 covered approximately 30 to 45 km during the 10 day sessions. In 2017, male dv10930 moved between cells 60 and 89 (43 km; Figure 4.2-6c) in session three; and male EK12843 moved between cells 3 and 22 (34 km; Figure 4.2-6b) in session 2. Given the topography and presence of water bodies between many of the cells, the actual distances travelled between points are likely considerably higher.

Figure 4.2-1
Detection of Individual Grizzly Bears in the DNA Study Area, 2012

ERM

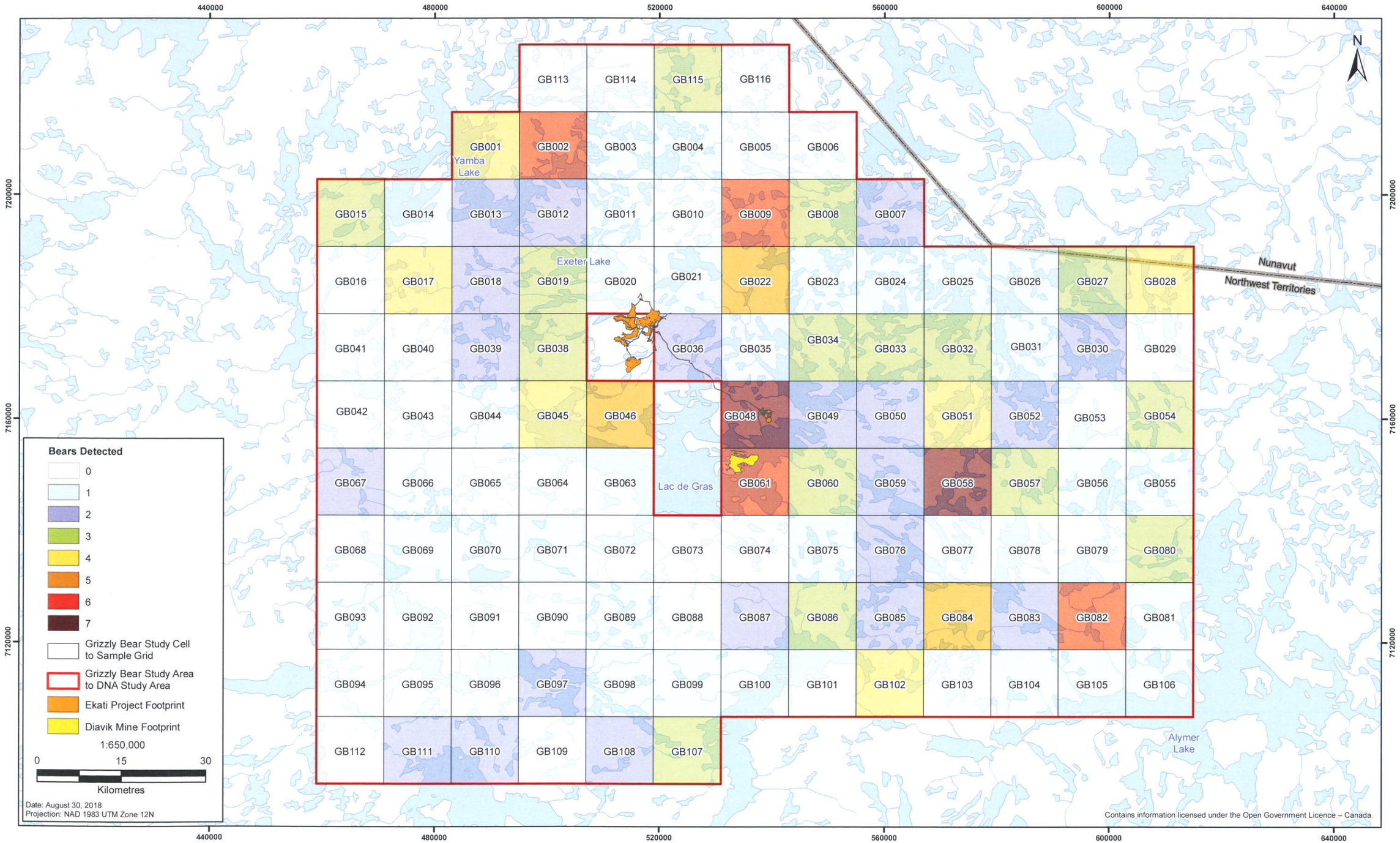
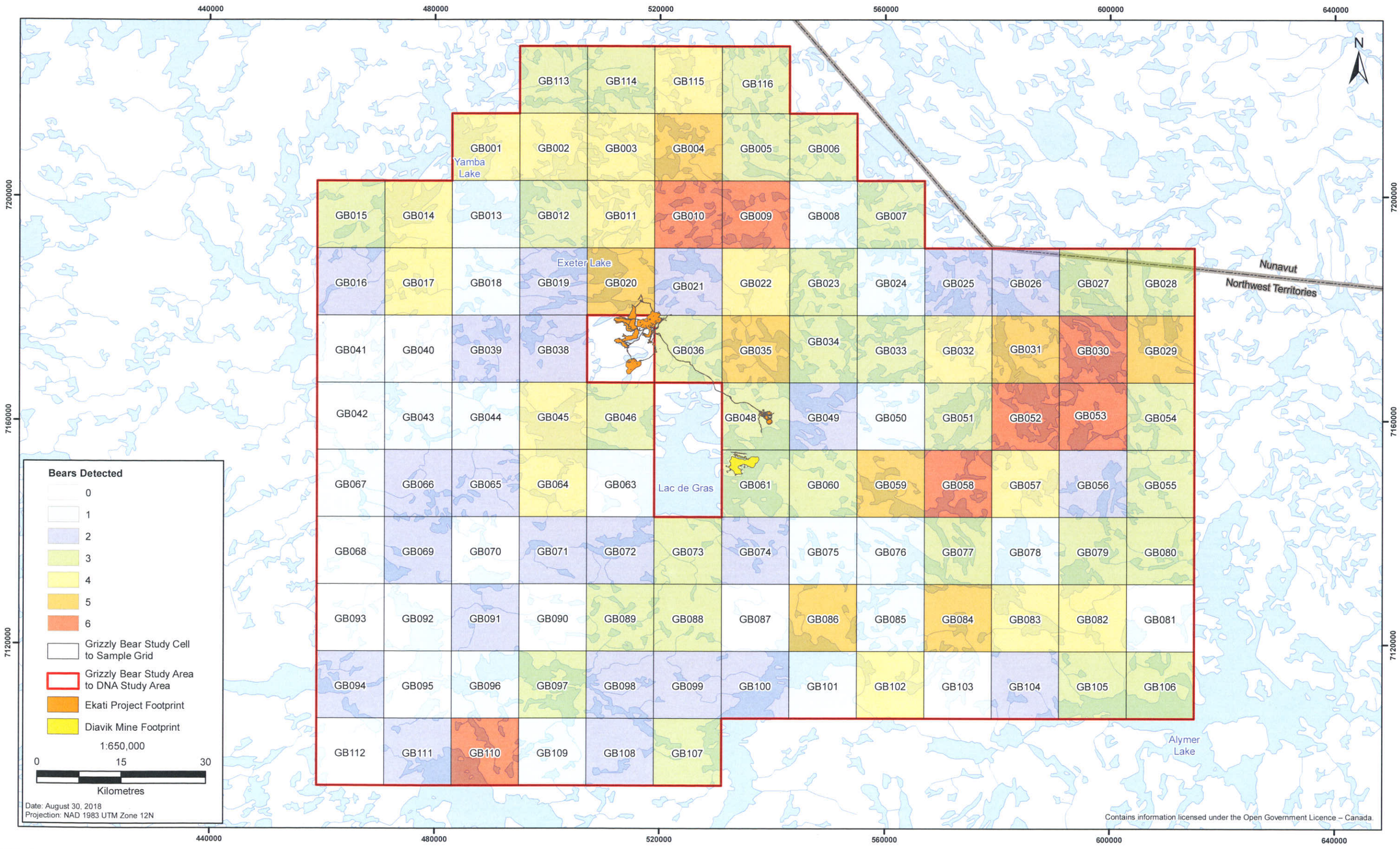


Figure 4.2-2
Detection of Individual Grizzly Bears in the DNA Study Area, 2013

ERM



DOMINION DIAMOND EKATI CORPORATION

Proj # 0211136-0010 | GIS # EKA-23-341b

Figure 4.2-3
Detection of Grizzly Bears in the DNA Study Area, 2017

ERM

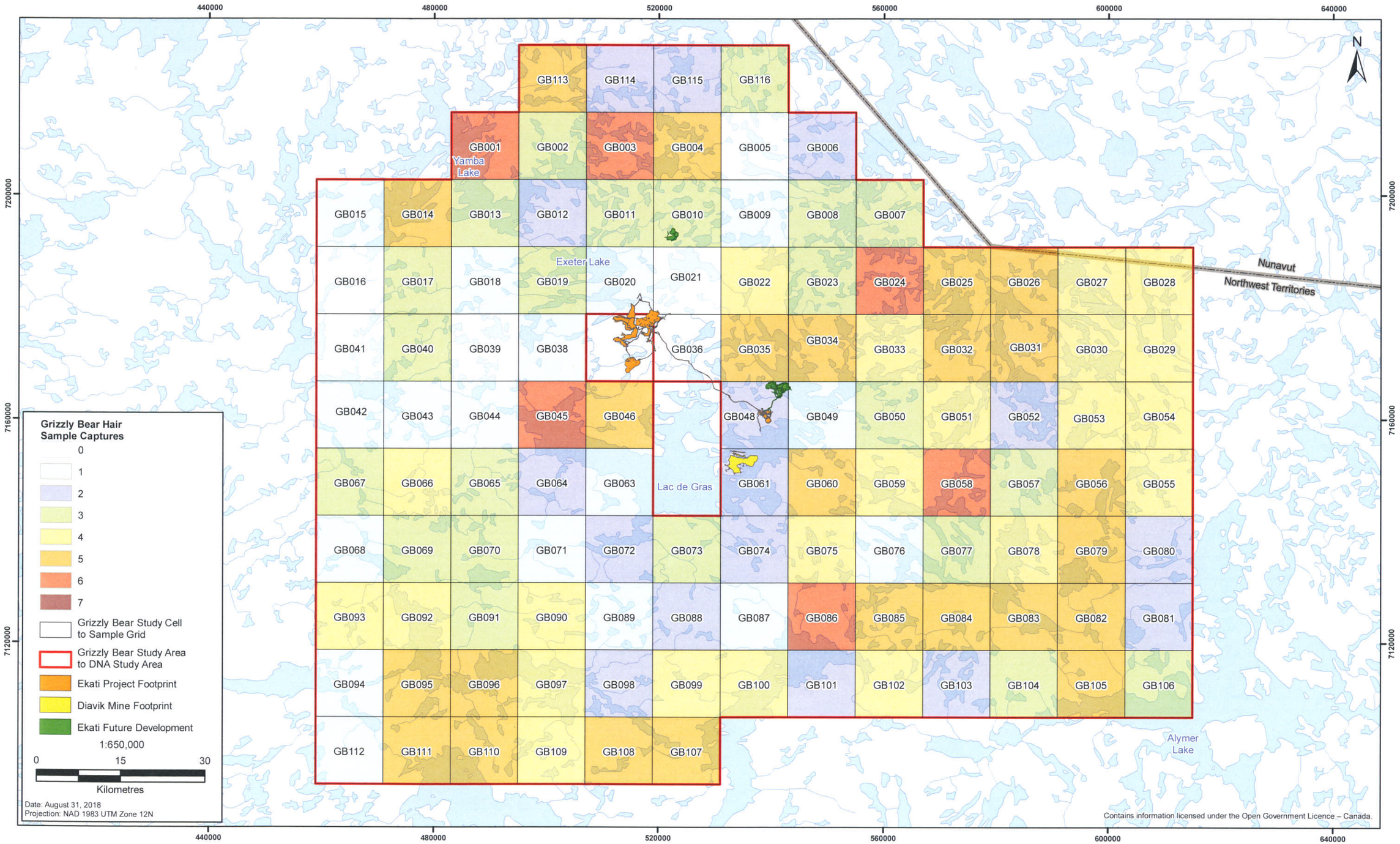


Figure 4.2-4a
Grizzly Bear DNA Results, Session 1, 2012

ERM

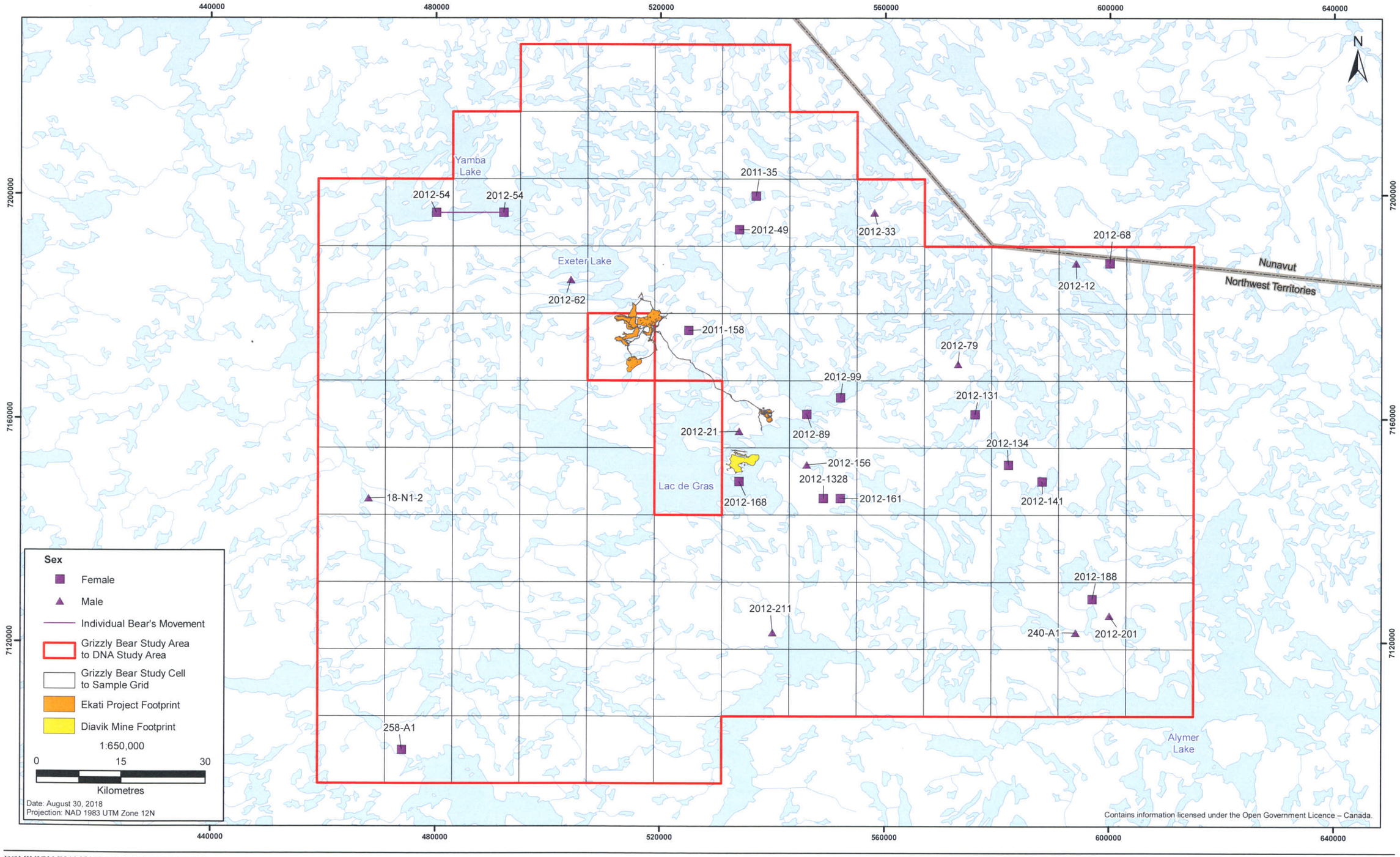


Figure 4.2-4b
Grizzly Bear DNA Results, Session 2, 2012

ERM

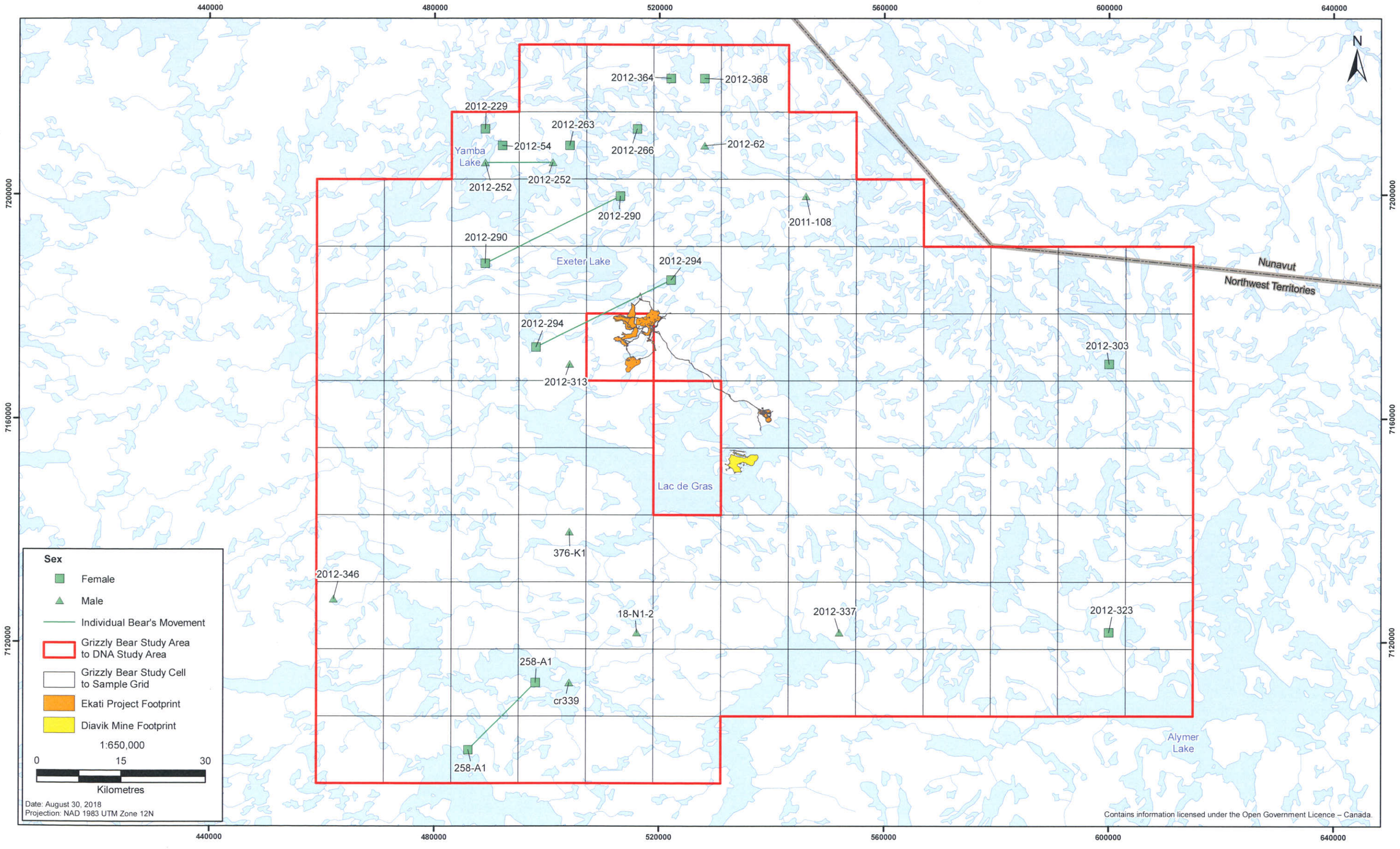


Figure 4.2-4c
Grizzly Bear DNA Results, Session 3, 2012

ERM

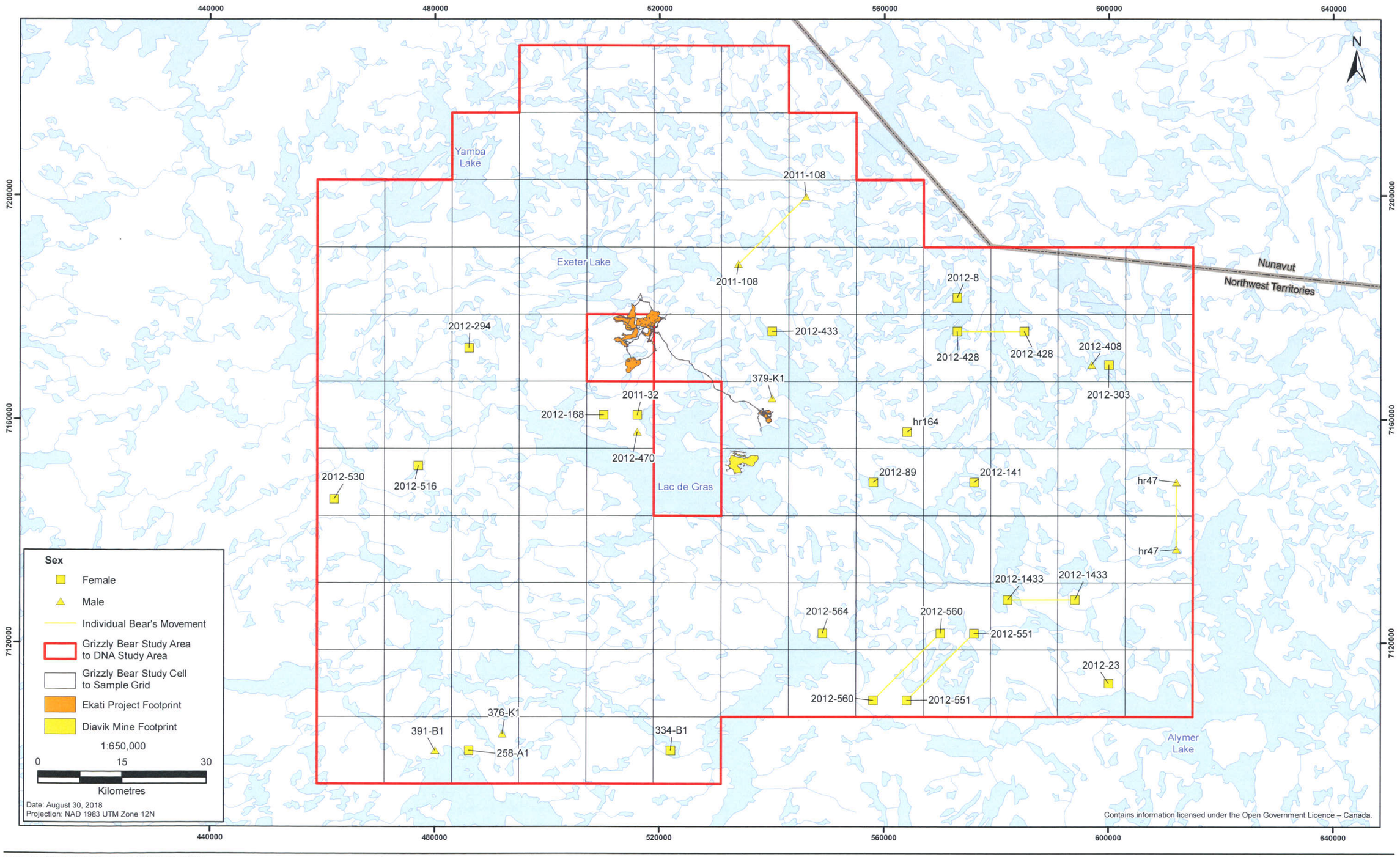


Figure 4.2-4d
Grizzly Bear DNA Results, Session 4, 2012

ERM

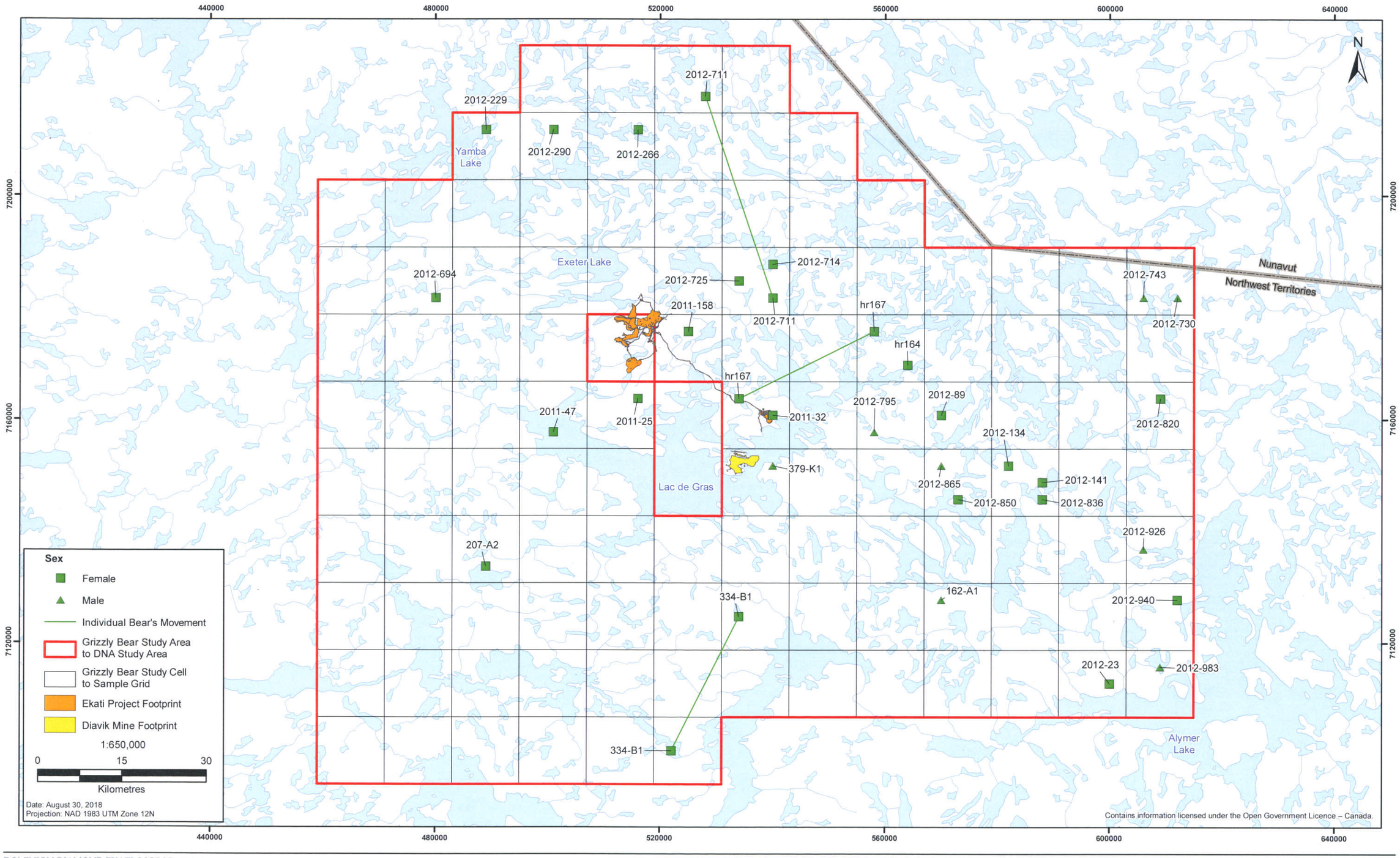


Figure 4.2-4e
Grizzly Bear DNA Results, Session 5, 2012

ERM

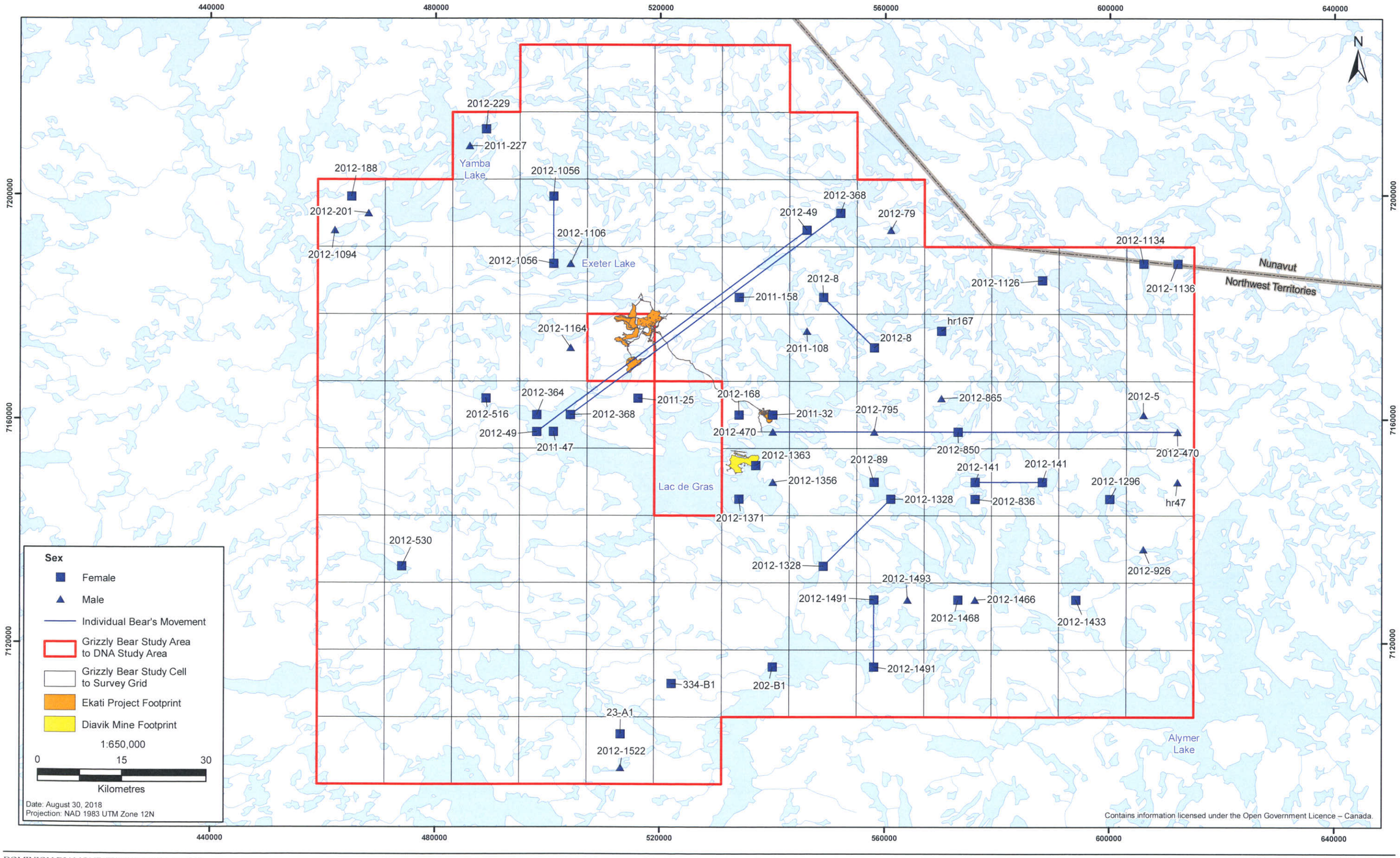


Figure 4.2-4f
Grizzly Bear DNA Results, Session 6, 2012

ERM

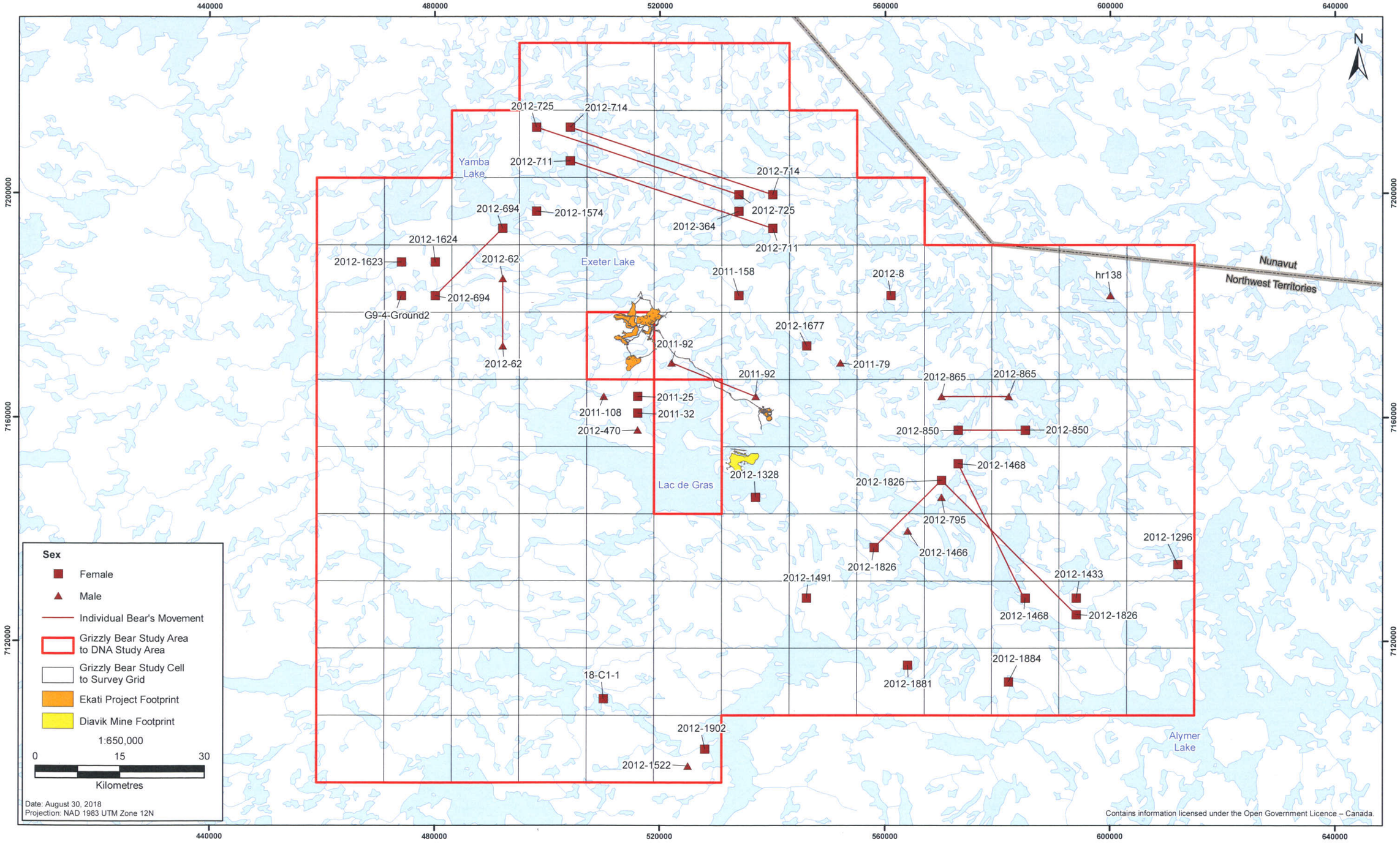


Figure 4.2-5a
Grizzly Bear DNA Results, Session 1, 2013

ERM

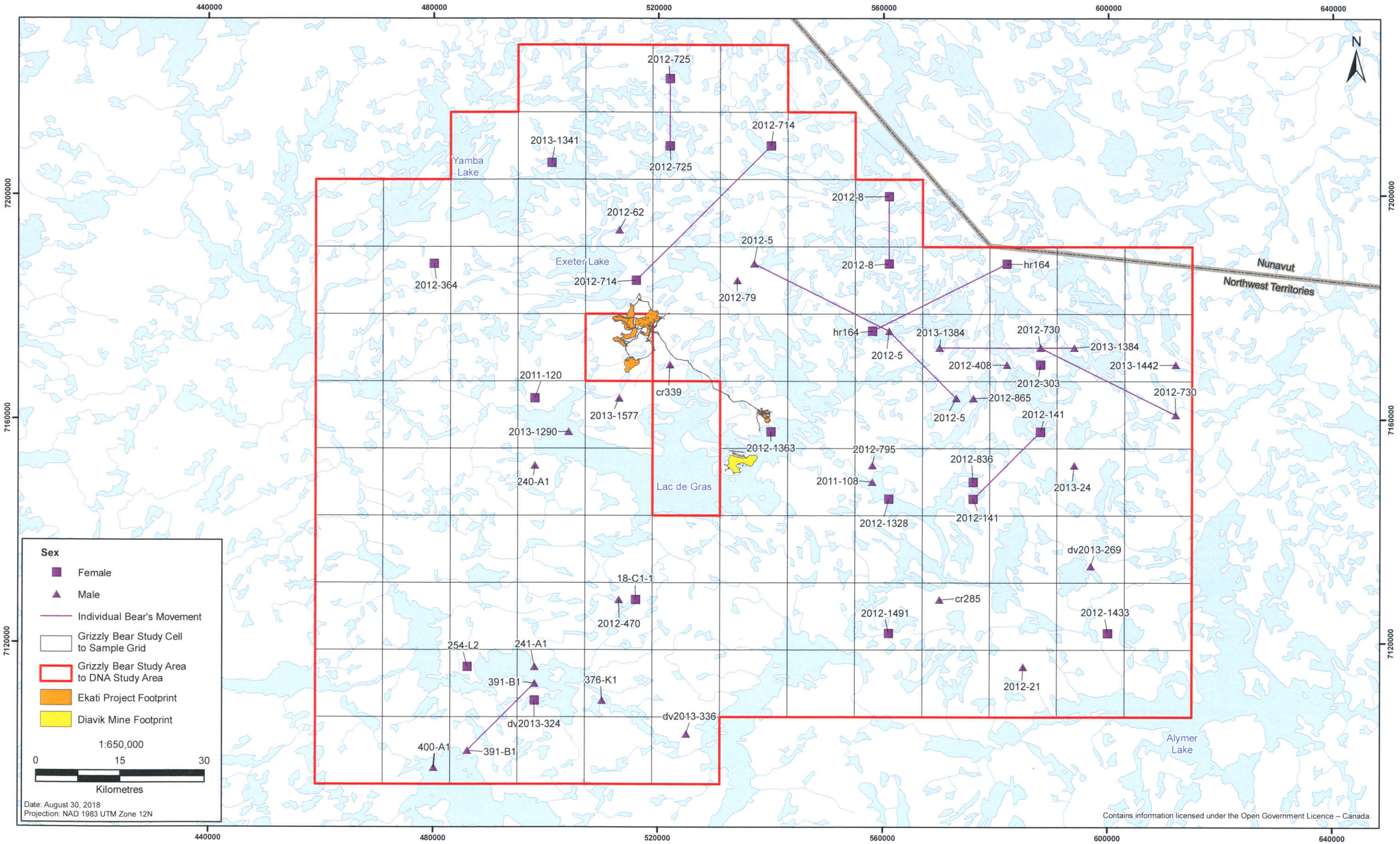


Figure 4.2-5b
Grizzly Bear DNA Results, Session 2, 2013

ERM

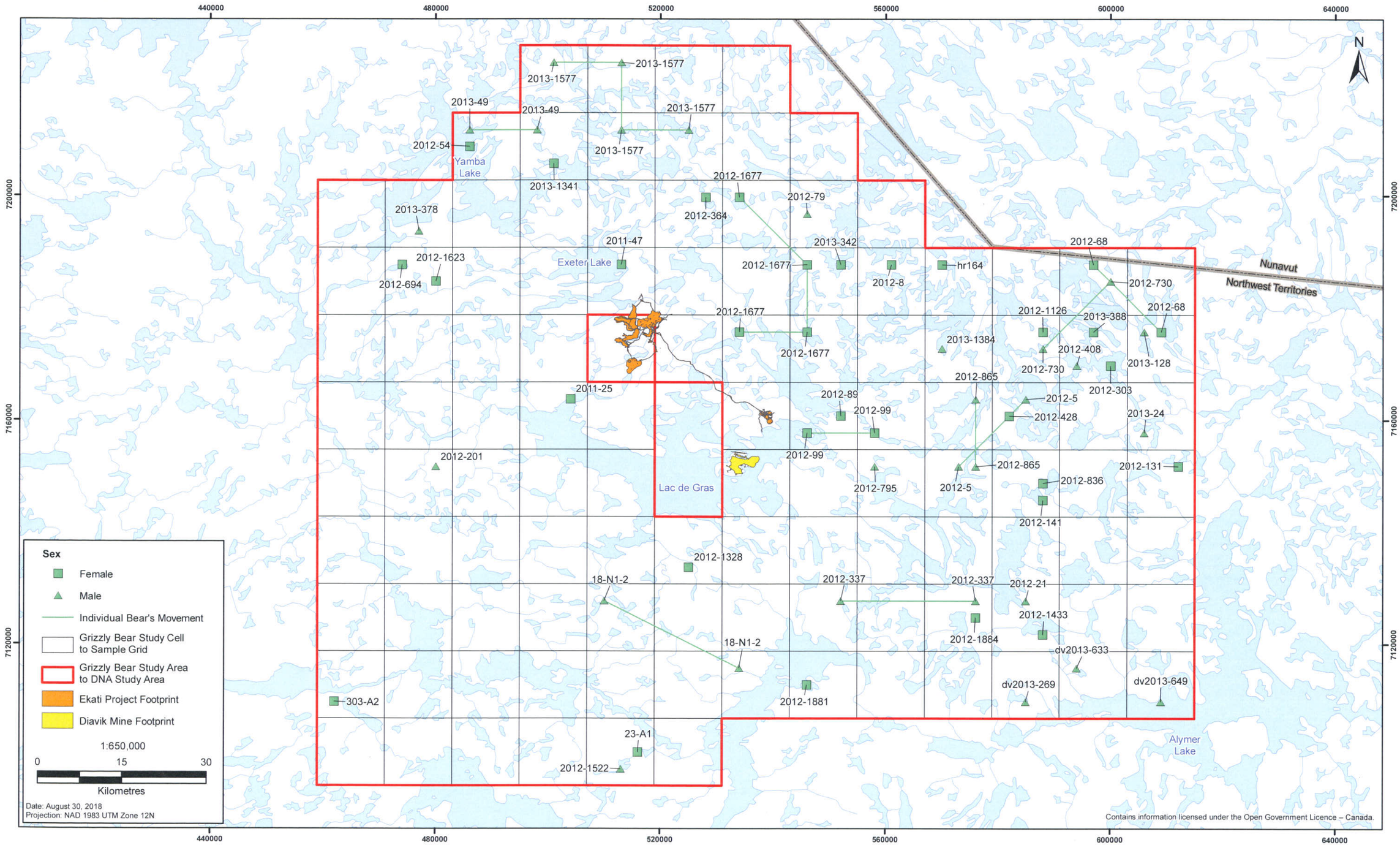


Figure 4.2-5c
Grizzly Bear DNA Results, Session 3, 2013

ERM

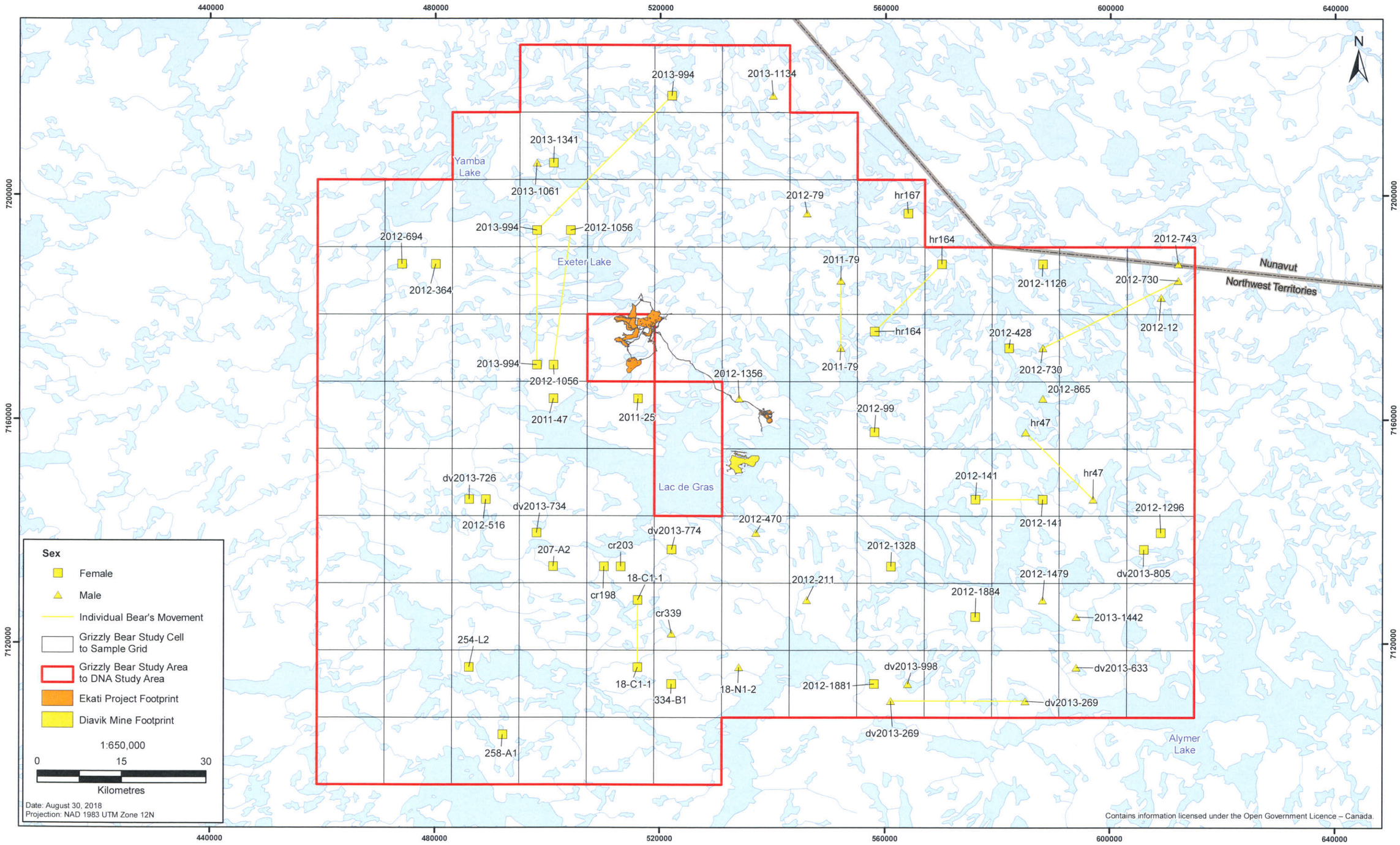


Figure 4.2-5d
Grizzly Bear DNA Results, Session 4, 2013

ERM

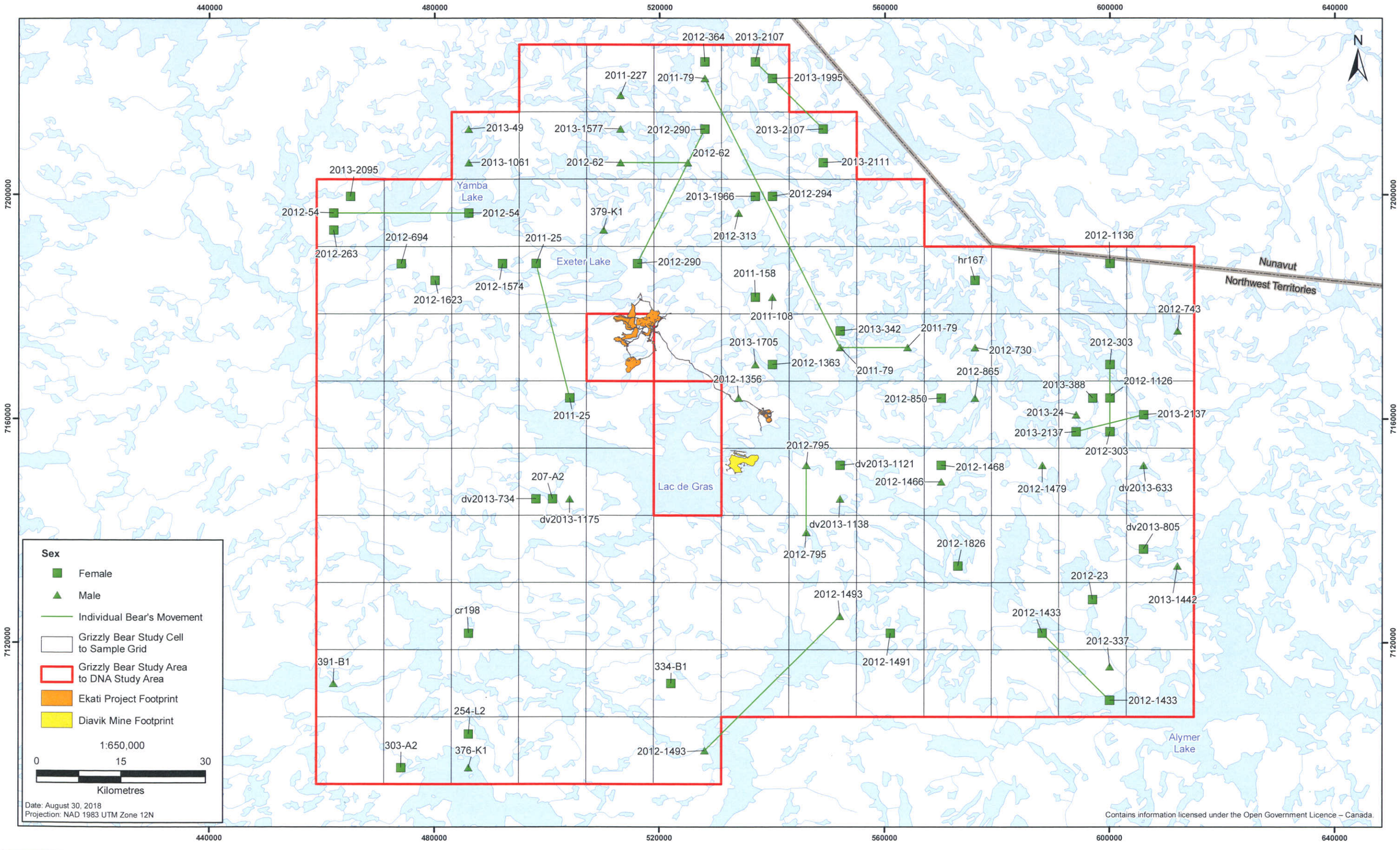


Figure 4.2-5e
Grizzly Bear DNA Results, Session 5, 2013

ERM

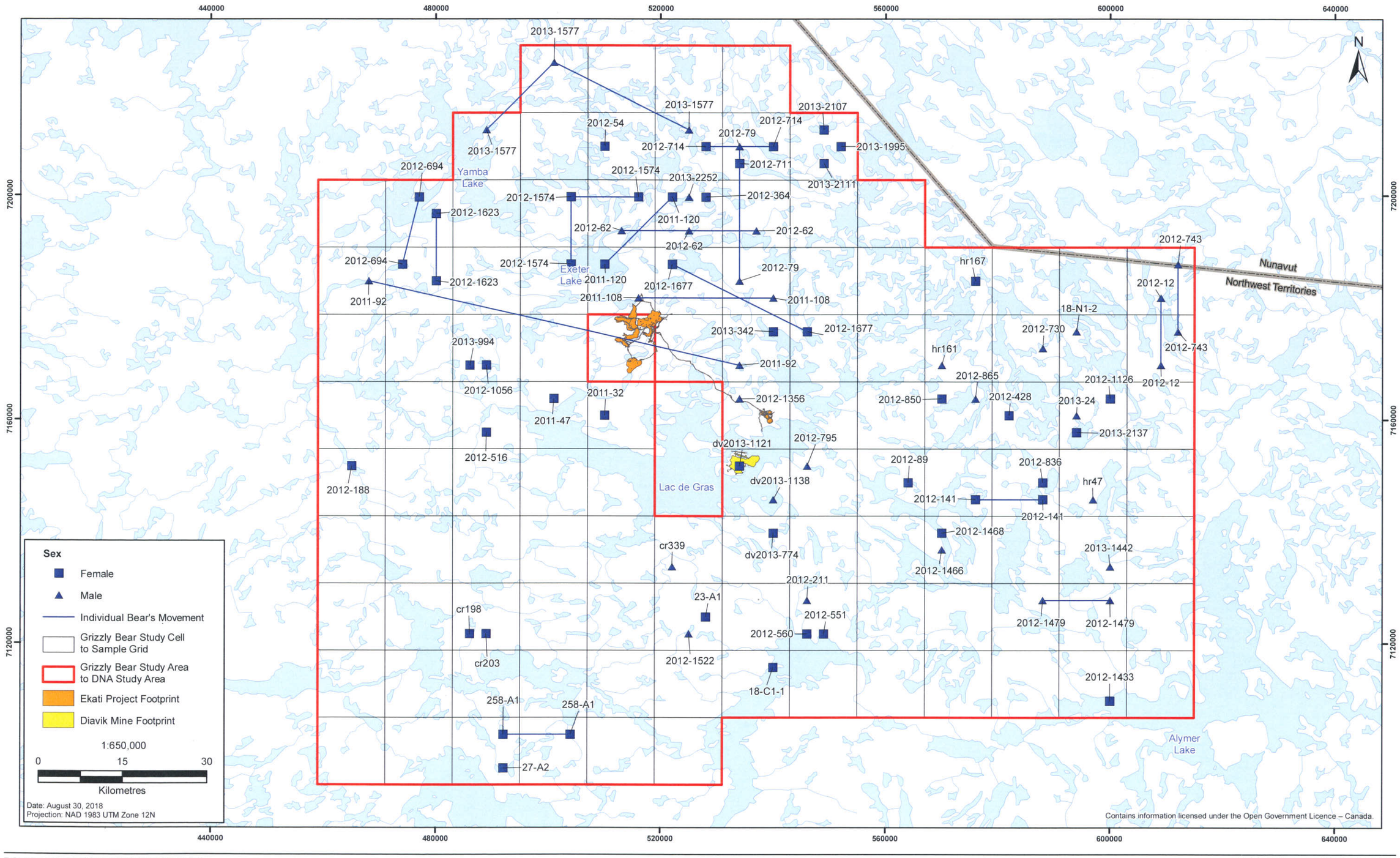


Figure 4.2-5f
Grizzly Bear DNA Results, Session 6, 2013

ERM

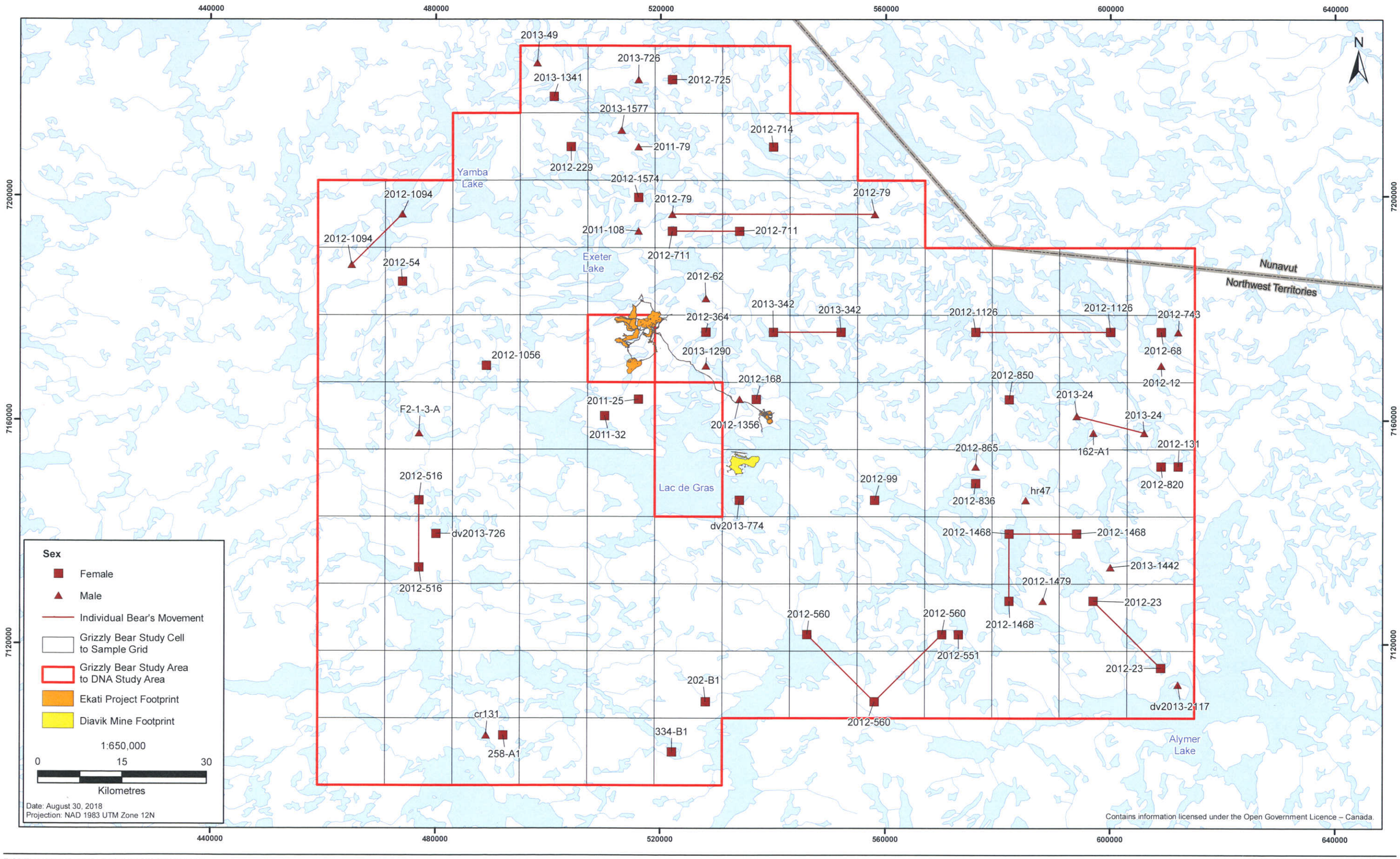


Figure 4.2-6a
Grizzly Bear DNA Results, Session 1, 2017

ERM

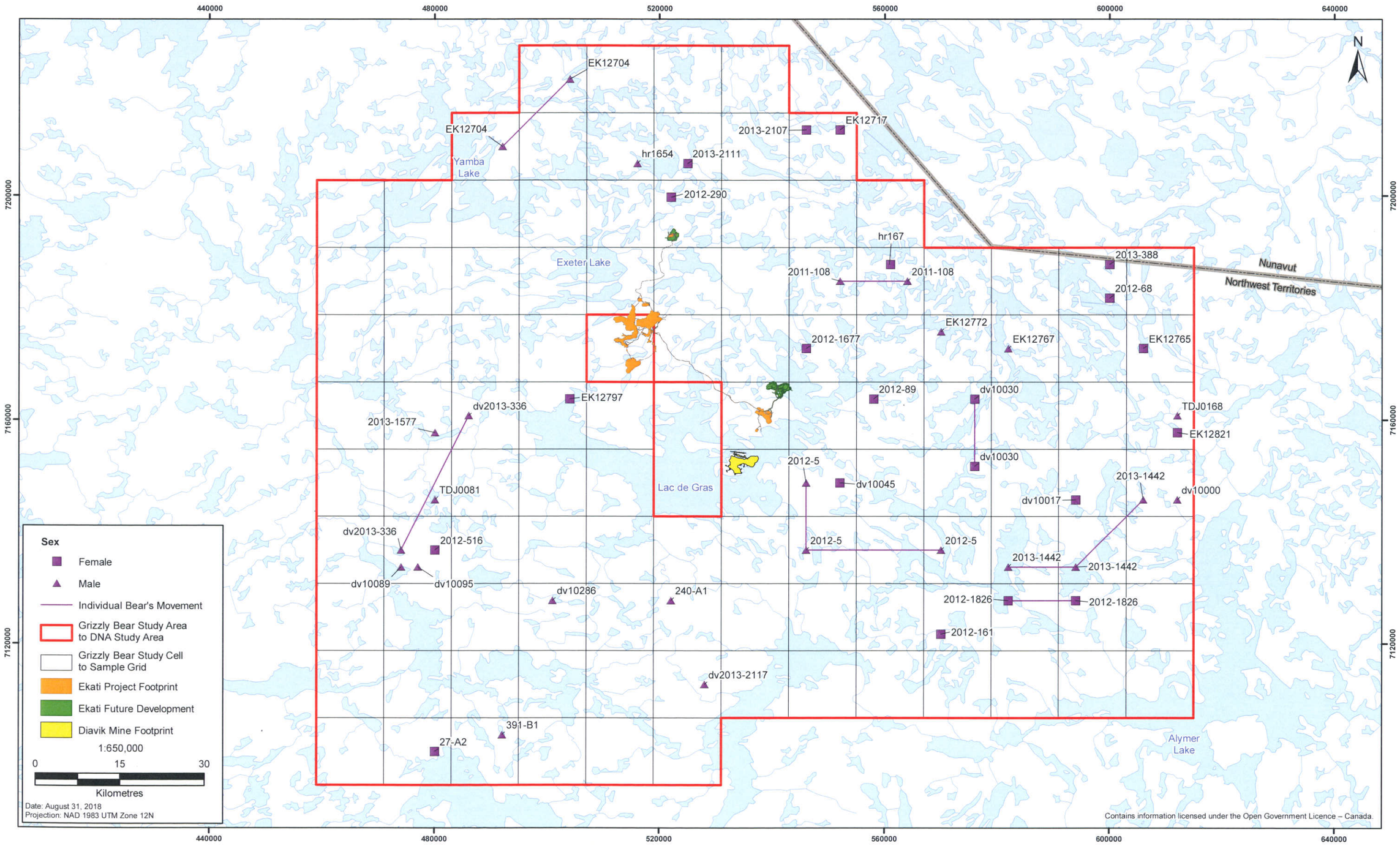


Figure 4.2-6b
Grizzly Bear DNA Results, Session 2, 2017

ERM

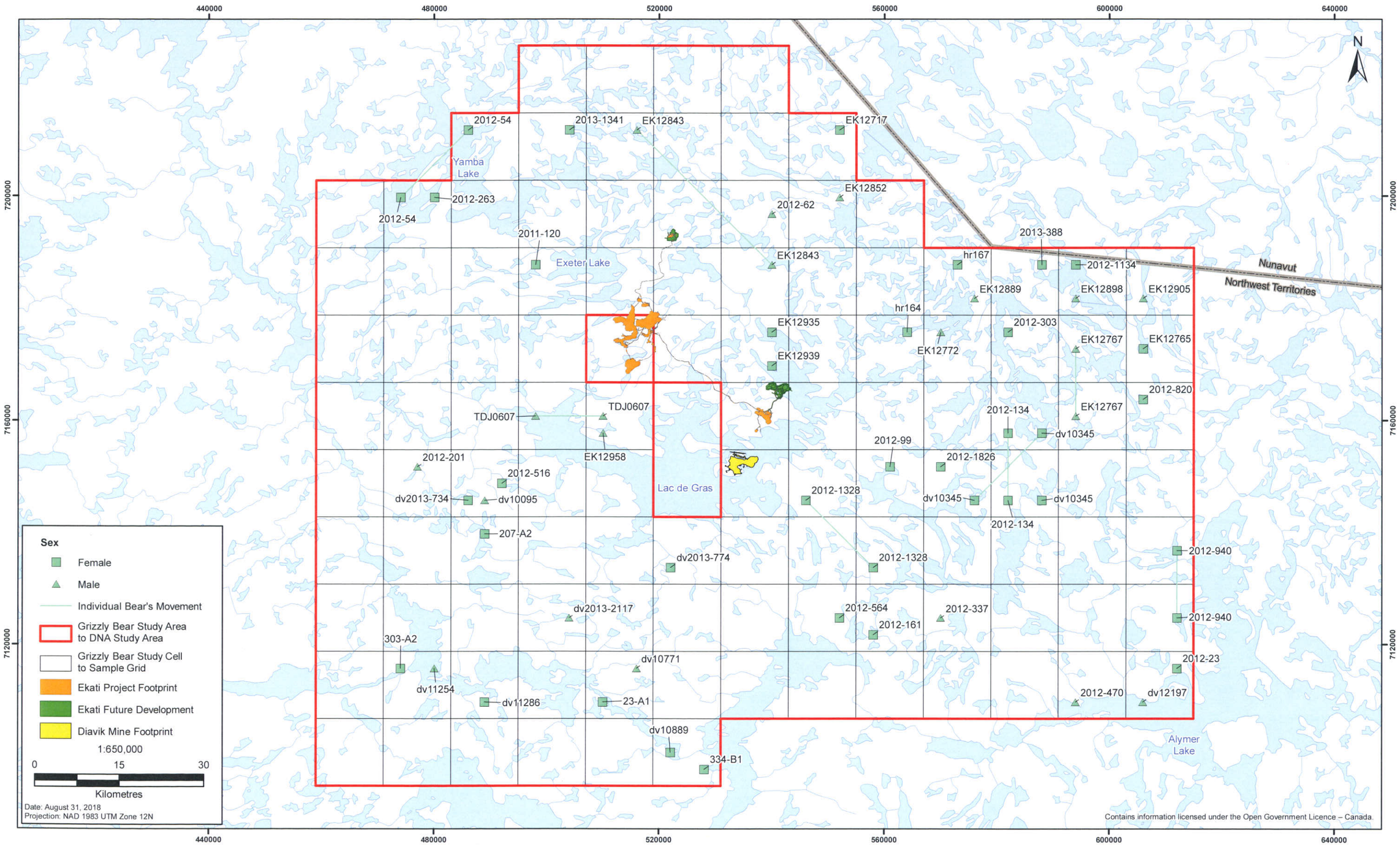


Figure 4.2-6c
Grizzly Bear DNA Results, Session 3, 2017

ERM

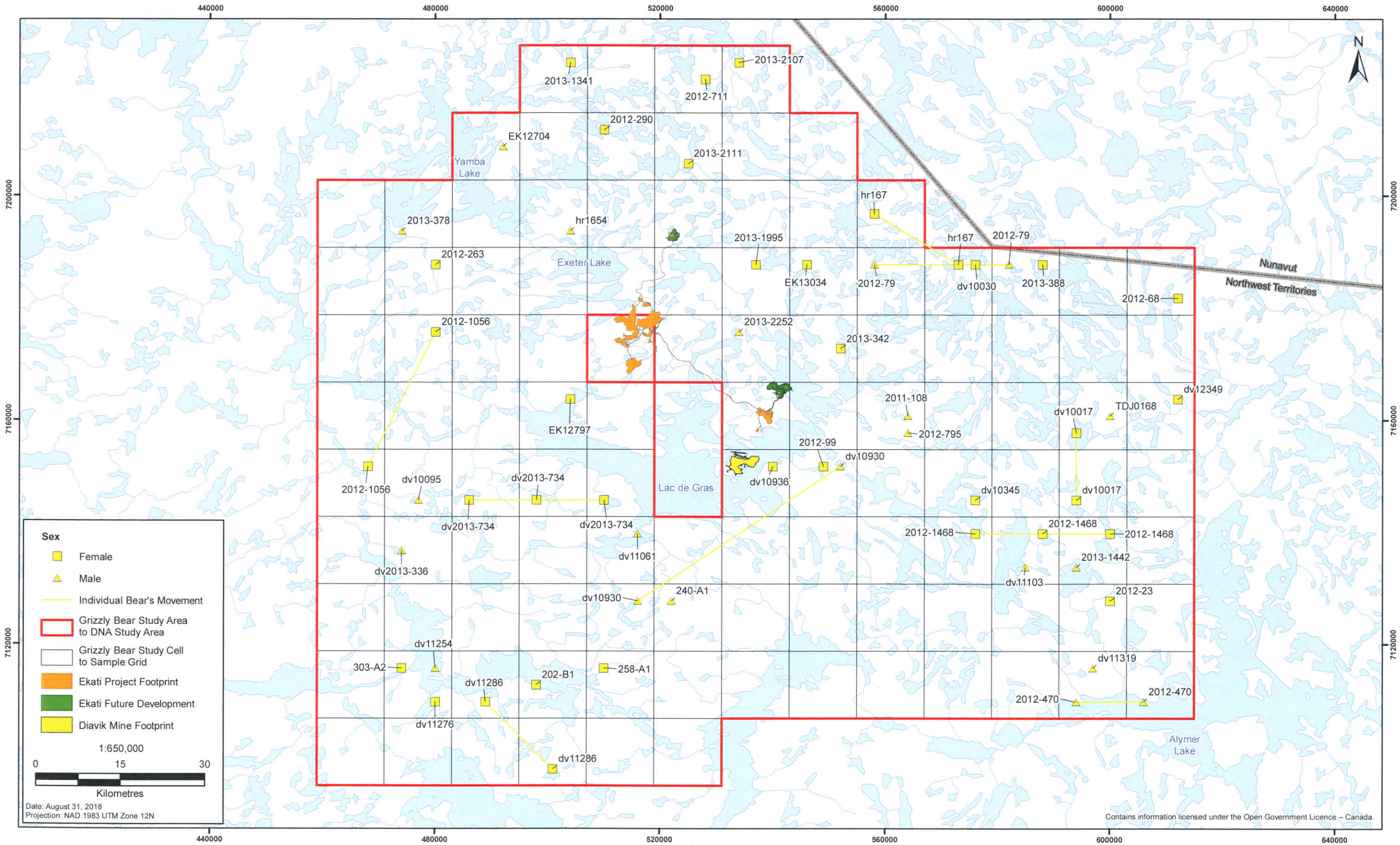


Figure 4.2-6d
Grizzly Bear DNA Results, Session 4, 2017

ERM

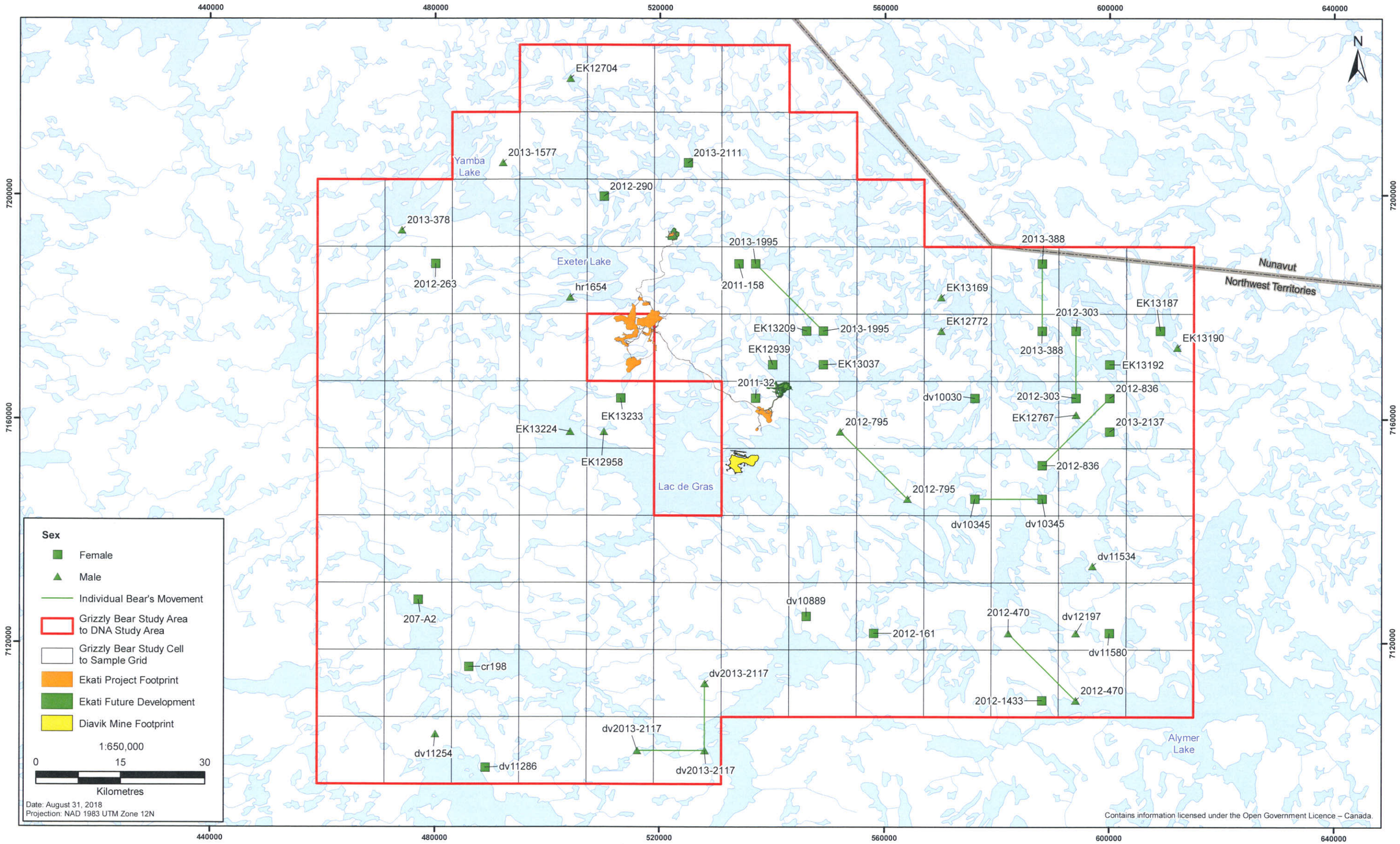


Figure 4.2-6e
Grizzly Bear DNA Results, Session 5, 2017

ERM

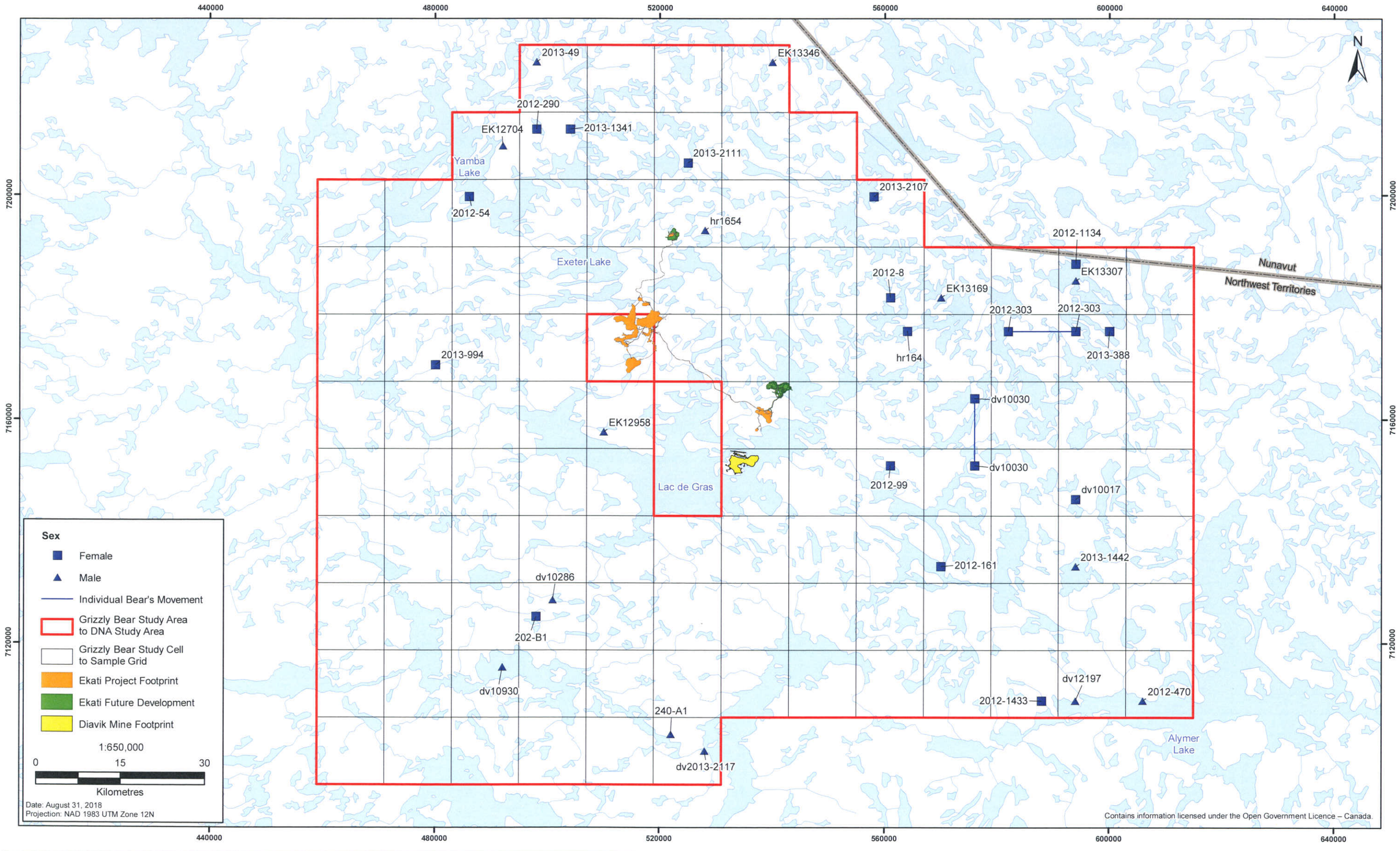


Figure 4.2-6f
Grizzly Bear DNA Results, Session 6, 2017

ERM

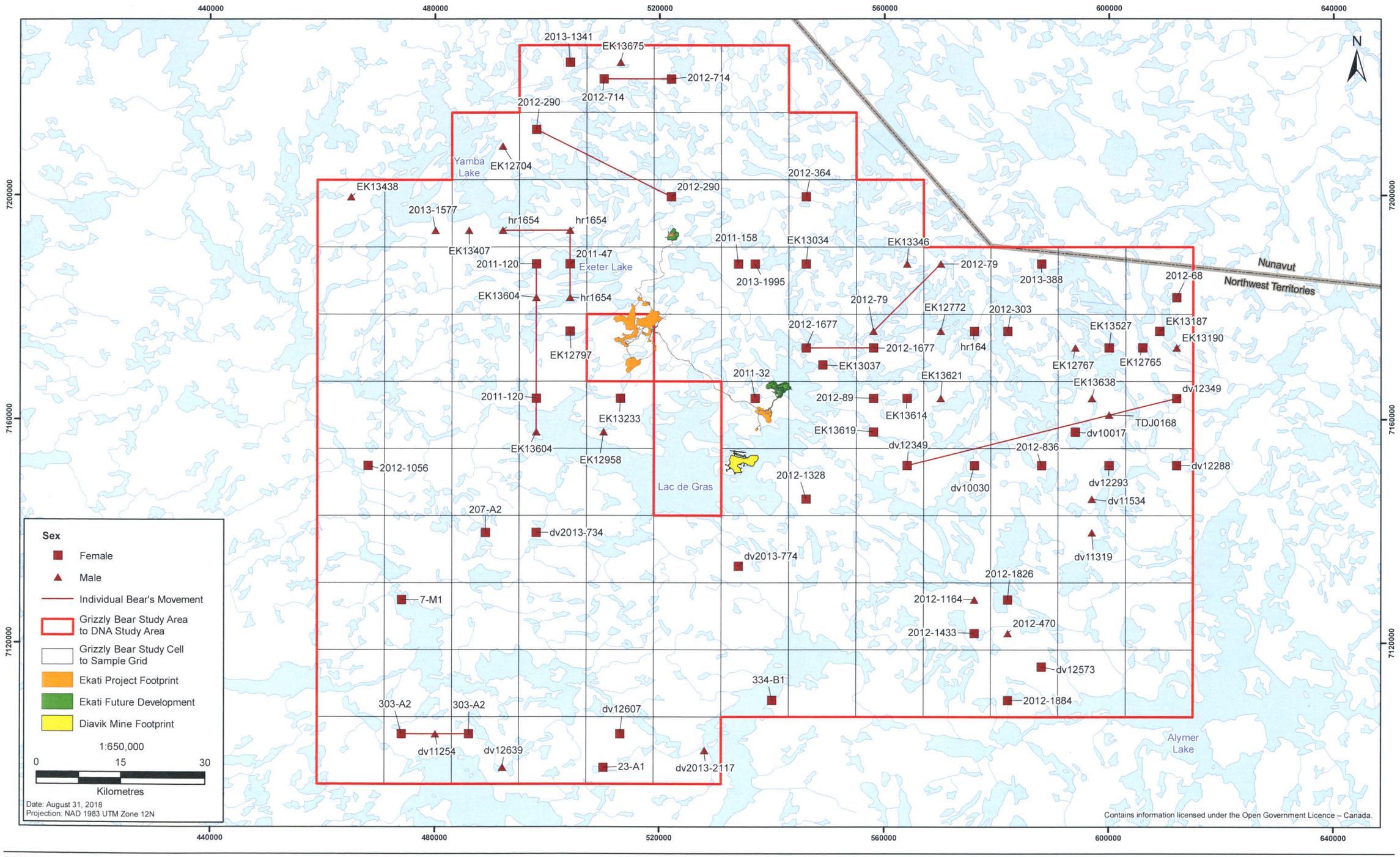


Plate 4.2-1. Photos of grizzly bears at tripod stations taken by remote cameras. Photo on left shows a family group and photo on right shows a lone individual.

WGI maintains a database of all grizzly bear genotypes throughout the Northwest Territories and Nunavut, enabling a comparison of genotypes across study areas and a means to track the large distance movements of some of these animals. Nineteen grizzly bears (10 males, 9 females) detected in 2012 were also previously detected in other study areas sampled from 2010-2012 in the Northwest Territories and Nunavut, including 14 from an adjacent study area around Courageous Lake (Northwest Territories), and four from study area near the Hackett River (Nunavut) and one female from the Izok study area (Nunavut). One male was detected at both Izok and Courageous Lake. In 2013, 19 grizzly bears were also previously detected in other regions of Northwest Territories and Nunavut, including two grizzly bears detected at Izok, four at Hackett River, and 20 from the adjacent Courageous Lake study area. In 2017, three grizzly bears were previously detected at Hackett River, five at Snap Lake/Gahcho Kue (Northwest Territories), and 11 at Courageous Lake.

4.3 REMOTE CAMERA DATA

4.3.1 2012

Remote cameras were positioned facing grizzly bear tripods in 20 sampling cells. During the 2012 sample sessions, remote cameras recorded 57 grizzly bears on 37 photo events. Some individuals may have been repeat visitors between sessions compared to 33 grizzly bears that were detected by DNA analyses for the corresponding sampling session (Table 4.3-1). There were 17 occasions where cameras took pictures of grizzly bears but DNA analysis did not identify all the potential grizzly bears. Much of this discrepancy involved family groups, particularly females accompanied by cubs of the year. There were four cases where DNA analysis identified more grizzly bears than were photographed during the corresponding sampling session.

Table 4.3-1. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2012

Cell ID	Photo Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
3	13-Jul-13	F + 3coy	F2012-266	4	1
	1-Aug-13	single	F2012-266	1	1
	2-Aug-13	single	F2012-266?	1	unk
	14-Aug-13	single		1	0
6	23-Jun-13	single		1	0
	2-Jul-13	single		1	0
9	23-Jun-13	F + 2x3yr	F2011-35, F2012-49	3	2
	25-Jun-13	single	unk	1	unk
	27-Aug-13	2 bears	F2012-711, F2012-714, F2012-725	2	3
11	13-Jul-13	single	F2012-290	1	1
	15-Jul-13	single	unk	1	unk
12	9-Aug-13	F + 2x1yr	F2012-1056	3	1
	20-Aug-13	single	F2012-1574	1	1
30	17-Jul-13	single	F2012-303	1	1
31	25-Jun-13	single		1	0
	16-Jul-13	single		1	0
35	18-Jul-13	F + 3x1yr	F2012-433	4	1
46	18-Jul-13	F + 2x2yr	F2011-32, F2012-168, M2012-470	3	3
	6-Aug-13	single	F2011-25	1	1
	18-Aug-13	single	F2011-25	1	1
	21-Aug-13	single	F2011-25?	1	?
	25-Aug-13	single	F2011-25, F2011-32, M2012-470, M2011-108	1	4
58	20-Jul-13	F + 2coy	F2012-141	3	1
	4-Aug-13	single	F2012-850, M2012-865	1	2
	17-Aug-13	single	F2012-141, F2012-836	1	2
66	27-Jun-13	single		1	0
	29-Jun-13	single		1	0
	29-Jun-13	F + 2x2yr		3	0
84	30-Jun-13	single		1	0
	23-Jul-13	F + 1x1yr	F2012-560, F2012-551	2	2
	26-Jul-13	single	unk	1	unk
84	7-Aug-13	single	M162-A1	1	1
	17-Aug-13	F + 2x2yr	F2012-1468, M2012-1466	3	2
93	17-Jul-13	single	M2012-346	1	1

(continued)

Table 4.3-1. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2012 (completed)

Cell ID	Photo Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
96	17-Aug-13	single		1	0
99	17-Aug-13	single	F354-B1	1	1
116	17-Jul-13	single		1	0
40				0	0
64				0	0
88				0	0
90				0	0
Total				**57**	**33**

unk denotes that it is unknown whether the photographed bear is the same as the previously identified bear, or represents a new bear not detected by DNA analysis.
coy refers to cubs of the year
1yr and 2yr refer to 1 year olds and 2 year olds

Ten family groups (30 individuals) were recorded by remote cameras during the survey period. Family units were mainly a mother and two cubs; a mother with three cubs was observed twice and a mother with a single cub was observed once. Two grizzly bear individuals were recorded together; however, picture quality did not allow age to be determined (i.e., whether they were cubs or yearlings).

4.3.2 2013

In 2013, remote cameras recorded 84 individual grizzly bears on 58 photo events; some may have been repeat visitors between sessions compared to 85 grizzly bears that were detected by DNA analyses for the corresponding sampling session (Table 4.3-2). There were 16 occasions where cameras took pictures of grizzly bears but DNA analysis did not identify all the potential grizzly bears; however, in contrast to 2012, there were 19 cases where DNA analysis identified more grizzly bears than were photographed during the corresponding sampling session.

Table 4.3-2. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2013

Cell ID	Photo Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
2	26-Jun-13	F + 2x1yr	2013-1341	3	1
	4-Jul-13	F + 2x2yr	2013-1341; 2013-49	3	2
	12-Jul-13	F + 2x1yr	2013-1341; 2013-1061	3	2
	13-Aug-13	single	2012-229	1	1
6	25-Jun-13	F + 3coy		4	0
	23-Jul-13	F + 3coy	2013-2107; 2013-2111	4	2
	30-Jul-13	F + 3coy	2013-2107; 2013-2111; 2013-1995	4	3

(continued)

Table 4.3-2. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2013 (continued)

Cell ID	Photo Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
9	10-Jul-13	single*	2012-1677	1	1
	11-Jul-13	single		1	0
	21-Jul-13	F + 2x2yr	2012-313; 2012-294; 2013-1966	3	3
9	8-Aug-13	single	2012-62	1	1
	9-Aug-13	single	2012-62	1	1
			2012-711	0	1
11	23-Jun-13	single	2012-62	1	1
	25-Jul-13	single	379-K1	1	1
	28-Jul-13	2 x single		2	unk
	30-Jul-13	single		1	unk
	1-Aug-13	single	2012-62	1	1
	7-Aug-13	single	2012-1574	1	1
	15-Aug-13	single	2012-108	1	1
	17-Aug-13	single	2012-1574	1	1
12	13-Jul-13	single	2012-1056; 2013-994	1	2
	5-Aug-13	single	2012-1574	1	1
14	3-Jul-13	single	2013-378	1	1
	5-Jul-13	single		1	unk
	6-Aug-13	single	2012-1623	1	1
	8-Aug-13	single	2012-694	1	1
	20-Aug-13	single	2012-1094	1	1
21	19-Jul-13	single		1	0
	2-Aug-13	single	2012-1677	1	1
			2012-62	0	1
25	7-Jul-13	single	hr-164	1	1
	check 3		hr-164	0	1
	24-Jul-13	single	hr-167	1	1
	check 5	X	hr 167	0	1
28	check 3	X	2012-12; 2012-730; 2012-743	0	3
	30-Jul-13	single		1	0
	check 5		2012-12; 2012-743	0	2
31	check 1		2012-303; 2012-408; 2012-730	0	3
	4-Jul-13	single	2012-1126; 2012-730	1	2
	29-Jul-13	single		1	0
	check 5		2012-730	0	1

(continued)

Table 4.3-2. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2013 (completed)

Cell ID	Photo Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
	18-Aug-13	single		1	0
34	6-Jul-13	single	2012-1677	1	1
	check 3		2011-79	0	1
	26-Jul-13	single	2011-79	1	1
	29-Jul-13	single	2013-342	1	1
	10-Aug-13	single	2012-1677	1	1
35	1-Jul-13	single	2012-1677	1	1
	27-Jul-13	single	2012-1363; 2013-1705	1	2
	31-Jul-13	F + 2x2yr	2011-92; 2013-342	3	2
	check 6		2013-342	0	1
39	7-Aug-13	single	2012-1056; 2013-994	1	2
	check 6		2012-1056	0	1
40				0	0
42				0	0
45	check 1		2013-1290; 2011-120	0	2
	6-Jul-13	single	2011-25	1	1
	19-Jul-13	single	2011-47	1	1
	10-Aug-13	F + 1x2yr	2011-25; 2011-47	2	2
	13-Aug-13	single		1	0
50	check 2		2012-99	0	1
	14-Jul-13	single	2012-99	1	1
53	20-Jul-13	F + 2x2yr	2013-24; 2013-388; 2012-1126	3	3
	26-Jul-13	single	2012-1126	1	1
	29-Jul-13	single	2012-303	1	1
	check 5		2013-24; 2013-2137; 2012-1126	0	3
	15-Aug-13	single	162-A1; 2013-24	1	2
116	16-Jul-13	single	2013-1134	1	1
	27-Jul-13	single	2013-2107	1	1
	28-Jul-13	F + 3x1yr	2013-1995; 2013-2107	4	2
	10-Aug-13	single		1	0
	18-Aug-13	single		1	0
Total				**84**	**85**

unk denotes that it is unknown whether the photographed bear is the same as the previously identified bear, or represents a new bear not detected by DNA analysis.
coy refers to cubs of the year
1yr and 2yr refer to 1 year olds and 2 year olds

Eleven family groups (36 grizzly bears) were recorded by remote cameras during the survey period. Family units were mainly a mother with yearlings or juveniles; a mother with three cubs of the year was observed three times in cell 6. Two grizzly bear individuals were recorded together; however, picture quality did not allow age to be determined (i.e., whether they were cubs or yearlings).

4.3.3 2017

In 2017, remote cameras recorded 93 individual grizzly bears on 37 photo events; some may have been repeat visitors between sessions compared to 313 grizzly bears that were detected by DNA analyses for the corresponding sampling session (Table 4.3-3). There were seven occasions where cameras took pictures of grizzly bears but DNA analysis did not identify all the potential grizzly bears; however, in contrast to previous years, there were 221 cases where DNA analysis identified more grizzly bears than were photographed during the corresponding sampling session. It is unknown whether this discrepancy was related to malfunctioning cameras.

Although multiple individuals were recorded on cameras, nine family groups (24 grizzly bears) were recorded by remote cameras during the survey period. There were five recordings of a female with two yearlings, two recordings of females with cubs of the year (coy; one with one coy and the other with two coy), a female with one juvenile (2-year old) and another female with two juveniles.

Table 4.3-3. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2017

Cell ID	Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
1	June 02 - July 13		EK12704	0	1
	June 12 - July 23		2012-54	0	1
	June 22 - August 02		EK12704	0	1
	August 01 - August 11		2013-1577	0	1
	August 11 - August 23		EK12704	0	1
	August 21 - September 02		EK12704	0	1
2	June 12 - July 23		2013-1341	0	1
	August 11 - August 23	2 x single	2012-290, 2013-1341	2	2
	August 21 - September 02		2012-290	0	1
3	June 02 - July 13		hr1654	0	1
	June 12 - July 23		EK12843	0	1
	June 22 - August 02		2012-290	0	1
	August 01 - August 11		2013-2111	0	1
4	June 02 - July 13		2013-2111	0	1
	June 22 - August 02		2012-2111	0	1
	August 11 - August 23		2013-2111	0	1
6	June 02 - July 13	single	2013-2107, EK12717	1	2
	June 12 - July 23		EK12717	0	1

(continued)

Table 4.3-3. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2017 (continued)

Cell ID	Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
7	June 22 - August 02		hr167	0	1
	August 11 - August 23		2013-2107	0	1
8	June 12 - July 23		EK12852	0	1
	August 21 - September 02		2012-364	0	1
9	June 12 - July 23	two, 2 x single	2012-62	4	1
	June 22 - August 02	single	-	1	0
	August 11 - August 23	single	-	1	0
10	June 02 - July 13		2012-290	0	1
	August 11 - August 23		hr1654	0	1
	August 21 - September 02		2012-290	0	1
11	August 01 - August 11	single	2012-290	1	1
	August 11 - August 23	single	-	1	0
12	June 22 - August 02		hr1654	0	1
	August 21 - September 02		hr1654	0	1
13	August 11 - August 23		2012-54	0	1
	August 21 - September 02		EK13407, hr1654	0	1
14	June 12 - July 23	single	2012-263, 2012-54	1	2
	June 22 - August 02		2012-378	0	1
	August 01 - August 11		2012-378	0	1
	August 21 - September 02		2013-1577	0	1
15	August 21 - September 02		EK13438	0	1
17	June 22 - August 02		2012-263	0	1
	August 01 - August 11		2012-263	0	1
19	June 12 - July 23		2011-120	0	1
	August 01 - August 11		hr1654	0	1
	August 21 - September 02		2011-120, 2011-47, EK13604, hr1654	0	4
22	June 12 - July 23		EK12843	0	1
	June 22 - August 02		2012-1995	0	1
	August 01 - August 11		2011-158, 2013-1995	0	2
	August 21 - September 02		2011-158, 2013-1995	0	2
23	June 02 - July 13		2011-108	0	1
	June 22 - August 02		EK13034	0	1
	August 21 - September 02		EK13034	0	1
24	June 02 - July 13		2011-108	0	1
	June 22 - August 02		2012-79	0	1
	August 11 - August 23		2012-8	0	1
	August 21 - September 02		EK13346	0	1

(continued)

Table 4.3-3. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2017 (continued)

Cell ID	Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
25	June 12 - July 23	F + 2 x coy	EK12889, hr167	3	2
	June 22 - August 02		dv10030, hr167	0	2
	August 01 - August 11		EK13169	0	1
	August 11 - August 23		EK13169	0	1
	August 21 - September 02	2 x single	2012-79	2	1
26	June 12 - July 23		2013-388	0	1
	June 22 - August 02		2012-79, 2013-388	0	2
	August 01 - August 11		2013-388	0	1
	August 21 - September 02		2013-388	0	1
27	June 02 - July 13		2012-68, 2013-388	0	1
	June 12 - July 23		2012-1134, EK12898	0	2
	August 11 - August 23		2012-1134, EK13307	0	2
28	June 12 - July 23	F + 2 x 2 yr	EK12905	3	1
	June 22 - August 02		2012-68	0	1
	August 21 - September 02		2012-68	0	1
29	June 02 - July 13		EK-12765	0	1
	June 12 - July 23		EK12765	0	1
	August 01 - August 11		EK13187, EK13190	0	2
	August 21 - September 02		EK12765, EK13187, EK13190	0	3
30	June 12 - July 23		EK12767	0	1
	August 01 - August 11		2012-303, EK13192	0	2
	August 11 - August 23		2012-303, 2013-388	0	2
	August 21 - September 02		EK12767, EK13527	0	2
31	June 02 - July 13	single	EK12767	1	1
	June 12 - July 23		2012-303	0	1
	August 01 - August 11		2013-388	0	1
	August 11 - August 23		2012-303	0	1
	August 21 - September 02		2012-303	0	1
32	June 02 - July 13		EK12772	0	1
	June 12 - July 23		EK12772	0	1
	August 01 - August 11		EK12772	0	1
	August 21 - September 02		EK12772, hr164	0	2
33	June 12 - July 23		hr164	0	1
	August 11 - August 23		hr164	0	1
	August 21 - September 02		2012-1677, 2012-79	0	2

(continued)

Table 4.3-3. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2017 (continued)

Cell ID	Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
34	June 02 - July 13	single	2012-1677	1	1
	June 22 - August 02	F + coy	2013-342	2	1
	August 01 - August 11		2013-1995, EK13037, EK13209	0	3
	August 21 - September 02		2012-1677, EK13037	0	2
35	June 12 - July 23	10 x single	EK12935, EK12939	10	2
	June 22 - August 02	2 x single	2013-2252	2	1
	August 01 - August 11	3 x single	EK12939	3	1
	August 21 - September 02	single	-	1	0
38	August 21 - September 02		EK12797	0	1
39	August 01 - August 11	single	-	1	0
40	June 22 - August 02		2012-1056	0	1
	August 11 - August 23		2013-994	0	1
42				0	0
43	June 02 - July 13		2013-1577	0	1
44	June 02 - July 13		dv2013-336	0	1
45	June 02 - July 13	2 x single	EK12797	2	1
	June 12 - July 23		TDJ0697	0	1
	June 22 - August 02		EK12797	0	1
	August 01 - August 11		EK13224	0	1
	August 21 - September 02		2011-120, EK13604	0	1
46	June 12 - July 23		EK12958, TDJ0607	0	2
	August 01 - August 11		EK12958, EK13233	0	2
	August 11 - August 23		EK12958	0	1
	August 21 - September 02		EK12958, EK13233	0	2
48	August 01 - August 11		2011-32	0	1
	August 21 - September 02		2011-32	0	1
49	August 01 - August 11		2012-795	0	1
50	June 02 - July 13		2012-89	0	1
	June 22 - August 02	2 x single	2011-108, 2013-795	2	2
	August 21 - September 02		2012-89, EK13614, EK13619	0	1
51	June 02 - July 13		dv10030	0	1
	August 01 - August 11		dv10030	0	1
	August 11 - August 23		dv10030	0	1
	August 21 - September 02		EK13621	0	1
52	June 12 - July 23		2012-134, dv10345	0	2

(continued)

Table 4.3-3. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2017 (continued)

Cell ID	Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
53	June 12 - July 23	3 x single	EK12767	3	1
	June 22 - August 02	single	dv10017, TDJ0168	1	2
	August 01 - August 11		2012-303, 2012-836, 2013-2137, EK12767	0	4
	August 21 - September 02		dv10017, EK13638, TDJ0168	0	3
54	June 02 - July 13		EK12821, TFJ0168	0	2
	June 12 - July 23		2012-820	0	1
	June 22 - August 02		dv12349	0	1
	August 21 - September 02		dv12349	0	1
55	June 02 - July 13		dv10000, 2013-1442	0	2
	August 21 - September 02		dv12288	0	1
56	June 02 - July 13		dv10017	0	1
	June 22 - August 02		dv10017	0	1
	August 11 - August 23		dv10017	0	1
	August 21 - September 02		dv11534, dv12293	0	2
57	June 12 - July 23		2012-134, dv10345	0	2
	August 01 - August 11		2012-836, dv10345	0	2
	August 21 - September 02		2012-836	0	1
58	June 02 - July 13		dv10030	0	1
	June 12 - July 23	2 yr	2012-1826, dv10345	1	2
	June 22 - August 02	F + 2 yr	dv10345	2	1
	August 01 - August 11		dv10345	0	1
	August 11 - August 23		dv10030	0	1
	August 21 - September 02		dv10030	0	1
59	June 12 - July 23		2012-99	0	1
	August 01 - August 11		2012-795	0	1
	August 11 - August 23		2012-99	0	1
	August 21 - September 02		dv12349	0	1
60	June 02 - July 13		dv10045, 2012-5	0	2
	June 12 - July 23		2012-1328	0	1
	June 22 - August 02		2012-99, dv10930	0	2
	August 21 - September 02		2012-1328	0	1
61	June 22 - August 02		dv10936	0	1
63	June 22 - August 02		dv2013-734	0	1
64	June 22 - August 02		dv2013-734	0	1
65	June 12 - July 23		2012-516, dv10095, dv2013-734	0	3
	June 22 - August 02		dv2013-734	0	1

(continued)

Table 4.3-3. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2017 (continued)

Cell ID	Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
66	June 02 - July 13		TDJ0081	0	1
	June 12 - July 23		2012-201	0	1
	June 22 - August 02		dv10095	0	1
67	June 22 - August 02		2012-1056	0	1
	August 21 - September 02		2012-1056	0	1
69	June 02 - July 13		2012-516, dv10089, dv10095, dv2013-336	0	4
	June 22 - August 02		dv2013-336	0	1
70	June 12 - July 23		207-A2	0	1
	August 21 - September 02		207-A2	0	1
71	August 21 - September 02		dv2013-734	0	1
72	June 22 - August 02		dv11061	0	1
73	June 12 - July 23		dv2013-774	0	1
74	August 11 - August 23	M	-	1	0
	August 21 - September 02	M	dv2013-774	1	1
75	June 02 - July 13		2012-5	0	1
76	June 12 - July 23		2012-1328	0	1
77	June 02 - July 13		2012-5	0	1
	June 22 - August 02		2012-1468	0	1
	August 11 - August 23		2012-161	0	1
78	June 02 - July 13		2013-1442	0	1
	June 22 - August 02		2012-1468, dv11103	0	2
79	June 02 - July 13	M	2013-1442	1	1
	June 22 - August 02	2x (F + 2 x 1yr), 2 x M	2012-1468, 2013-1442	8	2
	August 01 - August 11		dv11534	0	1
	August 11 - August 23		2013-1442	0	1
	August 21 - September 02		dv11319	0	1
80	June 12 - July 23		2012-940	0	1
81	June 12 - July 23		2012-940	0	1
82	June 02 - July 13		2012-1826	0	1
	June 22 - August 02		2013-23	0	1
	August 01 - August 11		dv11580, dv12197	0	2
83	June 02 - July 13		2012-1826	0	1
	August 01 - August 11		2012-470	0	1
	August 21 - September 02		2012-1826, 2012-470	0	2

(continued)

Table 4.3-3. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2017 (continued)

Cell ID	Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
84	June 02 - July 13		2012-161	0	1
	June 12 - July 23		2012-337	0	1
	August 21 - September 02		2012-1164, 2012-1433	0	2
85	June 12 - July 23		2012-161	0	1
	August 01 - August 11		2012-161	0	1
86	June 12 - July 23		2012-564	0	1
88	June 02 - July 13		240-A1	0	1
89	June 22 - August 02		dv10930	0	1
90	June 02 - July 13		dv10286	0	1
	June 12 - July 23		dv2012-2117	0	1
	August 11 - August 23		202-B1, dv10286	0	2
92	August 01 - August 11		207-A2	0	1
	August 21 - September 02		7-M1	0	1
95	June 12 - July 23		303-A2, dv11254	0	2
	June 22 - August 02		303-A2, dv11254, dv11276	0	3
96	June 12 - July 23		dv11286	0	1
	June 22 - August 02		dv11286	0	1
	August 01 - August 11		cr198	0	1
	August 11 - August 23		dv10930	0	1
97	June 22 - August 02	4 x single	202-B1	4	1
	August 01 - August 11	F		1	0
98	June 12 - July 23	4 x single	23-A1, dv10771	4	2
	June 22 - August 02		258-A1	0	1
99	June 02 - July 13		dv2013-2117	0	1
	August 01 - August 11		dv2013-2117	0	1
100	August 21 - September 02		334-B1	0	1
104	August 01 - August 11		2012-1433	0	1
	August 11 - August 23		2012-1433	0	1
	August 21 - September 02		2012-1884, dv12573	0	2
105	June 12 - July 23	4 x M, 3 x single	2012-470	7	1
	June 22 - August 02	3 x (F + 2 x 1yr), 3 x unk cub	2012-470, dv11319	12	2
	August 01 - August 11	M	2012-470	1	1
	August 11 - August 23		dv12197	0	1
106	June 12 - July 23		2012-23, dv12197	0	2
	June 22 - August 02		2012-470	0	1
	August 11 - August 23		2012-470	0	1

(continued)

Table 4.3-3. Summary of Remote Camera Data at Grizzly Bear Sampling Stations, 2017 (completed)

Cell ID	Date	Photo Result	DNA Result	No. of Bears in Photo	No. of Bears Detected by DNA Analysis
107	June 12 - July 23		334-B1, dv10889	0	2
	August 01 - August 11		dv2013-2117	0	1
	August 11 - August 23		240-A1, dv2013-2117	0	1
	August 21 - September 02		dv2013-2117	0	1
108	August 01 - August 11	single	dv2013-2117	1	1
	August 21 - September 02		23-A1, dv12607	0	2
109	June 22 - August 02		dv11286	0	1
110	June 02 - July 13		391-B1	0	1
	August 01 - August 11		dv11286	0	1
	August 21 - September 02		303-A2, dv12639	0	2
111	June 02 - July 13		27-A2	0	1
	August 01 - August 11		dv11254	0	1
	August 21 - September 02		303-A2, dv11254	0	2
113	June 02 - July 13		EK12704	0	1
	June 22 - August 02		2013-1341	0	1
	August 01 - August 11		EK12704	0	1
	August 11 - August 23		2013-49	0	1
	August 21 - September 02		2013-1341	0	1
114	August 21 - September 02		2012-714, EK13675	0	2
115	June 22 - August 02		2012-711	0	1
	August 21 - September 02		2012-714	0	1
116	June 22 - August 02		2013-2107	0	1
	August 11 - August 23		EK13346	0	1
Total				**93**	**313**

unk denotes that it is unknown whether the photographed bear is the same as the previously identified bear, or represents a new bear not detected by DNA analysis.
coy refers to cubs of the year; 1yr and 2yr refer to 1 year olds and 2 year olds.

4.4 POPULATION ANALYSIS

4.4.1 Abundance

Ten candidate models were ranked using AICc (Burnham and Anderson 2002). The top three models are listed in Table 4.4-1. The top model was a time dependent model where capture probabilities (p) were assumed equal to recapture probabilities (c) across individuals and varied across sessions and years, but no difference between males and females. The second highest ranked model differed from the first in the probability of remaining on the study area (G) differed between males and females. The model and associated terms is of the general form:

$$\widehat{N}(t)\ \{p(t) = c(t)\}$$

Table 4.4-1. Top Candidate Models to Estimate Population Size in the DNA Study Area

Model	AICc	Delta AICc	AICc Weight	Number of Parameters
$\hat{N}_{(t)}\{p_{(m)(t)}=c_{(m)(t)}=p_{(f)(t)}=c_{(f)(t)}, G_{(m)}=G_{(f)}, S_{(m)}\neq S_{(f)}\}$	3140.99	0.00	0.65	21
$\hat{N}_{(t)}\{p_{(m)(t)}=c_{(m)(t)}=p_{(f)(t)}=c_{(f)(t)}, G_{(m)}\neq G_{(f)}, S_{(m)}\neq S_{(f)}\}$	3142.29	1.30	0.34	22
$\hat{N}_{(t)}\{p_{(m)(t)}=c_{(m)(t)}=p_{(f)(t)}=c_{(f)(t)}, G_{(m)}\neq G_{(f)}, S_{(m)}=S_{(f)}\}$	3151.11	10.12	0.004	21

$\hat{N}$ = superpopulation, t=time, p=capture probability, c=recapture probability, m=males, f=females, G=probability of remaining on the study area, S=probability of survival.

Across years, the mean capture probability in the DNA Study Area was 0.21 (range 0.14 to 0.34) in 2012, 0.36 (range 0.28 to 0.44) in 2013, and 0.29 in 2017. In 2017, the superpopulation was estimated to be 92 females (95% CI 87 to 103) and 63 males (95% CI 58 to 72; Table 4.4-2). The estimated number of females in 2017 was the same as 2012, which were higher than in 2013 (82 females), whereas the number of males in 2017 stayed roughly the same as 2013 (64 males) and higher than 2012 (53 males) (Table 4.4-2).

Table 4.4-2. Estimated Superpopulation by Sex and Year

Sex	Year	$\hat{N}$	SE	Lower 95% CI	Upper 95% CI
F	2012	92	7	83	110
M	2012	53	5	47	66
F	2013	82	3	78	90
M	2013	64	2	62	72
F	2017	92	4	87	103
M	2017	63	3	58	72

F = females, M = males, $\hat{N}$ = superpopulation estimate, SE = standard error, CI = confidence interval

4.4.2 Density

As per the 2 dimensional root spatial variance measure of dispersion, home range size differed by gender (13.32 for males and 10 for females). Due to possible bias introduced by large differences between male and female home range size (Efford and Mowat 2014), AIC models were run separately for males and females. The entire study area is generally suitable for grizzly bears, and the habitats where tripods were located and where grizzly bears were detected were similar, resulting in a habitat covariate that was relatively uniform across the sampled space and was therefore not useful for modelling purposes.

The best model for females included location (spline for x and y location) effects for density and a time effect for the detection range (Table 4.4-3). The best model for males was the intercept model (no location or time effects for density and detection range).

Table 4.4-3. Candidate Models Used to Estimate Grizzly Bear Density Using SECR

Model	AIC	AIC Weight	Model Likelihood	No. Parameters
Females				
Density:Spline for location; Detection:Time	1,403.2	1	-688.6	13
Density:Spline for location	1,419.7	0	-701.8	8
Intercept Model: no covariates	1,425.8	0	-709.9	3
Males				
Intercept Model: no covariates	1,065.4	1	-529.7	3
Density:Spline for location	1,072.2	0	-528.1	8
Density:Spline for location; Detection:Time	1,078.2	0	-526.1	13

Detection was modelled using a half normal distribution. The estimated radius of this bivariate model was used to obtain an estimate of the amount of space used by an individual 95% of the time (Royle et al. 2014). In 2017, males were estimated to use 1,905.5 km^2 (95% CI 1476.8 to 2458.7) while females were estimated to use 613.1 km^2 (95% CI 411 to 914.6).

The expected number of male bears in the region was 93 (95% CI 70 to 122). The expected number of females was 136 (95% CI 104 to 178). The best models based on AIC were used to obtain density estimates (Table 4.4-4). Female density was estimated as 4.7/1,000km^2 (95% CI 3.7 to 6), and male density was estimated as 3/1,000km^2 (95% CI 2.3 to 3.9), representing an increasing trend relative to previous years.

Table 4.4-4. Density Estimates Across Sampling Years

Year	Female (95% CI)	Male (95% CI)
2012	3.6 (2.9 - 4.6)	2.0 (1.4 - 2.7)
2013	4.0 (3.2 - 5.0)	2.9 (2.2 - 3.7)
2017	4.7 (3.7 - 6.0)	3.0 (2.3 - 3.9)

CI = Confidence Interval

The number of new female and male bears detected in 2017 and not recorded in 2012 or 2013 was 51 and 18, respectively. The total number of bears captured by sex and year is illustrated in Figure 4.4-1. The total number of female grizzly bears captured by session and year is illustrated in Figure 4.4-2 and male grizzly bears in Figure 4.4-3. The estimated spatial density of female bears in 2012, 2013, and 2017 is shown in Figure 4.4-4. Location was not an important predictor for density of male bears (not shown).

The highest density estimates fell toward the northeastern part of the sampling area. This is consistent with the observation that bear capture frequencies tended to occur in the northeast half of the study area, corresponding to higher coverage of water and extensive esker systems that are prevalent throughout the area. Location was not an important predictor for density of males. This may be due to the large extent of their home range relative to the size of the sampling area.

Figure 4.4-1
Total Number of Grizzly Bears Captured by Year in the DNA Study Area

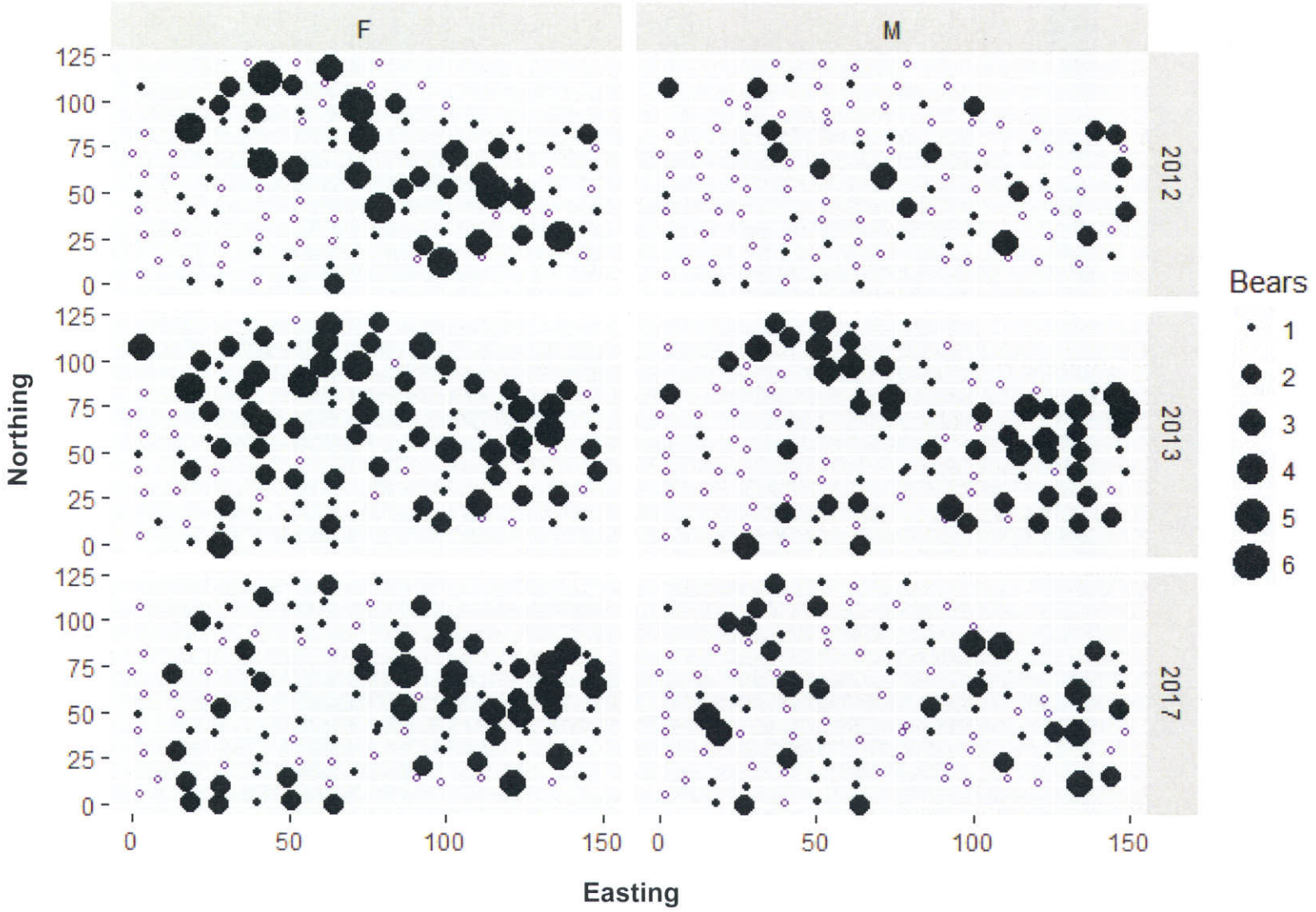


Figure 4.4-2

Number of Female Grizzly Bears Detected by Session and Year in the DNA Study Area

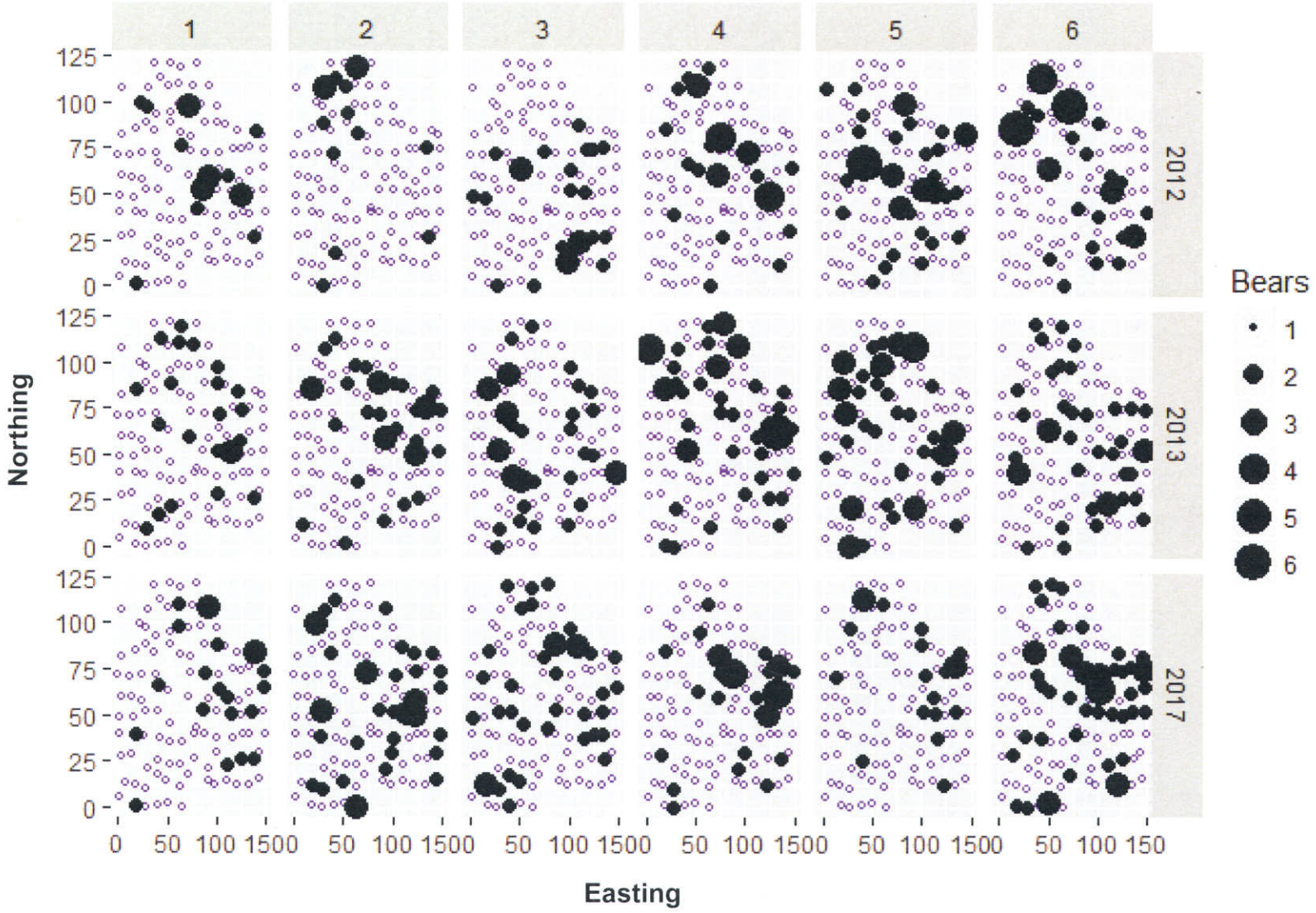


Figure 4.4-3
Number of Male Grizzly Bears Detected by Session and Year in the DNA Study Area

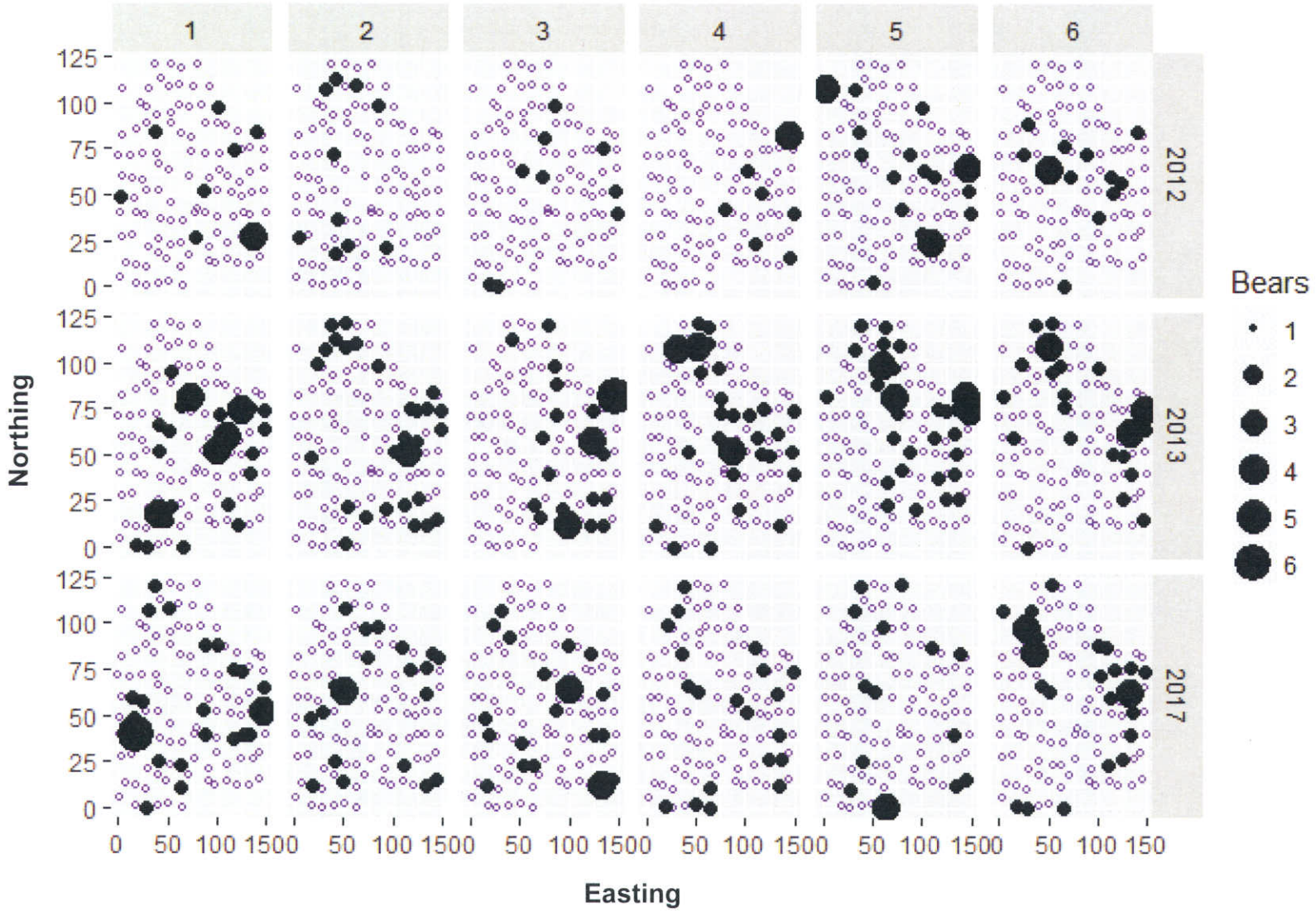
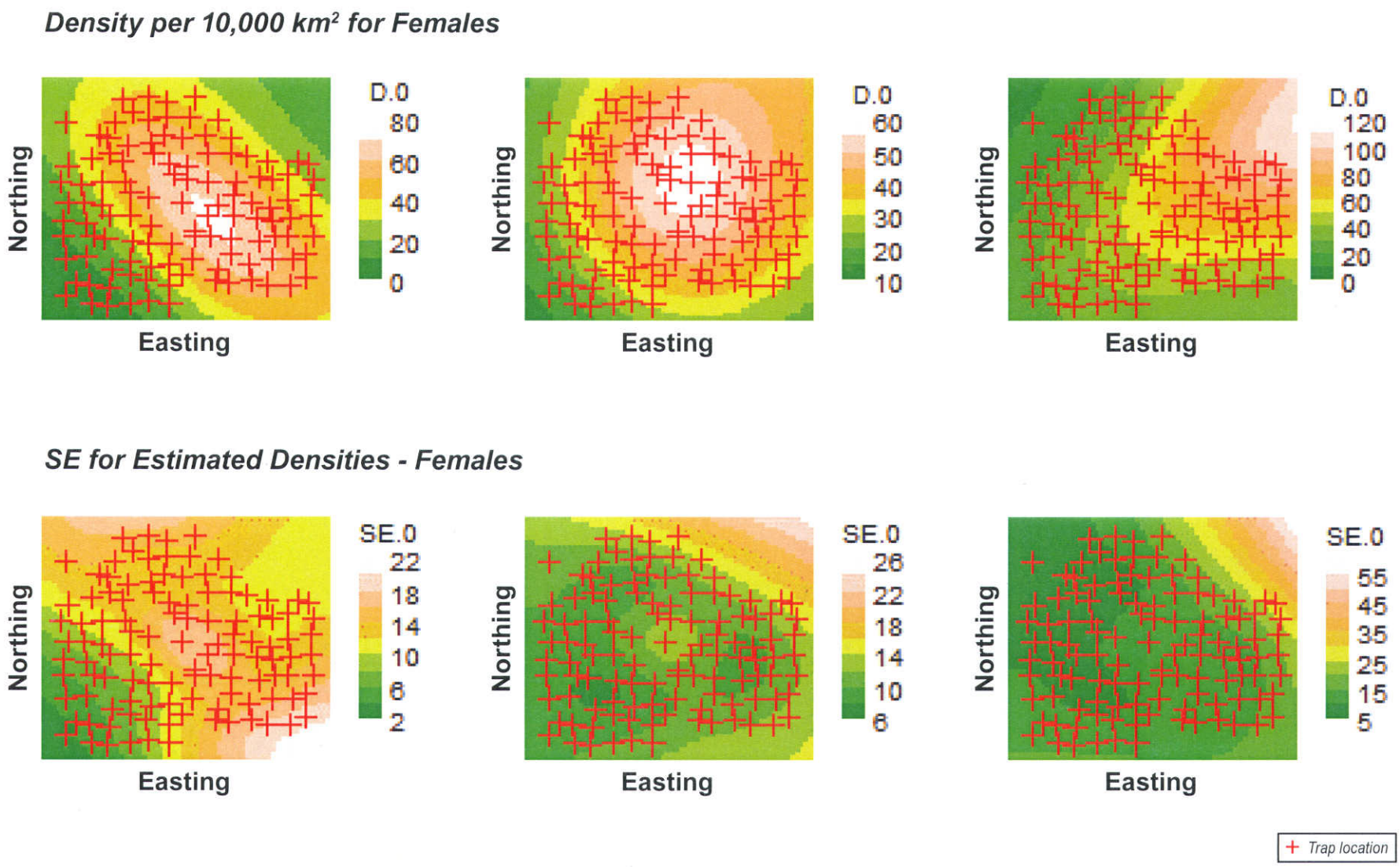


Figure 4.4-4

Spatial Variation in Density Estimates for Females in 2012, 2013, and 2017 (Top Row) and Associated Standard Errors (Bottom Row)



5. DISCUSSION

5.1 SAMPLE COLLECTION

Incorporating TK was a key element to the success of the program. Prioritizing the locations of sampling stations in areas that were identified by elders and experienced land users as high value habitat for grizzly bears increased the likelihood of encountering grizzly bears. Relocating sampling stations that were not successful at detecting grizzly bears in 2012 to new higher value habitats in 2013 may have also in part resulted in improved detection rates. It cannot be discounted that experience in running the program in terms of bait application and sample processing may have contributed to the substantial 2.5 fold increase in samples collected in 2013 and similarly high sample collections in 2017, resulting in the addition 101 (39 in 2013 and 62 in 2017) new grizzly bears to the regional database and higher capture probabilities in 2013 and 2017.

5.2 DNA ANALYSIS

Laboratory sub-selection rules were applied only to high quality DNA samples that remained after pre-screening. In 2012, approximately 1 in 3 high quality samples overall was analyzed to genotype. This reduced the potential to miss individuals due to sampling bias, and hence potentially underestimate the number of animals on the study area. In 2013, due to a 2.5-fold increase in the number of samples collected, the sub-sampling protocol changed to three samples per post and one ground sample for a total of 10 samples per post per session. The 2013 sub-sampling protocol was repeated in 2017. The change in protocol did not appear to negatively bias individual detections as more bears were detected in 2013 and 2017 compared to 2012, including 62 that were new to the regional database in 2017.

The success rate of extracting DNA from underfur samples was poor in comparison to samples that used ≥ 2 guard hair roots. Underfur has a finer structure than guard hairs, which may make them more susceptible to environmental conditions. Furthermore, new underfur growth does not generally occur until late summer or fall, such that underfur collected in the spring or early summer are remnants from the previous year that may have naturally degraded.

Across years, the overall rate of successful DNA extraction was moderate (60 to 70%) compared to other grizzly bear work in the Northwest Territories and Nunavut that had success rates around 80% (D. Paetkau, WGI, pers. comm.; Dumond et al. 2015). The stringent quality threshold, which resulted in an average of 7.0 guard hairs per extraction, would be expected to produce a success rate closer to 80%. The low success rate is potentially because of exposure to sunlight or moisture, which can degrade DNA samples (Dumond et al. 2015). In 2012, every effort was made to ensure session duration was kept to approximately 10 to 11 days, but in some cases, cells were left active for 12 to 15 days, which may have contributed to some sample degradation. However, in 2013, sample sessions were all approximately 10 days with little improvement in success rates, and 2017 success rates were even lower despite session lengths of 9 to 11 days. Nevertheless, the moderate success rates did not appear to impact the ability to identify individual grizzly bear genotypes. Lower extraction success might

result in artificially low capture probability and capture heterogeneity as an artefact of sampling error rather than being indicative of the likelihood of detecting individuals from the sampled population, which may result in missing individuals from the analysis. The sub-selection protocol prioritized higher quality samples, which resulted in sufficient DNA available to meet capture probability thresholds and minimize any sampling bias.

5.3 CAMERAS

Photographic evidence suggests that DNA analysis may be underestimating the number of grizzly bears using the study area during the sampling period. Much of this discrepancy results from the incomplete detection of family groups. In 2012, camera data suggest at least 10 family groups were detected, compared to three possible family groups identified by DNA analysis. In 2013, four family groups were photographed but were all partially detected by DNA analysis. In 2017, nine family groups were photographed, and all were at least partially detected by DNA analysis. Hair from cubs and yearlings may not snag on the barbed wire as easily as adult hair, which could explain why camera data identified family units where DNA analysis did not. In cases where lone grizzly bears were not detected by DNA analysis, there were some events where the grizzly bear approached the post but did not scratch against it, and others where the sampling interval exceeded 12 days, which may have resulted in the degradation of the sample.

5.4 POPULATION ANALYSIS

The Ekati Diamond Mine and Diavik Regional Grizzly Bear DNA study achieved its objective to establish a baseline the monitoring of trends in the relative abundance and distribution of grizzly bears over time. In addition, the results of this study can be used to support grizzly bear population management by the Government of the Northwest Territories – Department of Environment and Natural Resources. DNA analyses identified 114 grizzly bears (42 males and 72 females) in 2012, 136 grizzly bears (60 males and 76 females) in 2013, and 136 grizzly bears in 2017 (55 males and 81 females) within the 16,272 km^2 study area. Eight of these grizzly bears were also detected in study areas in Nunavut, demonstrating the large movement of barren-ground grizzly bears and the large home ranges they may utilize in a given year (or portions thereof over multiple years).

Barren-ground grizzly bears exhibit extensive movement patterns, which were observed for some grizzly bears in this study, and have the lowest densities and utilize the largest home ranges of all grizzly bear populations. For example, male movement rates are typically higher than females and may average an extra 2 to 3 km/day during the summer and late summer periods (McLoughlin et al. 1999). In this study, the maximum distance travelled by a male grizzly bear (85 km or 8.5 km/day) occurred during the 2013 survey period and was 30% greater than the maximum for a female bear, which was calculated in 2012 (58 km or 5.3 km/day). The result is that grizzly bears may only visit portions of their annual range in any given year, which is difficult to account for in heterogeneity-based models during an initial baseline inventory. An additional study design element that was utilized to address this dynamic of low densities and large movement rates was implementing six sessions per year. The standard in British Columbia is three to four sessions, typically in one year (Apps 2010). In the West Kitikmeot, a design of two sessions per year over a period of five years was used (Dumond et al. 2015). The number of new captures at the end of 2012,

the rate of recaptures in 2013 and 2017, and the addition of new grizzly bears to the regional database all contributed to higher capture probabilities, and demonstrate the success of this approach.

In all years, grizzly bears appeared to be concentrated in the northeastern half of the study area, in a band that extended from Yamba Lake in the northwest, along the north shore of Lac de Gas, and to Aylmer Lake in the southeast. Sampling stations were not placed near the mine sites to reduce the potential for human and bear interactions; however, incidental observations of grizzly bears are recorded at both sites and included in their respective annual wildlife monitoring reports. The high frequency of grizzly bear detections corresponded to a higher prevalence of water compared to the southwest portion of the study area. The extensive distribution of water bodies of varying sizes may provide extensive forage. Water may also afford some thermal and insect relief for grizzly bears during warmer periods in the summer. In addition to water, there are extensive esker systems distributed throughout the same region of the study area, which facilitate movement across the landscape and provide connectivity between high quality habitats. These esker systems also contain ground squirrel burrows, another important prey item for grizzly bears (McLoughlin et al. 1999). Results from habitat modelling conducted for the summer range of the Bathurst herd indicate that this area contains high quality habitat for caribou during the post-calving and summer periods (ERM 2017), which corresponds to the timing of the sampling period. Predation of caribou by grizzly bears in the sub-Arctic has been speculated, and observed, but rates of predation and implications for caribou population dynamics have not been quantified; however, Traditional Knowledge does indicate that grizzly bears do regularly prey on caribou.

5.5 STUDY DESIGN

To date, other studies in Nunavut utilized a 10 x 10 km study design (for example, the West Kitikmeot study across 40,000 km^2; Dumond et al. 2015). As a means to maximize study area size while maintaining cost efficiencies and simplifying logistics, this study implemented a 12 x 12 km grid cell size. During technical and community workshops hosted by ENR in Yellowknife from 2009 to 2011, there was uncertainty expressed over whether a 12 x 12 km study design would yield sufficient capture probabilities to provide precise estimates. The metric for success is a capture probability of 0.20 (Apps 2010). The mean capture probabilities were 0.21 (2012), 0.36 (2013), and 0.29 (2017). On a session basis, only the first three sessions in 2012 had capture probabilities below 0.20, and one of these was likely due to a poor batch of fish oil. Comparatively, in a concurrent program southwest of Bathurst Inlet in Nunavut over a similar sized study area (~19,000km^2) and utilizing the same study design (two years, six sessions per year, 12 x 12 km grid cells), 124 individual grizzly bears were identified in 2012 and 118 grizzly bears in 2013, resulting in capture probabilities of 0.25 (2012) and 0.33 (2013; Rescan 2014). In addition, Apps (2010) recommends a minimum of 50 grizzly bears to support a trend monitoring objective, with 100 grizzly bears suggested as the ideal threshold, which has been met in this study with the identification of 114 grizzly bears in 2012 and 136 grizzly bears in 2013 and 2017. The results of this study provide evidence to support the use of a 12 x 12 km grid size, which provides a suitable compromise to maximize spatial coverage and capture probabilities given the large space use and movement rates of grizzly bears, and address logistical constraints associated with sample collection over a large area.

5.6 CONCLUSIONS

This regional DNA study suggests that the central barrens of the Northwest Territories are productive for grizzly bears. The Lac de Gras region supports a large number of grizzly bears, potentially because of the prevalence of esker habitats for secure denning, seasonal access to caribou, fish resources in the abundant lakes and streams in the area, productive forage in riparian zones, and the relatively low level of hunting in this area. The overall density of barren-ground grizzly bears was estimated to be 3.5 grizzly bears per 1,000 km^2 for the central barrens of mainland Nunavut and the Northwest Territories (McLoughlin and Messier 2001), and up to seven bears per 1,000 km^2 in the Kitikmeot region of western Nunavut (Dumond et al. 2015). In this study, grizzly bear densities ranged from 2.0 to 3.0/1,000 km^2 for males and 3.6 to 4.7/1,000 km^2 for females. The result of this regional study over the period of 2012 to 2017 suggest that grizzly bear numbers appear to be stable to increasing since estimates for the Slave Geological Province were last obtained in the late 1990's (3.5/1,000 km^2; McLoughlin and Messier 2001). These results provide evidence in support of the conclusion that the Ekati and Diavik Diamond Mines, which have been constructed since the last grizzly bear survey in the late 1990's, have not had a negative impact on the regional population of grizzly bears in the SGP. This conclusion is consistent with impact predictions that state these projects would not result in significant impacts to grizzly bears given the small size of these Projects relative to size of a female grizzly bear home range and extensive wildlife monitoring and mitigation programs designed to be protective of grizzly bears. Effective mitigation programs include monitoring of activity near the mine sites, waste management, and deterrence of grizzly bears from potentially hazardous areas.

6. RECOMMENDATIONS

The overall goal of the three year DNA program (with two of the three years representing resampling years) was to estimate the number of grizzly bears that are likely to occur in the Ekati Diamond Mine/Diavik DNA Study Area and complete population trend monitoring. There is interest amongst communities, regulators, and industry in developing a protocol for regional grizzly bear monitoring, given that site specific monitoring is ineffective at addressing population level effects due to the large movement patterns and low densities of barren-ground grizzly bears. Based on the results of this study, the following protocol is recommended as part of a monitoring strategy for grizzly bears inhabiting tundra environments north of the treeline:

1. DNA programs are expensive and logistically challenging. They can only operate effectively and efficiently by establishing regional partnerships.
2. The initial baseline inventory requires intensive effort to fully characterize the regional superpopulation. In future sampling efforts under a long-term trend monitoring objective, the study area should remain the same to avoid sampling different segments of the superpopulation, but the sampling effort can be reduced. The change in effort can be addressed in subsequent modelling exercises, but the effects of changing the study area boundary are more difficult to quantify.
3. The Ekati Diamond Mine/Diavik Study Area was an appropriate size to estimate the regional grizzly bear population, providing information that can inform management and cumulative effects assessment. For low density populations typical of northern environments, these results suggest that a study area size of approximately 15,000 km^2 is required to detect 100 grizzly bears recommended as the basis for monitoring.
4. For northern grizzly bear populations that are at naturally low densities with individuals that range over large distances, multiple sampling sessions across multiple years may be required to attain adequate data for statistical analyses as accurate population estimates are dependent on sufficiently high recapture rates (Proctor et al. 2010). Results in this study and a parallel study in Nunavut (Rescan 2014) suggest that six sessions per year will yield a sufficient number of individuals and capture probabilities for statistical analysis.
5. A 12 x 12 km grid cell size is an appropriate size to successfully conduct a large scale grizzly bear mark-recapture DNA program for northern populations. A 12 x 12 km grid cell size roughly corresponds to the 10-day range use of a female grizzly bear, and provides an effective trade-off in terms of study area size, cost, and logistics while achieving the requirement for capture probabilities above 0.20.
6. Relocating sampling stations every session is not recommended due to costs and logistical constraints. Instead, introducing novel baits each session is an effective alternative to continuously attract bears to the sampling post.
7. Considerable upfront work is required to identify areas to locate tripods. The incorporation of Traditional Knowledge to develop a set of criteria for placing posts within cells will reduce the

intensity of the desktop phase, and will increase capture probability. As a general guide and in order of priority, key areas include eskers, riparian areas, upland meadows, and heath tundra.

8. If sampling stations are relocated within a cell, it is recommended that they be moved at least 2 km from the previous location, and are located at least 5 km from a sampling station in an adjacent cell.
9. The deployment of motion detection cameras is an effective means to monitor grizzly bear activity at the sampling posts, and provides a way to assess potential bias in the sampling protocol and DNA analyses.
10. It is an expensive process to extract DNA and all hair samples cannot be analyzed. A number of laboratory based sub-sampling protocols are available, including a 1-in-3 sub-sample if sample sizes are not prohibitive. Given the possibility of multiple bears interacting with a post during a single session, three samples per post plus a ground sample will maximize detections in the case of large sample sizes. If budgets are constrained, two samples per post from the upper and lower half can be considered.
11. A large scale program will provide the data required for Spatially Explicit Capture Recapture modelling to estimate density. An understanding of applicable terrain and individual co-variates (e.g. habitat, age, residency times and reproductive status from collar data) will improve density estimates and improve inference about the spatial distribution of grizzly bears.

7. ADDITIONAL CONSIDERATIONS

The above recommendations are based on the results of this study; however, agencies responsible for the management of wildlife could use these data in additional power analyses to further optimize study design considering the logistics and costs of running a program of this scale. Of particular importance are the following study design elements:

1. Study area size
    a. What is the minimum study area size to support a long-term monitoring objective? If 50 individual grizzly bears are the minimum required for a long-term monitoring objective, then a study area of approximately 10,000 km^2 may be adequate.
2. Sampling frequency
    a. Is one year of baseline adequate?
    b. What is the optimal return frequency? In this study, three years was chosen as the average reproductive interval. What are the management implications of longer intervals, for example five years?
3. Sampling sessions
    a. What is the optimal number of sampling sessions to meet capture probability and individual detection criteria? This study used 6 sampling sessions across all years. Dumond et al. (2015) use two sessions per year for five consecutive years. Studies in British Columbia typically use three to four sessions.
4. Cell size
    a. What is the optimal cell size to maximize spatial coverage and meet individual detection and capture probability criteria?
5. Sub-sampling protocol
    a. In cases where thousands of samples are collected, what is the optimal sub-sample that maximizes individual detections while limiting lab analysis time and costs?
6. Logistics and Costs
    a. The management of grizzly bears in the Northwest Territories and Nunavut will require numerous programs of this scale to monitor population dynamics over the long term in response to development and climate change. Regional programs of this scale require effective partnerships to implement successfully, both in terms of costs and logistical planning. A key consideration is that the program requires helicopter support, which is the most expensive element of the design. Whatever can be done to optimize study design (items 1-4 above) will minimize helicopter costs and reduce safety considerations working around helicopters. Such optimization may result in broader coverage of grizzly bear sub-populations across the Canadian Arctic.

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Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

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APPENDIX K

Grizzly Bear Incidental Observations Summary 2018

Date	Number of Animals	Characteristics of Animals	Location	Deterrents Used?
16/04/2018	1	Single grizzly, dark brown	Tundra near SCRP	Yes
17/04/2018	1	Medium sized bear	Tundra near SCRP	No
23/04/2018	1	-	Tundra near SCRP	No
23/04/2018	1	-	Tundra near SCRP	No
25/04/2018	1	-	Tundra near SCRP	No
26/04/2018	1	-	Tundra near pond 6	No
27/04/2018	1	Single grizzly, same bear observed over past week. Stiff lighter brown with dark strip down the back	On pipe near Pond 6	Yes
28/04/2018	1	-	tundra South of SCRP	No
30/04/2018	1	Single grizzly, light brown bear observed on weekend	Bear was at the WTA snow dump pushed to the tundra south of the SCRP	Yes
14/05/2018	1	Single grizzly, blond young with dark strip down back	South Haul Road near C portal	Yes
16/05/2018	1	-	At snow gauge	No
17/05/2018	1	Single grizzly, sandy coloured with brown stripe down back	Near Lakeshore Drive on Tundra	Yes
19/05/2018	1	Single grizzly, sandy coloured with brown stripe down back	A21 South Dyke	Yes
21/05/2018	1	Single grizzly, dark brown with lighter shoulders	Tundra near Winter Road Approach	Yes
22/05/2018	1	-	On ice headed E away from Island	No
25/05/2018	1	-	A21 Pitshop, Tundra	No
01/06/2018	1	Single grizzly, blond colour relocated in 2017	Shallow Bays to North Inlet	Yes
02/06/2018	1	-	Tundra near N winter road approach	No
02/06/2018	1	-	South winter road approach, ice, A21 N dike, E towards mainland	No
03/06/2018	2	Mother and cub	North inlet	No
06/06/2018	1	Single grizzly	South of 418 dyke on Lake	Yes
13/06/2018	1	Light coloured bear - the one that has been here before	Warehouse Sprung near main accommodations	Yes
13/06/2018	1	Light coloured bear - the one that has been here before	Near A154 Pit Ramp	No
13/06/2018	3	Large blonde sow and 2 dark brown cubs	North Inlet	No

Date	Number of Animals	Characteristics of Animals	Location	Deterrents Used?
14/06/2018	3	Sow and two cubs	Pond 3 and 4 on tundra	No
14/06/2018	1	-	South haul road towards SCAP shop. Pond 13	No
15/06/2018	3	Blonde Sow and 2 dark brown cubs	Pond 13	No
15/06/2018	1	Blonde Bear that was here before	D1 Laydown	No
16/06/2018	3	Blonde Sow and 2 dark brown cubs	Pond 13 Backfill	Yes
16/06/2018	1	-	A154 pit above 390 bench	No
17/06/2018	1	Blonde bear from before	A154 Ramp moved to fish Habitat	No
17/06/2018	3	Sow and 2 Cubs	Tundra near North Inlet later moved to fish habitat	Yes
18/06/2018	1	Blonde Bear that was here before	D1 Laydown	Yes
18/06/2018	3	-	ERT Training area	No
19/06/2018	1	Blonde bear from last year	D1 Laydown	Yes
20/06/2018	4	Blonde bear that was here before / Sow with 2 dark brown cubs	Pond 5 / Pond 1	Yes
21/06/2018	1	-	Reported N of the runway - ENV did not see bear	No
21/06/2018	1	Blonde bear from last year	Water treatment plant - non-burnable bin	Yes
22/06/2018	3	Grizzly sow and two cubs	Pond 1	Yes
23/06/2018	1	Single grizzly, blond bear from last year	D1 Laydown	Yes
23/06/2018	3	Grizzly sow and two cubs	North Inlet	Yes
24/06/2018	1	Single grizzly, blond bear from last year	Backfill plant, pond 1, process ROM, WTA, AN road	Yes
25/06/2018	1	Single grizzly, blond bear from last year	main camp, warehouse mega dome, pond 10, pond 5, ROM hill, pond 5	Yes
26/06/2018	1	Blonde resident bear	process plant sizer, Test piles, PKC, AN road	Yes
26/06/2018	3	-	backfill load out, N haul road, till pile	No
29/06/2018	3	Grizzly sow and two cubs	Crusher ROM, till pile, airport road, crusher load out, till pile, ERT training grounds, A154	Yes
01/07/2018	1	Single grizzly, blond resident bear	NIWTP bin, hanging tree, tundra N of WTP	Yes
01/07/2018	1	-	Airport	No

Date	Number of Animals	Characteristics of Animals	Location	Deterrents Used?
02/07/2018	1	Single grizzly, blond resident bear	N winter road approach, Pond 13, Backfill, Pond 1, W Shallow Bays, Pond 5, Pond 10, Fresh water uptake, ice NE of Diavik	Yes
03/07/2018	1	Single grizzly, blond resident bear	WTA, Pond 12, Pond 5, Process Plant, PKC,	Yes
08/07/2018	1	Single grizzly, resident bear	Tundra near NI, tundra behind WTP	Yes
21/07/2018	1	-	North Country Till Pile	No
25/07/2018	1	Single grizzly, blond resident bear	backfill, till pile, pond 1, shallow bays, pond 5	Yes
02/08/2018	1	Single grizzly, resident bear	North Country Till Pile	Yes
03/08/2018	1	-	Tundra near Hanging Tree	No
04/08/2018	2	-	Airport	No
05/08/2018	3	-	Till Pile, NI	No
05/08/2018	2	One dark faced grizzly with a white plug/tag in right ear. One lighter faced grizzly with a white plug/tag in left ear	Till Pile, South Haul Road, Pond13, Veggie Plots	Yes
06/08/2018	2	Two grizzlies, one sandy coloured and one darker brown	Pond 5, Shallow Bays, Rose Garden, Vegetation Plots, Pond 1	Yes
08/08/2018	2	-	Fish Habitat of 154	No
09/08/2018	2	Two grizzlies, one blond and one darker blond	Backfill Crusher, C Portal, Shallow Bays, 154 Fish Habitat	Yes
10/08/2018	2	Two grizzlies, one blond and one darker blond	Shallow Bays, 418 Fish Habitat, 154 Fish Habitat, East Dike of NI	Yes
13/08/2018	1	-	North Winter Road Approach	No
13/08/2018	1	Blond bear with dark face and legs and rear	Backfill ditch by South Haul Road	Yes
16/08/2018	1	-	154 Pit ramp heading to FAR	No
16/08/2018	1	-	Pond 1	No
17/08/2018	1	-	Crusher ROM	No
23/08/2018	1	-	Fuel Cache at Heli pad	No
24/08/2018	1	-	All around mine site	Yes
26/08/2018	1	-	In fish habitat area A154 dike near DPS-2	Yes
28/08/2018	1	-	N17 near Pond 3	No

Date	Number of Animals	Characteristics of Animals	Location	Deterrents Used?
29/08/2018	1	-	Shallow bays near N winter road approach, Pond 13, Backfill plant, ERT training grounds, A154 Dike, A154 fish habitat	No
11/09/2018	1	-	Tundra near North Inlet	No
12/09/2018	1	The local bear from previous years	North of the runway at the airport	No
15/09/2018	3	Sow and 2 cubs	Between the East North Inlet dike and airport runway	No
19/09/2018	3	Sow and 2 cubs	Near airport	No
26/09/2018	1	-	Airport, N17 laydown, NI, NI dam, tundra E of NI dam	No
27/09/2018	1	-	Tundra near NI	No
02/10/2018	3	-	Tundra near NI	No
02/10/2018	1	-	Tundra near NI	No
03/10/2018	1	-	Tundra between NI and Airport	No
04/10/2018	1	Resident grizzly bear	A154 Dike, Tundra of Shallow bays, Backfill Yard, Till Pile	Yes
05/10/2018	1	-	Tundra near NI	No
05/10/2018	1	-	Tundra near Airport	No
05/10/2018	1	-	Tundra near Airport	No
09/10/2018	1	-	Tundra East of Airport, near Heli Pad, moving East	No
10/10/2018	1	-	Moved from North Haul Road through to Pond 1 and then into Shallow Bays	No
10/10/2018	1	-	Process plant crusher to PKCF	No
11/10/2018	1	-	Tundra near Zone 1 of A21	No
17/10/2018	1	-	Moved from A21 along haul road toward SCRP, the ROM, and then toward PKC	No

APPENDIX L

Wildlife Deterrent Action Incident Reports 2018

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-04-16 - South Country Rock Pile

Document No.
WildlifeReport000237

2018-04-16

Score
2/441 - 0.45%

Completed on
2018-05-01, 7:26 AM

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	2018-04-16, 8:30 PM	
Department/Individual Who Reported Wildlife:	Pit Ops/Sheldon	
Environment On Scene		
Environment at Call-out Location	2018-04-16, 8:45 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	1 dark brown	
Photo (If Possible):		
Chronological Events		
	2030 ENV receives cal from security of grizzly at south country rock pile 2100 ENV has eyes on bear on tundra S of South Country Rock pile 2120 bear spotted crossing entrance to South Country Rock pile 2125 ENV used TRUCK to keep bear on tundra 2130 bear Bedded down on tundra	
Movement Map (Import NotePlus Site Map)		
 Appendix 1		
Deterrent Count		Score (1/440) 0.23%

Question	Response	Details
Truck	1	
Specify		
Environment Off Scene		
End of Environment Call-out	2018-04-16, 9:45 PM	
Final Location of Wildlife	Tundra SE of South Country Rock pile entrance	
Closure & Sign-off		Score (1/1) 100%
Wildlife Report Complete	On	

Signature	Don Roberts	2018-05-01 7:26 AM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-04-27 - SCRP

Document No.
WildlifeReport000241

01 May 2018

Completed on
01 May 2018

Score
3/441.0 - 0.68%

Audit - 3/441 0.68%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (2/440) 0.46%
Enter Initial Time of Wildlife Sighting	27 Apr 2018 09:50 AM	
Department/Individual Who Reported Wildlife:	Dewatering	
Environment On Scene		
Environment at Call-out Location	27 Apr 2018 10:00 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Same bear from the past week. Stiff lighter brown wi dark strip down the back	
Photo (If Possible):		
Chronological Events		
	9:50 grizzly spotted by dewatering 10:00 ENV on scene 10:15 pushed bear with TRUCK east over A21 haul road 10:25 bear returned to original position 10:30 used TRUCK to push bear south west to tundra south of the south country rock pile 10:45 Issued all announce ENV left scene	
Movement Map (Import NotePlus Site Map)  Appendix 1		
Deterrent Count		Score (2/440) 0.46%
Truck	2	
Air Horn	0	

Question	Response	Details
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		
Environment Off Scene		
End of Environment Call-out	27 Apr 2018 10:45 AM	
Final Location of Wildlife	Tundra south of the SCRP	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Don Roberts	01 May 2018 07:50 AM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-04-30 - Pond 12

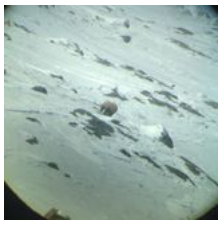
Document No.
WildlifeReport000239

30 Apr 2018

Completed on
01 May 2018

Score
6/441.0 - 1.36%

Audit - 6/441 1.36%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (5/440) 1.14%
Enter Initial Time of Wildlife Sighting	30 Apr 2018 01:20 PM	
Department/Individual Who Reported Wildlife:	Brad - site Services	
Environment On Scene		
Environment at Call-out Location	30 Apr 2018 01:30 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Light brown same bear from weekend	
Photo (If Possible):  Appendix 1		
Chronological Events		
	1:20 snow removal called in bear at WTA SNOW DUMP 1:30 environment on scene used TRUCK to push bear into pond 12 1:40 used TRUCK to push bear. Back into pond 6 1:50 bear laying down on tundra 2:00 usedTRUCK to push bear off AN road south 2:05 used TRUCK to push bear out of A 21 portal 2:10 used TRUCK to push bear south of pond 8 2:45 bear crossed over SCRP road to tundra 2:50 ENV left scene	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 2		

Deterrent Count	Score (5/440) 1.14%
Truck	5
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	

Environment Off Scene	
End of Environment Call-out	30 Apr 2018 02:48 PM
Final Location of Wildlife	Tundra South of SCRP

Closure & Sign-off	Score (1/1) 100.00%
Wildlife Report Complete	On

Signature	Don Roberts	30 Apr 2018 02:52 PM	

Media

Appendix 1

Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-05-14 - Pond 13

Document No.
WildlifeReport000244

14 May 2018

Completed on
19 May 2018

Score
3/441.0 - 0.68%

Audit - 3/441 0.68%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (2/440) 0.46%
Enter Initial Time of Wildlife Sighting	14 May 2018 09:05 AM	
Department/Individual Who Reported Wildlife:	Brock Taylor	
Environment On Scene		
Environment at Call-out Location	14 May 2018 09:30 AM	
Animal Type		
Description (eg. number of individuals, colour, age, size, etc.):	Blonde, young, dark eyes, darker fur strip on back.	

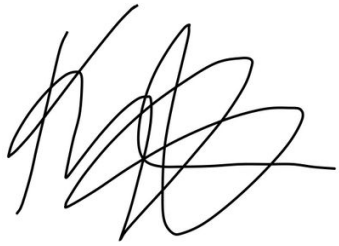
Photo (If Possible):

Appendix 1

Appendix 2

Question	Response	Details
Chronological Events		
	0905 (SS2) bear called in N PKC, Issued bear alert 0940 ENV did not find Bear 1115 bear reported on S Haul Road heading towards C portal 1121 bear in pond 13, crosses haul road towards shallow bays 1127 grazing on tundra next to Veggie plot road 1141 crossed shallow bays heading towards Rose Garden 1217 still grazing in shallow bays near Rose Garden 1242 Bedded down in Rose Garden area 1300 bear got up and started grazing again 1330 KG switch out with SS2. Bear grazing moving slowly south towards camp. 1415 near transformers in shallow bays 1457 made site ANNOUNCEMENT bear near pond 10 on berm. Used TWO BANGERS. Bear looked up and walked down the pond berm. Now travelling south towards communication building. 15:13 lost visual behind comm building on tundra. 15:42 still no visual. 16:00 ENV returned to office	
Movement Map (Import NotePlus Site Map)		
Deterrent Count		Score (2/440) 0.46%
Truck	0	
Air Horn	0	
C/F Bear Banger	2	
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		

Question	Response	Details
Environment Off Scene		
End of Environment Call-out	14 May 2018 04:00 PM	
Final Location of Wildlife	Tundra heading South	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Kyla Gray	19 May 2018 03:48 PM	

Media

Appendix 1

Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly Bear 2018-05-17 Lakeshore Blvd

Document No.
WildlifeReport000245

17 May 2018

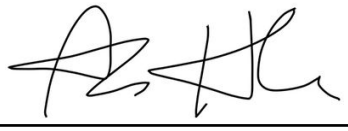
Completed on
19 May 2018

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	17 May 2018 12:00 PM	
Department/Individual Who Reported Wildlife:	Unknown	
Environment On Scene		
Environment at Call-out Location	17 May 2018 12:12 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Same bear. Sandy coloured with brown stripe down back	
Photo (If Possible):		
Chronological Events		
	12:00 ENV received call about grizzly near Lakeshore Blvd on Tundra. ENV issued wildlife alert. 12:12 ENV arrived on scene and got eyes on bear. 14:10 Bear crossed Lakeshore Blvd, ENV used TRUCK to chase bear across road. 14:12 ENV received call of bear between Waste Transfer Area and South Country Rock Pile. ENV did not spot bear on Tundra between Emulsion Plant and AN Storage. 14:45 ENV continued scan around A21 portal with no sight of bear. 15:00 ENV ended call and returned to office 15:48 ENV received call of bear near Zone 2 on Tundra headed out towards the Lake.	
Movement Map (Import NotePlus Site Map)  Appendix 1		

Question	Response	Details
Deterrent Count		Score (1/440) 0.23%
Truck	1	
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		
Environment Off Scene		
End of Environment Call-out	17 May 2018 05:00 PM	
Final Location of Wildlife	Tundra headed towards Lake	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Atikin Hehn	19 May 2018 04:11 PM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-05-19 - A21

Document No.
WildlifeReport000246

19 May 2018

Completed on
20 May 2018

Score
14/441.0 - 3.17%

Audit - 14/441 3.17%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (13/440) 2.96%
Enter Initial Time of Wildlife Sighting	19 May 2018 12:20 PM	
Department/Individual Who Reported Wildlife:	Tyler	
Environment On Scene		
Environment at Call-out Location	19 May 2018 12:50 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Same bear. Sandy coloured with dark stripe down back	
Photo (If Possible):		

Question	Response	Details
Chronological Events		
	1220 ENV Received call about bear at A21 1222 ENV issued alert about bear 1250 ENV arrived on scene and got eyes on bear near South Dike at A21 1253 ENV shot 3 BANGERS in a row, bear ran towards ice then disappeared behind rock 1330 ENV leaves A21. Bear last seen headed toward Zone 2. People working in area notified 13:45 ENV receives call of bear at A21 issues announcement 13:53 ENV arrives on scene and locates bear on ice outside of North Dike A21. ENV uses TRUCK to move bear away from Dike. ENV SHOUTS at bear to move away from Dike 1358 bear moves toward A21 offices 1402 ENV uses HORN 2 times and TRUCK 2 times to move bear 1404 ENV uses TRUCK and HORN to move bear, then uses BANGER to move bear 1410 bear crosses Lakeshore Blvd. ENV uses TRUCK and HORN to cross bear. Bear headed in direction of A21 portal 14:24 ENV lost sight of bear. Bear headed in direction of Pond 6 14:30 ENV left scene	
Movement Map (Import NotePlus Site Map)  Appendix 1		
Deterrent Count		Score (13/440) 2.96%
Truck	5	
Air Horn	4	
C/F Bear Banger	4	
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	0	

Question	Response	Details
12GA B.B. Marker	0	
12GA Rubber Bullet	0	
12GA Slug	0	
Helicopter	0	
Other	0	
Specify		
Environment Off Scene		
End of Environment Call-out	19 May 2018 02:30 PM	
Final Location of Wildlife	Tundra near Pond 6	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Atikin Hehn	20 May 2018 07:55 AM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly -2018-05-21 - A21 Tundra

Document No.
WildlifeReport000249

21 May 2018

Completed on
22 May 2018

Score
5/441.0 - 1.13%

Audit - 5/441 1.13%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (4/440) 0.91%
Enter Initial Time of Wildlife Sighting	21 May 2018 10:50 AM	
Department/Individual Who Reported Wildlife:	Darren - Nuna	
Environment On Scene		
Environment at Call-out Location	21 May 2018 11:00 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Dark brown with lighter shoulders	
Photo (If Possible):  Appendix 1  Appendix 2  Appendix 3		
Chronological Events		
	1050 ENV received call about bear on Tundra headed in direction of A418 pit area 1100 ENV arrived on scene near Pond 11 and got eyes on bear and issues announcement 1115 bear moves toward road, ENV uses TRUCK to move Bear towards Tundra. 1120 bear moves along Tundra and tries to cross Lakeshore Blvd headed toward South Tank Farm area. ENV uses TRUCK to move bear back to Tundra. Bear moves along and starts to cross Lakeshore Blvd. ENV uses TRUCK and HORN to move bear across road. Bear crosses headed in direction of E21 sump and A21 portal. ENV loses sight of bear and continues searching 1150 ENV cannot locate bear and leaves scene	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 4		
Deterrent Count		Score (4/440) 0.91%
Truck	3	
Air Horn	1	
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		
Environment Off Scene		
End of Environment Call-out	21 May 2018 11:50 AM	
Final Location of Wildlife	E21 Sump Area	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Atikin Hehn	22 May 2018 10:50 AM

Media

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly Bear 2018-06-01 - shallow bays

Document No.
WildlifeReport000251

01 Jun 2018

Completed on
01 Jun 2018

Score
2/441.0 - 0.45%

Audit - 2/441 0.45%

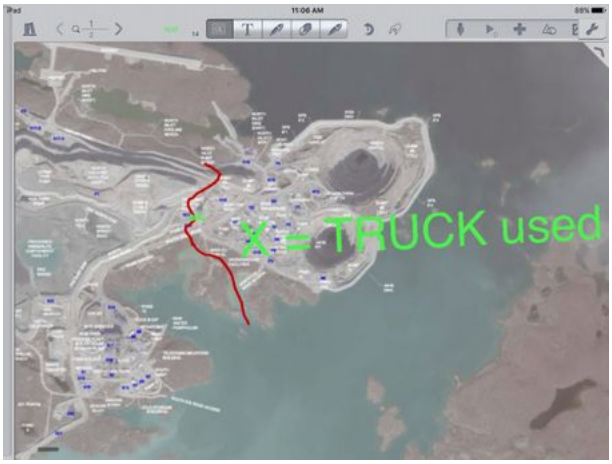
Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (1/440) 0.23%
Enter Initial Time of Wildlife Sighting	01 Jun 2018 10:20 AM	
Department/Individual Who Reported Wildlife:	Geotechnical	
Environment On Scene		
Environment at Call-out Location	01 Jun 2018 10:30 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	1, blonde, same bear that was relocated in 2017	
Photo (If Possible):  Appendix 1  Appendix 2		
Chronological Events		
	10:20 Bear called in chasing caribou in shallow bays, environment called 10:30 on scene, bear missing 10:40 bear moved to backfill plant, environment used TRUCK to push bear north toward north haul road to keep out of yard 10:50 bear on tundra south of north inlet 11:20 bear still in area, environment leaving scene	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 3		
Deterrent Count		Score (1/440) 0.23%
Truck	1	
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		
Environment Off Scene		
End of Environment Call-out	01 Jun 2018 11:22 AM	
Final Location of Wildlife	On tundra south of north inlet	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Mark Nelson	01 Jun 2018 11:24 AM

Media

Appendix 1

Appendix 2



Appendix 3

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-06-06

Document No.
WildlifeReport000254

07 Jun 2018

Completed on
07 Jun 2018

Score
3/441.0 - 0.68%

Audit - 3/441 0.68%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (2/440) 0.46%
Enter Initial Time of Wildlife Sighting	06 Jun 2018 08:00 PM	
Department/Individual Who Reported Wildlife:	Darcy Bourassa	
Environment On Scene		
Environment at Call-out Location	06 Jun 2018 08:00 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	1 grizzly	
Photo (If Possible):		
Chronological Events		
	20:00 sighted bear approaching A418 Dike 20:10 revved engine and bear retreated 20:25 sighted bear again from A154 Dike, revved engine again and bear retreated south across the lake	
Movement Map (Import NotePlus Site Map)		
Deterrent Count		Score (2/440) 0.46%
Truck	2	
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	

Question	Response	Details
12GA Slug	0	
Helicopter	0	
Other	0	
Specify	Revved TRUCK engine on two occasions	
Environment Off Scene		
End of Environment Call-out	06 Jun 2018 08:35 PM	
Final Location of Wildlife	Lac de Gras	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Darcy Bourassa		

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-06-13 Pond 5

Document No.
WildlifeReport000094

13 Jun 2018

Completed on
13 Jun 2018

Score
11/441.0 - 2.49%

Audit - 11/441 2.49%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (10/440) 2.27%
Enter Initial Time of Wildlife Sighting	13 Jun 2018 01:30 AM	
Department/Individual Who Reported Wildlife:	Site Service Brad	
Environment On Scene		
Environment at Call-out Location	13 Jun 2018 01:45 AM	
Animal Type		
Description (eg. number of individuals, colour, age, size, etc.):	Blonde coloured. Looks like the one from last year	

Photo (If Possible):

Appendix 1

Appendix 2

Question	Response	Details
Chronological Events		
		0130 bear was by the warehouse mega dome. Brad (site service supervisor) followed the bear in his Loader as it walked between the Process Plant and Truck shop and all the way into Pond 5. Brad called the area supervisors and informed them of the bear 0145 JG on site. The bear is eating vegetation in pond 5 and is walking toward the middle of the pond 0150 made a site wide notice on the radio of the Bears location 0215 the bear is still feeding in Pond 5 and is to far for bear bangers 0230 drove to the other side of the pond and down into it. The bear saw the truck and headed back the opposite direction 0240 the bear was closer to the road on one side of the pond. Hit it with a rubber bullet 0250 bear left pond 5 and crossed the haul road. Charged it with the truck 0258 the bear went onto the haul road. Charged it with the truck. It ran toward pond 1 0305 made announcement of the Bears location 0310 bear was by pond 1. Hit it with a rubber bullet. It ran out on the haul road and then into Pond 1 0315 bear was in the ditch between pond 1 and the Backfill plant. Hit it with a rubber bullet. It ran out onto the road. 0320 charged the bear with the truck on the road. It ran into the ditch by the Backfill and climbed the berm and went into the Backfill crush area 0325 chased the bear through the Backfill crush area toward the Till pile 0330 fired a bear banger. The bear ran and climb up on onto the NCRP road 0335 bear climbed up and went over the Till Pile 0340 the bear is in the North Inlet area heading west 0350 made an announcement on the radio of current location 0355 JG leaving the area
Movement Map (Import NotePlus Site Map)  Appendix 3		

Question	Response	Details
Deterrent Count		Score (10/440) 2.27%
Truck	5	
Air Horn	0	
C/F Bear Banger	1	
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	3	
12GA Slug	0	
Helicopter	0	
Other	1	
Specify	Front end Loader	
Environment Off Scene		
End of Environment Call-out	13 Jun 2018 03:55 AM	
Final Location of Wildlife	North inlet area heading west	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	JG	13 Jun 2018 11:10 AM	

Media

Appendix 1

Appendix 2

Appendix 3

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-06-16 - Pond 13

Document No.
WildlifeReport000261

16 Jun 2018

Completed on
17 Jun 2018

Score
4/441.0 - 0.91%

Audit - 4/441 0.91%

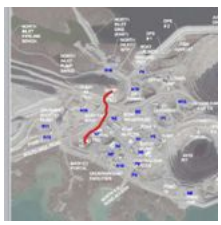
Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (3/440) 0.68%
Enter Initial Time of Wildlife Sighting	16 Jun 2018 08:05 PM	
Department/Individual Who Reported Wildlife:	Underground dispatch	
Environment On Scene		
Environment at Call-out Location	16 Jun 2018 08:20 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde Sow and 2 dark brown cubs	

Photo (If Possible):


Appendix 1


Appendix 2


Appendix 3

Question	Response	Details
Chronological Events		
		2005 bears spotted by C portal 2020 bears feeding in pond 13 2045 bears feeding 2130 bears still feeding 2145 bears slowly walking north. Received another bear call and left the area 2210 bears crossed over to the ditch below the SCAP fab shop 2225 bears crossed south haul road to the north entrance to the backfill 2235 bears grazing in the ditch 2245 cubs started breast feeding and all three bears rolled over to go to sleep. Drove into a pull out to try and keep the bears moving. Bears saw the truck and got up and started walking 2255 bears crossed the north entrance road and are hiding away in the corner out of site. Spoke with the area supervisor and left the bears there. 0300 bears on the move toward pond 13 0315 bears in the ditch between the backfill and south haul road heading south. Drove into a pull out and Blocked off the bears 0325 bears heading north 0350 bears still in the ditch feeding on grass and slowly moving north 0355 bears just below the NCR road. Pulled into a pull out area in the berm of the road. Bears saw the truck and climbed the berm to the NCR road. 0400 bears crossed the road and climbed up and onto the Till dump 0415 bears onto the Till dump, went back into the rocks out of site 0435 no sign of the bears. Made a radio announcement of location.
Movement Map (Import NotePlus Site Map)  Appendix 4		
Deterrent Count		Score (3/440) 0.68%
Truck	3	

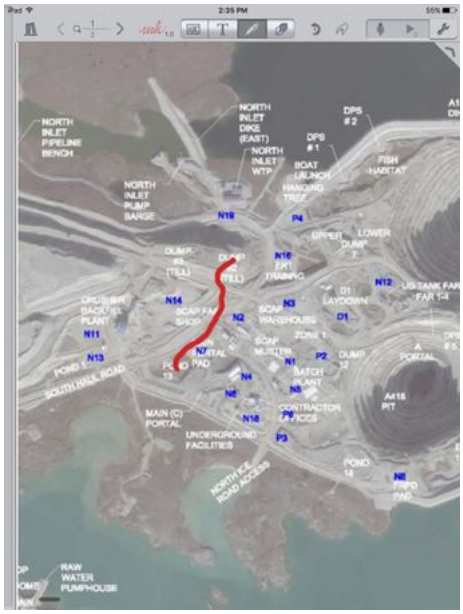
Question	Response	Details
Air Horn	0	
C/F Bear Banger	0	
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	0	
12GA Slug	0	
Helicopter	0	
Other	0	
Specify		
Environment Off Scene		
End of Environment Call-out	16 Jun 2018 04:35 AM	
Final Location of Wildlife	Till dump	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	JG	17 Jun 2018 02:26 PM

Media

Appendix 1

Appendix 2

Appendix 3



Appendix 4

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-06-17 - North Inlet

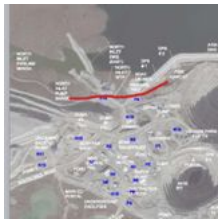
Document No.
WildlifeReport000264

17 Jun 2018

Completed on
17 Jun 2018

Score
3/441.0 - 0.68%

Audit - 3/441 0.68%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (2/440) 0.46%
Enter Initial Time of Wildlife Sighting	17 Jun 2018 09:05 AM	
Department/Individual Who Reported Wildlife:	Lawrence- Site Services	
Environment On Scene		
Environment at Call-out Location	17 Jun 2018 09:05 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Sow and 2 cubs	
Photo (If Possible):		
Chronological Events		
	09:05 ENV receives call of bears on Tundra near North Inlet, issues Announcement 09:46 ENV uses TRUCK and HORN to move bears away from Water Treatment Plant 10:03 ENV leaves scene to looks for other bear 14:20 AH found the bears on the tundra between the hanging tree and the water treatment plant. Radio announcement made and left the bears there 1530 JG found the bears in A154 fish habitat. Made radio announcement and left them there 1700 bears still in the same area grazing	
Movement Map (Import NotePlus Site Map)  Appendix 1		

Question	Response	Details
Deterrent Count		Score (2/440) 0.46%
Truck	1	
Air Horn	1	
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		
Environment Off Scene		
End of Environment Call-out	17 Jun 2018 05:30 PM	
Final Location of Wildlife	A154 fish habitat	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	JG	17 Jun 2018 06:30 PM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-06-18 - D1 Lay down

Document No.
WildlifeReport000265

18 Jun 2018

Completed on
19 Jun 2018

Score
3/441.0 - 0.68%

Audit - 3/441 0.68%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (2/440) 0.46%
Enter Initial Time of Wildlife Sighting	18 Jun 2018 08:00 AM	
Department/Individual Who Reported Wildlife:	Pit Ops	
Environment On Scene		
Environment at Call-out Location	18 Jun 2018 08:15 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde bear from last year (also the Sow and 2 cubs sighting)	

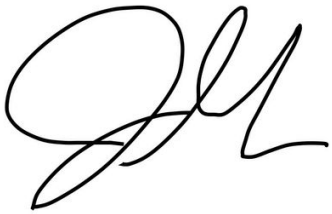
Photo (If Possible):

Appendix 1

Appendix 2

Question	Response	Details
Chronological Events		
	0800 Pit Ops reported the bear in D1 lay down 0815 JG arrived on scene. The bear was feeding on some grass in the lay down. Chased the bear into a near by pond. There is an oil tote in the lay down that the bear has got into. Night shift witnessed the bear eating the oil. There is chew marks on it 0835 chased the bear onto the A418 Dike 0845 bear went down into a grassy area above the A418 pit 0915 bear in the same area feeding 1000 bear in the same area sleeping 1020 still sleeping. Made radio announcement and leaving area 1650 Ken (IT) spotted the bear heading toward to A418 fish habitat 1710 JG on scene. The bear is grazing in the A418 fish habitat 19:30 bear at D1 laydown KG made bear announcement 19:45 KG on scene 20:30 6 piles of fresh bear skat at D1 laydown near totes 20:35 talked with Shayne with Nuna - witnessed bear chewing tote and eating oil contents (unknown contents, light coloured possibly vegetable based?) then would eat grass and then go back to tote contents 20:43 KG saw Sow and 2 cubs bedded on tundra behind ERT training grounds. 20:50 bear at A154 fish habitat near DPS well 2 feeding (same light coloured resident bear) 21:17 bear bedded on rock. Sow with cubs and this bear are within 500-700m of each other.	
Movement Map (Import NotePlus Site Map)  Appendix 3		
Deterrent Count		Score (2/440) 0.46%
Truck	2	
Air Horn	0	
C/F Bear Banger	0	

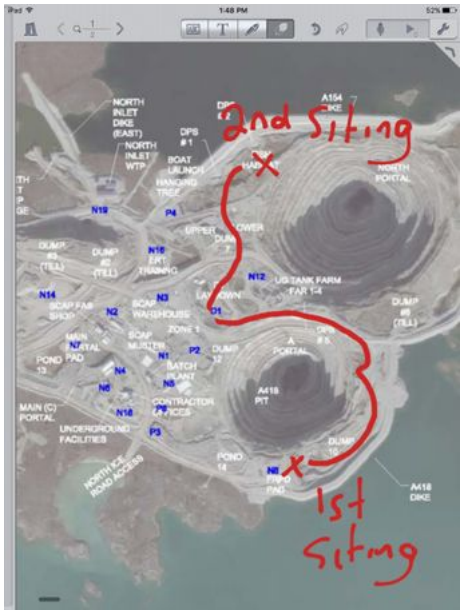
Question	Response	Details
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	0	
12GA Slug	0	
Helicopter	0	
Other	0	
Specify		
Environment Off Scene		
End of Environment Call-out	18 Jun 2018 09:20 PM	
Final Location of Wildlife	A154 fish habitat	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	JG KG	19 Jun 2018 01:49 PM	

Media

Appendix 1

Appendix 2



Appendix 3

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-06-19 - D1 Lay down

Document No.
WildlifeReport000095

19 Jun 2018

Completed on
26 Jun 2018

Score
3/441.0 - 0.68%

Audit - 3/441 0.68%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (2/440) 0.46%
Enter Initial Time of Wildlife Sighting	19 Jun 2018 04:30 PM	
Department/Individual Who Reported Wildlife:	ENV JG	
Environment On Scene		
Environment at Call-out Location	19 Jun 2018 04:30 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde bear from last year	

Photo (If Possible):

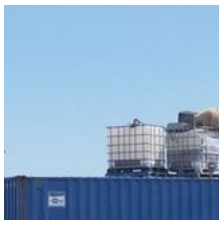

Appendix 1


Appendix 2


Appendix 3


Appendix 4


Appendix 5


Appendix 6

Question	Response	Details
Chronological Events		
	** Env was earlier informed of bear getting into totes in D1, totes were moved on top of sea can as precaution. 1630 found the bear in D1 lay down while doing a search for the bear. The bear was on top a sea can getting into a tote of oil. The bear got down when it saw the truck. Chased the bear toward N3 lay down. 1640 bear crossed the road above me he A418 pit 1650 the bear climbed up the edge of dump 12 and lays down on a pile of rocks 1720 the bear is still laying down on top the rock pile. Made radio announcement and left area 2345 bear spotted by C portal pad 0010 JG on scene. Found the bear in Pond 13 grazing 0020 drove down into Pond area and the bear ran out of the pond and crossed the road to Backfill plant 0027 bear walking on a pipe line 0034 bear lays down on the pipe 0040 bear passed through crush area 0047 bear passed through Backfill area and into Pond 1 0105 bear feeding and slowly moving west 0110 bear climbed up on a rock and lays down 0130 bear sleeping on the rock. Made radio announcement 0140 informed Backfill supervisor of the bear and left the area. 19:00 Env had site services remove totes and take them to the waste transfer area. The contents of the tote are believed to be release agent Alderox ASA-12.	
Movement Map (Import NotePlus Site Map)  Appendix 7		
Deterrent Count		Score (2/440) 0.46%
Truck	2	
Air Horn	0	
C/F Bear Banger	0	
C/F Pen Whistle	0	

Question	Response	Details
12GA Bear Banger	0	
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	0	
12GA Slug	0	
Helicopter	0	
Other	0	
Specify		
Environment Off Scene		
End of Environment Call-out	20 Jun 2018 01:40 AM	
Final Location of Wildlife	Pond 1	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	JG	20 Jun 2018 04:06 AM	

Media

Appendix 1

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Appendix 4

Appendix 5

Appendix 6

Appendix 7

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-06-20 - Pond 5

Document No.
WildlifeReport000096

20 Jun 2018

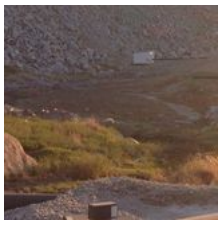
Completed on
21 Jun 2018

Score
10/441.0 - 2.27%

Audit - 10/441 2.27%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (9/440) 2.04%
Enter Initial Time of Wildlife Sighting	20 Jun 2018 03:40 AM	
Department/Individual Who Reported Wildlife:	Site Services	
Environment On Scene		
Environment at Call-out Location	20 Jun 2018 03:55 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde bear from last year. Blonde Sow and 2 dark brown cubs	

Photo (If Possible):


Appendix 1


Appendix 2

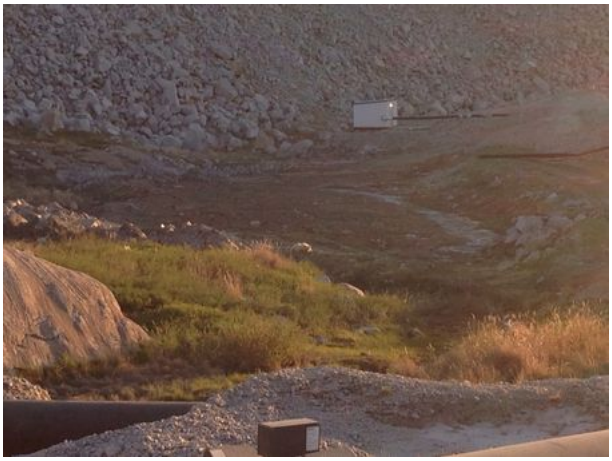

Appendix 3

Question	Response	Details
Chronological Events		
WildlifeReport000096 Grizzly - 2018-06-20 - Pond 5 Score (10/441) 2.27%		0340 bear was spotted on the side of the south Haul road heading to Pond 5 0355 JG arrived on scene and bear is grazing in Pond 5 0410 Bear lays down 0420 bear up and grazing 0440 bear climbed the rocks up towards the PKC. Charged at it with the truck. It went back down the hill and into Pond 5 0500 the bear went to the far side of the pond at the base of the PKC dam and is laying down on a rock 0520 bear sleeping in same spot. Made radio announcement and left the area 06:30 Sow and 2 Cubs called in behind Backfill, KG issues Announcement 06.50 KG and AH spot single Bear in Pond 5 06:55 KG and AH arrive on scene at Pond 1 and spot Sow and 2 Cubs, KG and AH move back to Pond 5 to watch single bear 07:05 KG uses TRUCK 2 times, no movement of bear 07:09 KG throws 2 ROCKS at bear to move bear away from road, uses GUN CYCLE to move bear 07:12 KG and AH leave Pond 5 to check on Sow and Cubs in Pond 1, still in same spot 07:15 KG and AH leave Pond 1 to return to Pond 5 to watch single bear 08:10 single bear disappears in valley beside ROM Road 08:20 KG and AH leave to find Sow and Cubs, search area near Pond 1, Backfill, Pond 13 and Shallow Bays, cannot locate 08:28 KG and AH search Pond 5, cannot spot bear, head back to office 10:45 KG and AH spot Sow and Cubs in Pond 1 11:49 KG and AH check Pond 1, Sow and Cubs still bedded 1500 Sow and Cubs in Pond13. AH followed them as they passed through SCAP area to D1 lay down 1520 JG approached the Sow and Cubs in D1 lay down. They ran toward the core shack, then climbed up onto the A154 road and into dump 7 1525 Bears feeding on Tundra between ERT training grounds and dump 7. Radio announcement made of location 1540 Cubs breast feeding 1550 Bears sleeping 1620 Bears still sleeping. Leaving area to look for other bear 1635 found the other bear in Pond 5. The bear saw the truck and left pond, and crossed the haul road. 1539 bear down by the lake feeding on grass 1620 bear further east on the tundra 1710 bear still feeding in the same area. Sow and Cubs spotted going into A154 fish habitat. Radio announcement made for the location all of the Bears 1730 the single bear is in the same area digging a hole. Maybe trying to get a Sik Sik 1750 single bear still digging a hole 1800 Sow and Cubs still feeding in A154 fish habitat

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 4  Appendix 5		
Deterrent Count		Score (9/440) 2.04%
Truck	6	
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	3	
Specify	Rocks and cycling the action on the gun	
Environment Off Scene		
End of Environment Call-out	20 Jun 2018 08:30 PM	
Final Location of Wildlife	Sow and Cubs in A154 fish habitat. Single bear in A154 Pit area	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Question	Response	Details	
Signature	JG KG AH	21 Jun 2018 01:30 PM	

Media



Appendix 1

Appendix 2

Appendix 3

Appendix 4

Appendix 5

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-06-21 - NIWTP

Document No.
WildlifeReport000268

21 Jun 2018

Completed on
22 Jun 2018

Score
4/441.0 - 0.91%

Audit - 4/441 0.91%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (3/440) 0.68%
Enter Initial Time of Wildlife Sighting	22 Jun 2018 09:30 PM	
Department/Individual Who Reported Wildlife:	Site Services Wayne	
Environment On Scene		
Environment at Call-out Location	22 Jun 2018 09:45 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde bear from last year. Sow and cubs	

Photo (If Possible):


Appendix 1


Appendix 2


Appendix 3

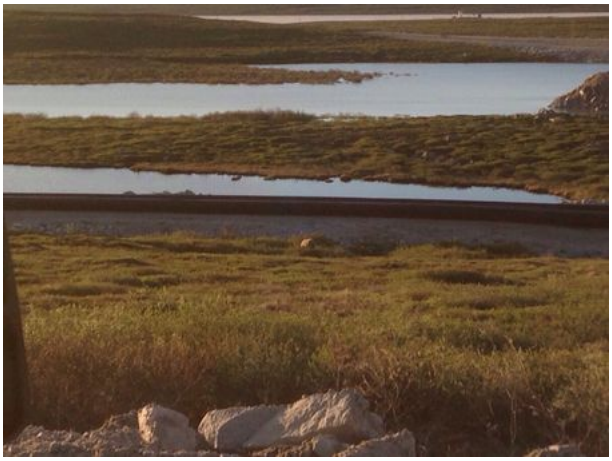

Appendix 4

Question	Response	Details
Chronological Events		
		2130 Wayne from Site Services was driving by the Water Treatment Plant and saw the bear stick its head out of the Non burnable bin out side of the Water Treatment Plant. Wayne drove up to the bin and the bear climbed out, and then walked out onto the tundra toward the airport. 2145 JG arrived on scene and the bear was out on the tundra grazing 2205 bear walking alone the north inlet pipe line 2215 bear still walking by the pipe line heading west. Leaving to respond to a call about the Sow and cubs 2220 JG on scene. The Sow and 2 cubs are in Pond 13. Radio announcement made for the location of the bears 2240 bears grazing. Drove down into the pond. The Sow saw the truck and started walking away 2300 bears went to far corner of the pond. Drove around to the other side of the pond above the bears. Made some noise by clapping. The Sow looked toward the noise then started walking away 2325 the bears left the pond and crossed A418 road and went down onto the tundra. Chased the bears further away from the road. 0040 bears by the lake grazing 0055 bears laying down 0120 bears sleeping. Radio announcement of location made. JG leaving area
Movement Map (Import NotePlus Site Map)  Appendix 5  Appendix 6		
Deterrent Count		Score (3/440) 0.68%
Truck	2	
Air Horn	0	
C/F Bear Banger	0	
C/F Pen Whistle	0	
12GA Bear Banger	0	

Question	Response	Details
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	0	
12GA Slug	0	
Helicopter	0	
Other	1	
Specify	Clapping	
Environment Off Scene		
End of Environment Call-out	22 Jun 2018 01:30 AM	
Final Location of Wildlife	Single bear in north inlet. Sow and cubs on the tundra across from C portal	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	JG	22 Jun 2018 06:10 AM	

Media



Appendix 1

Appendix 2

Appendix 3

Appendix 4

Appendix 5

Appendix 6

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-06-22 - Pond 1

Document No.
WildlifeReport000269

22 Jun 2018

Completed on
23 Jun 2018

Score
14/441.0 - 3.17%

Audit - 14/441 3.17%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (13/440) 2.96%
Enter Initial Time of Wildlife Sighting	22 Jun 2018 05:15 AM	
Department/Individual Who Reported Wildlife:	Site Services	
Environment On Scene		
Environment at Call-out Location	22 Jun 2018 05:45 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Sow and cubs	

Photo (If Possible):


Appendix 1


Appendix 2


Appendix 3

Question	Response	Details
Chronological Events		
		0515 Bears spotted by Pond 13 0530 Bears by backfill plant going into pond 1 0545 JG on scene. The bears are grazing in pond 1 0620 deterred bears by clapping hands. Bears started walking west 0640 bears just passed the pond 1 entrance heading west 0700 bears grazing and slowly moving west 0710 bears crossed the haul road and went out onto the Vegetation plots 0720 bears went out onto the tundra just south of the vegetation plots and then out of site. 0735 bears out of site 0745 found the bears on the shoreline of the lake walking west 0800 Bears across South haul road from pond 5 0810 bears went into pond 5 08:45 AH and MN have eyes on Sow and Cubs in Pond 5 10:23 AH and MN use TRUCK and HAND CLAP to move bears, no reaction, use AIR HORN twice, no reaction 1140 JG switched out. Bears grazing in the same area 1210 cubs are breastfeeding 1230 bears taking a nap 1245 drove down into pond area to try and them moving. Sow saw the truck and started walking. The cubs followed her for about 10 feet then laid back down. The Sow stopped and laid down to 1330 bears up and grazing 1345 shot a rubber bullet at the Sow. She ran a little bit then stopped. May have missed the shot or was a little to far for it to have much effect 1445 hit Sow with a rubber bullet. The bears ran for a bit then started walking. They left the pond, crossed the haul road, went out onto the tundra heading east 1505 bears on the old Rose Garden 1525 bears on the tundra across from pond 1 heading east 1555 bears still in the same area. Cubs breastfeeding 1615 bears in the water in west shollow bay. The cubs are playing and the Sow is laying down 16:30 AH switched out, bears still snacking in Shallow Bays 16:45 AH received call of bear on Tundra between A154 Dike and NIWTP 16:55 AH receives call of Sow and Cubs crossing road to Pond 13, AH has eyes on bears 17:20 AH uses ROCKS to move bears away from Road 1755 Bears laying down. JG fired 2 bear bangers. Bears got up looked around and laid back down, but then got up and started walking 1813 fired another banger to get them moving 1830 crossed haul road to backfill 1845 used truck to chase bears out of backfill area and up the till dump 19 bears last spotted on top the Till dump

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 4		
Deterrent Count		Score (13/440) 2.96%
Truck	3	
Air Horn	2	
C/F Bear Banger	3	
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	2	
12GA Slug	0	
Helicopter	0	
Other	3	
Specify	Hand clap. Rocks	
Environment Off Scene		
End of Environment Call-out	22 Jun 2018 07:00 PM	
Final Location of Wildlife	Till dump	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Question		Response	Details
Signature	JG AH MN	23 Jun 2018 01:42 PM	

Media

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-06-23 - D1 Lay down

Document No.
WildlifeReport000270

23 Jun 2018

Completed on
24 Jun 2018

Score
4/441.0 - 0.91%

Audit - 4/441 0.91%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (3/440) 0.68%
Enter Initial Time of Wildlife Sighting	23 Jun 2018 12:10 PM	
Department/Individual Who Reported Wildlife:	Site Services Clayton	
Environment On Scene		
Environment at Call-out Location	22 Jun 2018 12:35 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde bear from last year	

Photo (If Possible):


Appendix 1


Appendix 2


Appendix 3

Question	Response	Details
Chronological Events		
	1210 bear spotted passing through D1 Lay down 1235 JG searching for the bear 1250 found the bear on the Tundra by A418 south Dike entrance Laying down 1345 bear sleeping. Made radio announcement of location and leaving area 1430 bear spotted going into the A418 fish habitat 1610 bear spotted going through the old mine dry area 1635 JG found the bear in pond 13 1645 drove into pond 13 and chased the bear out and across the haul to the ditch by the backfill plant 1655 fired a banger. Bear ran a little then started walking 1710 bear went to the backfill crush area and over by the north entrance 1725 bear crossed the road over to the till dump 1730 bear climbed to the top of the Till dump 1745 chased the bear off the till pile towards the north inlet 1757 bear is in the north inlet area 1810 bear crossed the north inlet Dike (east side) and is walking north	
Movement Map (Import NotePlus Site Map)  Appendix 4		
Deterrent Count		Score (3/440) 0.68%
Truck	2	
Air Horn	0	
C/F Bear Banger	1	
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	0	
12GA B.B. Marker	0	

Question	Response	Details
12GA Rubber Bullet	0	
12GA Slug	0	
Helicopter	0	
Other	0	
Specify		
Environment Off Scene		
End of Environment Call-out	23 Jun 2018 06:15 PM	
Final Location of Wildlife	North inlet/ airport	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	JG	24 Jun 2018 07:51 AM	

Media

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-06-23 - North Inlet

Document No.
WildlifeReport000271

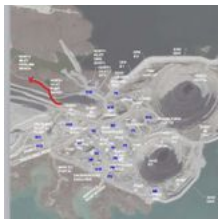
23 Jun 2018

Completed on
24 Jun 2018

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	23 Jun 2018 02:15 PM	
Department/Individual Who Reported Wildlife:	Pit Ops	
Environment On Scene		
Environment at Call-out Location	23 Jun 2018 02:25 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Sow and cubs	
Photo (If Possible):  Appendix 1  Appendix 2  Appendix 3		
Chronological Events		
	1420 Pit Ops spotted the bear at the Till dump/ ring road intersection 1425 Atikin and Mark were close by and responded. They charged the bears toward the North Inlet 1435 bears on the NCRP side of the airport 1445 called JG and left area 1500 JG arrived on scene. Found the bears and they crossed the airport road over to the north inlet 1515 Sow laying down 1530 bears still laying down	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 4		
Deterrent Count		Score (1/440) 0.23%
Truck	1	
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		
Environment Off Scene		
End of Environment Call-out	23 Jun 2018 03:30 PM	
Final Location of Wildlife	North Inlet	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

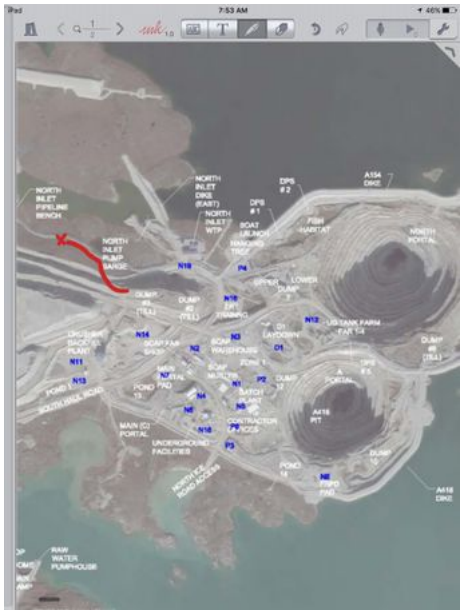
Question		Response	Details
Signature	AH MN JG	24 Jun 2018 07:55 AM	

Media

Appendix 1

Appendix 2

Appendix 3



Appendix 4

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-06-24 - Pond 1

Document No.
WildlifeReport000272

24 Jun 2018

Completed on
25 Jun 2018

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	24 Jun 2018 04:45 AM	
Department/Individual Who Reported Wildlife:	Nuna	
Environment On Scene		
Environment at Call-out Location	24 Jun 2018 05:20 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde bear from last year	

Photo (If Possible):

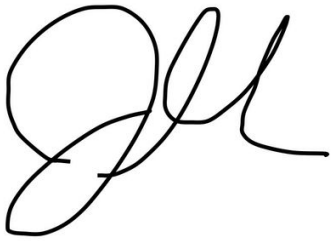
Appendix 1

Appendix 2

Appendix 3

Question	Response	Details
Chronological Events		
	0445 the bear was spotted going through the backfill plant yard 0500 bear in pond 1 0520 bear climbed up the rock pile just below the North haul road and laid down 0535 bear still laying down. Made radio announcement and left area 0715 bear still sleeping in same area 0745 still sleeping 1400 bear spotted going up the Process ROM road 1430 JG found the bear outside the waste transfer area and chased it withe truck. The bear ran on the tundra toward the AN road. 1500 bear grazing on the side of the AN road 1505 bear crossed the AN road and went on to the SCR till dump 1515 bear in the E21 pod area 1524 crossed over the SCRP entrance 1540 bear by A21 causeway. Made radio announcement of location and left the area	
Movement Map (Import NotePlus Site Map)  Appendix 4		
Deterrent Count		Score (1/440) 0.23%
Truck	1	
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	

Question	Response	Details
12GA Slug	0	
Helicopter	0	
Other	0	
Specify		
Environment Off Scene		
End of Environment Call-out	24 Jun 2018 03:50 PM	
Final Location of Wildlife	A21 causeway	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	JG	25 Jun 2018 03:18 PM	

Media

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly- 2018-06-25 - Main Accommodations

Document No.
WildlifeReport000273

25 Jun 2018

Completed on
26 Jun 2018

Score
9/441.0 - 2.04%

Audit - 9/441 2.04%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (8/440) 1.82%
Enter Initial Time of Wildlife Sighting	25 Jun 2018 02:45 PM	
Department/Individual Who Reported Wildlife:	Site Services Mike	
Environment On Scene		
Environment at Call-out Location	25 Jun 2018 02:55 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde bear from last year	

Photo (If Possible):

Appendix 1

Question	Response	Details
Chronological Events		
	1445 bear in front of main accommodations front door approx 10m. Site Services chased it away from the front. It went back to the front. 1455 Darcy on scene. Bear was unresponsive to his truck 1500 JG on scene. Bear started crossing the road. Chased it toward the warehouse mega dome. 1503 bear in pond 10 1505 JG fired 2 bear bangers. The bear ran a few feet then stopped and started eating grass 1515 bear still in pond 10 1525 shot the bear with 2 rubber bullets. It ran out of the pond and down by the lake. Bear is heading north 1535 bear on the tundra across from pond 5 1545 bear laying down 1620 bear up and moving east 1640 bear digging a hole on the tundra 1700 bear still digging. Looks like a potential den. The bear is all the way inside. Made announcement and left the area 1735 bear at the base of the the ROM 1745 bear started climbing the hill by the ROM light vehicle road 1750 drove up the road, pulled out the gun to use rubber bullets. The bear ran down the hill when he saw the gun. 1752 bear is in Pond 5 1808 fired a banger. The bear started walking 1837 fired 2 12 gauge bangers. The bear ran to the far corner of the pond and laid down on some boulders 1907 sleeping behind some boulders. ENV leaves scene and makes announcement of location.	
Movement Map (Import NotePlus Site Map)  Appendix 2		
Deterrent Count		Score (8/440) 1.82%
Truck	1	
Air Horn	0	

Question	Response	Details
C/F Bear Banger	3	
C/F Pen Whistle	0	
12GA Bear Banger	2	
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	2	
12GA Slug	0	
Helicopter	0	
Other	0	
Specify		
Environment Off Scene		
End of Environment Call-out	25 Jun 2018 07:00 PM	
Final Location of Wildlife	Pond 5	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Kyla Gray	26 Jun 2018 01:15 PM	

Media

Appendix 1

Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-06-25 Process Plant

Document No.
WildlifeReport000274

26 Jun 2018

Completed on
26 Jun 2018

Score
9/441.0 - 2.04%

Audit - 9/441 2.04%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (8/440) 1.82%
Enter Initial Time of Wildlife Sighting	26 Jun 2018 01:00 AM	
Department/Individual Who Reported Wildlife:	Brad site Services	
Environment On Scene		
Environment at Call-out Location	26 Jun 2018 01:30 AM	
Animal Type		
Description (eg. number of individuals, colour, age, size, etc.):	Blonde resident bear	
Photo (If Possible):		
Chronological Events		
	01:00 security called KG bear at Process plant sizer. ENV makes announcement. 01:30 ENV on scene. Bear is on small tundra patch behind SS line near the process plant LV road. Brad says bear is persistent on trying to move towards sizer area. ENV Has loader operator toss rocks to get bear moving. Bear moves up and over rock pile slowly. ENV goes up onto LV road to chase bear. ENV finds bear and moves it SW towards test piles. Uses TRUCK x3. 02:10 bear now near south PKC by test piles. ENV updates announcement. BANGERS x2 02:20 bear crosses AN road ENV uses TRUCK to charge. 02:59 bear on tundra slowly moving west. ENV leaves. 08:20 Sow and two cubs at backfill load out. ENV issues announcement. 08:35 ENV on scene finds bears in ditch uses BANGERS x2. Bears moves to far north end of backfill load out. ENV uses TRUCK to get them moving up the rock pile. Bears cross haul road and go up till pile. Loose visual. 09:34 still no visual. Talked with site Services and it was mentioned single grizzly was seen on top of the burnables bin outside the north inlet water treatment plant over the weekend. 09:40 ENV leaves.	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 1		
Deterrent Count		Score (8/440) 1.82%
Truck	2	
Air Horn	0	
C/F Bear Banger	4	
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	2	
Specify	Rocks	
Environment Off Scene		
End of Environment Call-out	26 Jun 2018 09:40 AM	
Final Location of Wildlife	Bear - last seen on tundra near AN road and sow and cubs near NCRP till pile	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Question		Response	Details
Signature	Kyla Gray	26 Jun 2018 01:32 PM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-06-29 - Crusher Rom

Document No.
WildlifeReport000276

29 Jun 2018

Completed on
02 Jul 2018

Score
3/441.0 - 0.68%

Audit - 3/441 0.68%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (2/440) 0.46%
Enter Initial Time of Wildlife Sighting	29 Jun 2018 03:00 AM	
Department/Individual Who Reported Wildlife:	Pit Ops Mike	
Environment On Scene		
Environment at Call-out Location	29 Jun 2018 09:00 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Sow and two cubs	
Photo (If Possible):  Appendix 1		
Chronological Events		
	0300 Sow and 2 cubs reported behind berm off N haul road near Crusher ROM, issued bear alert. TRUCK used to keep Bears of N haul road 0319 Sow and 2 cubs headed up and over till pile, crossed airport road onto Tundra and heading towards airport 2045 Clayton called in Sow and 2 cubs in Crusher load out 2100 ENV on scene. Bears in grass patch in NE corner of yard 2120 bears crossed N Haul Road towards base of Till Pile. Used TRUCK to move towards ERT Training Grounds 2143 bears in A154, updated bar alert, ENV out	

Question	Response	Details
Movement Map (Import NotePlus Site Map)		

Appendix 2

Deterrent Count	Score (2/440) 0.46%
Truck	2
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	

Environment Off Scene	
End of Environment Call-out	29 Jun 2018 09:45 PM
Final Location of Wildlife	A154

Closure & Sign-off			Score (1/1) 100.00%
Wildlife Report Complete	On		
Signature	Shelby Skinner	02 Jul 2018 07:49 AM	

Media

Appendix 1

Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly-2018-07-01 North Inlet

Document No.
WildlifeReport000001

01 Jul 2018

Completed on
02 Jul 2018

Score
4/441.0 - 0.91%

Audit - 4/441 0.91%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (3/440) 0.68%
Enter Initial Time of Wildlife Sighting	01 Jul 2018 04:00 PM	
Department/Individual Who Reported Wildlife:	Site services	
Environment On Scene		
Environment at Call-out Location	01 Jul 2018 04:05 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde resident bear	
Photo (If Possible):		
Chronological Events		
	16:00 bear called on bins at the WTP. Bear alert issued. 16:05 environment on scene. Bear climbed down bin into pipeline ditch, heading towards hanging tree on pipeline. 16:15 bear grazing bear hanging tree, used ROCKS 2x, Bear moved slightly. 16:20 bear moved back towards WTP along pipeline. 16:22 used TRUCK to move bear towards North Inlet tundra. 16:25 bear grazing on tundra north of WTP, ENV out	
Movement Map (Import NotePlus Site Map)		
Deterrent Count		Score (3/440) 0.68%
Truck	1	
Air Horn	0	
C/F Bear Banger	0	
C/F Pen Whistle	0	
12GA Bear Banger	0	

Question	Response	Details
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	0	
12GA Slug	0	
Helicopter	0	
Other	2	
Specify	Rocks	
Environment Off Scene		
End of Environment Call-out	01 Jul 2018 04:25 PM	
Final Location of Wildlife	NIWTP	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	02 Jul 2018 08:20 AM	

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-07-02 - N Winter Road Approach

Document No.
WildlifeReport000278

02 Jul 2018

Completed on
08 Jul 2018

Score
10/441.0 - 2.27%

Audit - 10/441 2.27%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (9/440) 2.04%
Enter Initial Time of Wildlife Sighting	02 Jul 2018 12:30 PM	
Department/Individual Who Reported Wildlife:	Darrell - UG	
Environment On Scene		
Environment at Call-out Location	02 Jul 2018 12:50 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde resident bear	
Photo (If Possible):		
Chronological Events		
	1230 Bear called in at N Winter Road Approach heading towards C Portal, issued bear alert 1250 ENV on scene, bear in Pond 13, updated bear alert 1430 bear went up rock wall into C Pad, lost visual 1445 bear in Pond 13, CYCLED gun, ran and crossed S Haul Road into Backfill, updated bear alert 1502 used TRUCK to move bear into Pond 1 1530 bear crossed S Haul Road into West Bays, fired EXPLOSIVE x2, bear ran towards lakeshore 1635 threw ROCKS, used TRUCK, bear crossed S Haul Road into Pond 5 1648 used ROCKS x2, CYCLED gun 4x, over slightly 2000 bear called in at Pond 10, updated bear alert 2020 ENV on scene, CYCLYED gun, no reaction 2100 bear walking along shoreline from Fresh Water Uptake towards S Winter Road Approach 2115 bear on ice heading NE 2130 ENV off scene, updated bear alert	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 1		
Deterrent Count		Score (9/440) 2.04%
Truck	2	
Air Horn	0	
C/F Bear Banger	0	
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	2	
12GA B.B. Marker	0	
12GA Rubber Bullet	0	
12GA Slug	0	
Helicopter	0	
Other	5	
Specify	3 rocks thrown, gun cycled 2 times	
Environment Off Scene		
End of Environment Call-out	04 Jul 2018 09:30 PM	
Final Location of Wildlife	On ice heading E from Diavik	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Shelby Skinner	04 Jul 2018 06:20 PM

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-07-03 - WTA

Document No.
WildlifeReport000003

03 Jul 2018

Completed on
06 Jul 2018

Score
22/441.0 - 4.99%

Audit - 22/441 4.99%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (21/440) 4.77%
Enter Initial Time of Wildlife Sighting	03 Jul 2018 12:00 AM	
Department/Individual Who Reported Wildlife:	Site Services	
Environment On Scene		
Environment at Call-out Location	03 Jul 2018 12:21 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde resident bear	

Photo (If Possible):


Appendix 1


Appendix 2


Appendix 3

Question	Response	Details
Chronological Events		
	1200 Security called in bear at WTA, no visual 0100 still no visual, updated bear alert 0800 Mike with Geotechnical called in bear at Pond 12, updated bear alert 0815 ENV on scene, bear laying in mud in Pond 12 0820 used TRUCK and ROCK x2, bear moved towards tag in shack 0830 bear trying to cross new light vehicle road, used ROCK x2 bear moved back towards tag in shack 0900 updated bear alert 0930 used AIR HORN x3, bear crossed Pond 12 road and climbed up on berm around WTA 0945 lost visual of bear 1025 bear crossed N Haul Road 1030 bear in Pond 5, threw ROCKS x5, no response. Used AIRHORN 2x, no response. updated bear alert 10:55 KG on scene. Uses RUBBER BULLET. hits hind quarter bear moves 20 metres and stops 11:10 bear grazing in Pond 5 sniffing air 11:20 used TRUCK x2 BANGERS x2 bear walks 30 metered over rock and beds down 11:33 bear sleeping ENV leaves to office 17:30 ENV gets call bear Is near bay door 10 at Process plant ROM. ENV issues advisory. 17:30 env sees bear on black pipe going west. Bay door and man door open 200m away. KG tells process plant operator to have doors shut. 17:40 bear crossed north haul road to old pkc muster station. 17:09 bear on tundra between test piles and south pkc. ENV updates advisory. Loose visual. 18:50 found bear digging large hole. Bear fits all the way in. See photos 19;15 bear hanging around hole, crawls back in a few times 19:22 bear try's to cross AN road to waste transfer. Bear is on road berm.Uses TRUCK to stop bear. Bear goes back down berm and travels west. 19:45 bear still moving west. Safe distance. ENV leaves scene.	
Movement Map (Import NotePlus Site Map)		
Deterrent Count		Score (21/440) 4.77%
Truck	4	
Air Horn	5	

Question	Response	Details
C/F Bear Banger	2	
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	1	
12GA Slug	0	
Helicopter	0	
Other	9	
Specify	Rock	
Environment Off Scene		
End of Environment Call-out	03 Jul 2018 07:45 PM	
Final Location of Wildlife	AN Road	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	06 Jul 2018 10:12 AM	

Media

Appendix 1

Appendix 2

Appendix 3

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-07-08 - North Inlet

Document No.
WildlifeReport000279

08 Jul 2018

Completed on
09 Jul 2018

Score
13/441.0 - 2.95%

Audit - 13/441 2.95%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (12/440) 2.73%
Enter Initial Time of Wildlife Sighting	08 Jul 2018 04:15 PM	
Department/Individual Who Reported Wildlife:	Site Services Daniel	
Environment On Scene		
Environment at Call-out Location	08 Jul 2018 04:25 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Resident bear.	
Photo (If Possible):		
Chronological Events		
	4:15- got call from site Services about grizzly on tundra at the North Inlet. 4:25- Environment on scene. 4:30- shot EXPLOSIVE at bear but no response. 5:10- shot a B.B. MARKER at bear but no response. 5:21- shot 3 C/F BEAR BANGERs, first one bear moved slightly but was not responding to the other two. 5:35- used TRUCK to push away from road. 5:43- shot and hit bear with RUBBER BULLET. Bear moved out of sight but returned. When pointed at again with gun he went out of sight. 6:15- used TRUCK to push over the berm. 6:23- shot one C/F BEAR BANGER but no response. 6:26- shot three C/F BEAR BANGERs but no response. 6:28- Environment left bear in the tundra behind the NIWTP.	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 1		
Deterrent Count		Score (12/440) 2.73%
Truck	2	
Air Horn	0	
C/F Bear Banger	7	
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	1	
12GA B.B. Marker	1	
12GA Rubber Bullet	1	
12GA Slug	0	
Helicopter	0	
Other	0	
Specify		
Environment Off Scene		
End of Environment Call-out	08 Jul 2018 06:20 PM	
Final Location of Wildlife	On tundra behind WTP	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Question		Response	Details
Signature	Shelby Skinner	09 Jul 2018 09:47 AM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-07-25 - Backfill Crusher

Document No.
WildlifeReport000005

25 Jul 2018

Completed on
28 Jul 2018

Score
6/441.0 - 1.36%

Audit - 6/441 1.36%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (5/440) 1.14%
Enter Initial Time of Wildlife Sighting	25 Jul 2018 02:00 PM	
Department/Individual Who Reported Wildlife:	Pit Ops / Clayton	
Environment On Scene		
Environment at Call-out Location	25 Jul 2018 02:30 PM	
Animal Type		
Description (eg. number of individuals, colour, age, size, etc.):	Blonde resident bear	
Photo (If Possible):		
Chronological Events		
	1400 Bear called in at the Backfill ROM, crossed N Haul Road and went up to the Till Pile 1415 Bear crossed N Haul Road into Backfill Crusher yard 1430 ENV on scene 1700 Bear spotted grazing in Pond 1 1705 Bear crossed Haul Road into shallow bays, updated bear alert 1710 used 3 ROCKS, bear ran over electrical lines in Shallow Bays 1730 Bear ran along shoreline, crossed Haul Road into Pond 5, used RUBBER BULLET and bear moved 20 m, updated bear alert and closed walking trail 1757 CYCLED GUN, bear moved 20 m	
Movement Map (Import NotePlus Site Map)		
Deterrent Count		Score (5/440) 1.14%
Truck	0	
Air Horn	0	
C/F Bear Banger	0	

Question	Response	Details
C/F Pen Whistle	0	
12GA Bear Banger	0	
12GA Explosive	0	
12GA B.B. Marker	0	
12GA Rubber Bullet	1	
12GA Slug	0	
Helicopter	0	
Other	4	
Specify	3 rocks thrown, gun cycled once	
Environment Off Scene		
End of Environment Call-out	25 Jul 2018 06:10 PM	
Final Location of Wildlife	Pond 5	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Shelby Skinner	28 Jul 2018 07:50 AM	

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Bear-2018-08-02

Document No.
WildlifeReport000282

02 Aug 2018

Completed on
03 Aug 2018

Score
5/441.0 - 1.13%

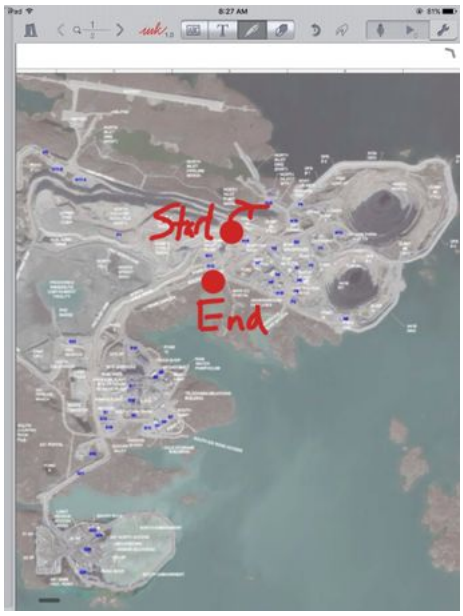
Audit - 5/441 1.13%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (4/440) 0.91%
Enter Initial Time of Wildlife Sighting	02 Aug 2018 04:45 PM	
Department/Individual Who Reported Wildlife:	Clayton- pit supervisor	
Environment On Scene		
Environment at Call-out Location	02 Aug 2018 04:50 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Resident bear	
Photo (If Possible):  Appendix 1		
Chronological Events		
	16:45 Clayton called bear going from Crusher across north Haul Road to the till pile. 16:50 ENV on scene, bear across Till Pile. 16:52 used TRUCK to push bear across Till Pile 16:54 used TRUCK to push bear. 17:08 used TRUCK to push bear slightly down till pile but bear returned to the top. 17:11 used ROCKs to try and mov bear off a rock on the till pile. 17:39 bear sleeping on rock at the top of Till Pile, environment left the bear sleeping. 19:30 bear spotted at Backfill Plant, updated bear alert 20:00 ENV on scene no visual of bear 20:15 bear spotted in West Shallow Bays digging, update bear alert 20:22 ENV off scene	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 2		
Deterrent Count		Score (4/440) 0.91%
Truck	3	
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	Rocks	
Environment Off Scene		
End of Environment Call-out	02 Aug 2018 08:25 PM	
Final Location of Wildlife	West Shallow Bays	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Shelby Skinner	03 Aug 2018 08:29 AM

Media

Appendix 1



Appendix 2

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Bear- 2018-08-05 - Base of Till Pile

Document No.
WildlifeReport000284

05 Aug 2018

Completed on
07 Aug 2018

Score
4/441.0 - 0.91%

Audit - 4/441 0.91%

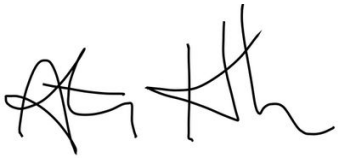
Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (3/440) 0.68%
Enter Initial Time of Wildlife Sighting	05 Aug 2018 03:05 PM	
Department/Individual Who Reported Wildlife:	Environment	
Environment On Scene		
Environment at Call-out Location	05 Aug 2018 03:05 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	One dark faced grizzly with a white plug/tag in right ear. One lighter aced grizzly with a white plug/tag in left ear.	
Photo (If Possible):  Appendix 1  Appendix 2  Appendix 3  Appendix 4  Appendix 5		
Chronological Events		
	15:05 Two Grizzlies spotted walking down Till Pile. 15:05 issued bear alert. 15:14 the two Grizzlies went into ERT training area. 15:20 bears running down south haul road. 15:21 issued updated bear alert. 15:24 used TRUCK to push bears off haul road into C-Portal area. 15:26 issued updated bear alert. 15:45 used TRUCK to push bears off road towards the Veggie plots. 15:49 used TRUCK. 16:04 issued updated bear alert for bears in the shallow Bay Area. 16:07 environment left bears in the shallow Bay Area.	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 6		

Deterrent Count	Score (3/440) 0.68%
Truck	3
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	

Environment Off Scene	
End of Environment Call-out	05 Aug 2018 04:07 PM
Final Location of Wildlife	Shallow Bays

Closure & Sign-off	Score (1/1) 100.00%
Wildlife Report Complete	On

Signature	Atikin Hehn	07 Aug 2018 07:17 AM	

Media

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Appendix 5

Appendix 6

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-08-06 - Pond 5

Document No.
WildlifeReport000285

06 Aug 2018

Completed on
07 Aug 2018

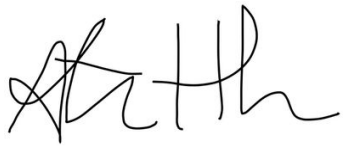
Score
10/441.0 - 2.27%

Audit - 10/441 2.27%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (9/440) 2.04%
Enter Initial Time of Wildlife Sighting	06 Aug 2018 06:30 AM	
Department/Individual Who Reported Wildlife:		
Environment On Scene		
Environment at Call-out Location	06 Aug 2018 06:40 AM	
Animal Type		
Description (eg. number of individuals, colour, age, size, etc.):	2 Grizzlies; one sandy coloured and one darker brown	
Photo (If Possible):		

Question	Response	Details
Chronological Events		
	06:30 Bears called in near Truck Shop heads to Pond 5, ENV issues alert 06:40 ENV arrives on scene at Pond 5 06:47 AH uses ROCKS to move bears away from ROM direction 07:02 AH uses GUN CYCLE, 1 bear (sandy coloured) moves, no reaction from darker bear 07:15 bears cross South Haul Road to Shallow bays area 07:40 AH leaves scene, bears in Shallow Bays moving toward Rose Garden 08:20 AH returns to Rose Garden and has eyes on bears 09:12 AH leaves scene, bears grazing in Rose Garden 11:07 ENV receives call of bears crossing South Haul Road to Pond 1, ENV updates alert 11:40 AH fires BANGER, bears move away from Pond, then move to base of rock adjacent to Pond 1. 12:00 AH loses sight of bears in grassy area of Pond 1 12:30 ENV leaves scene. No sign of bears 16:20 Bears called in near pipeline along South Haul Road 16:30 AH spots bears in Shallow Bays near Veggie Plots 16:48 AH fires 2 BANGER to move bears to Veggie Plots 16:53 AH throws ROCKS to move bears 17:25 ENV updates announcement and leaves scene 19:20 ENV receives all of bears in Pond 1, updates announcement 19:25 AH arrives on scene, fires BANGER to move bears 19:30 AH fires 2 BANGERS to move bears, bears move to base of rocks in Pond 1 19:50 AH uses TRUCK to move bears across South Haul Road to Shallow Bays near Rose Garden 20:12 AH leaves scene, bears snacking in Rose Garden	
Movement Map (Import NotePlus Site Map)  Appendix 1		
Deterrent Count		Score (9/440) 2.04%
Truck	1	
Air Horn	0	

Question	Response	Details
C/F Bear Banger	6	
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	2	
Specify	1 rocks, 1 gun cycle	
Environment Off Scene		
End of Environment Call-out	06 Aug 2018 08:12 PM	
Final Location of Wildlife	Rose Garden	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	

Signature	Atikin Hehn	07 Aug 2018 07:15 AM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-08-09 - Shallow Bays

Document No.
WildlifeReport000007

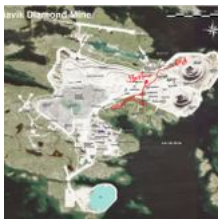
09 Aug 2018

Completed on
11 Aug 2018

Score
9/441.0 - 2.04%

Audit - 9/441 2.04%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (8/440) 1.82%
Enter Initial Time of Wildlife Sighting	09 Aug 2018 06:00 AM	
Department/Individual Who Reported Wildlife:	Jimmy - Pit Ops	
Environment On Scene		
Environment at Call-out Location	09 Aug 2018 06:20 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	2 grizzlies; 1 blonde, 1 darker blonde	
Photo (If Possible):		
Chronological Events		
	06:00 ENV receives call of bears at Crusher, issues announcement, heads out 06:20 ENV receives call of bears heading to C Portal, updates announcement 06:45 AH spots bears in Shallow Bays 06:50 AH fires BANGER to move bears 07:10 AH fires 2 BANGERS to move bears 07:15 AH uses ROCKS to move bears, 1 bears looks, then resumes eating 08:00 AH fires BANGER to move bears 08:30 MN takes over 12:50 bears called near C Portal, headed towards Backfill Plant, ENV updates announcement 13:20 AH spots bears in Ditch near Backfill 13:30 AH uses TRUCK and HORN to move bears, no reaction, AH uses CLAPPING to move bears towards Till Pile, bears move along pipeline 13:41 AH uses TRUCK to move bears across North Haul Road toward Till Pile 14:20 AH leaves area, bears sleeping at best of Till Pile 14:48 bears called in at Fish Habitat of 154 Pit, ENV updates announcement 14:54 AH spots bears in 154 Fish Habitat. AH leaves area	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 1		

Deterrent Count	Score (8/440) 1.82%
Truck	2
Air Horn	0
C/F Bear Banger	4
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	2
Specify	1 Rocks, 1 Clapping

Environment Off Scene	
End of Environment Call-out	09 Aug 2018 02:54 PM
Final Location of Wildlife	154 Fish Habitat

Closure & Sign-off			Score (1/1) 100.00%
Wildlife Report Complete		On	
Signature	Atikin Hehn	11 Aug 2018 09:38 AM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-08-10

Document No.
WildlifeReport000010

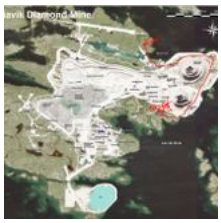
10 Aug 2018

Completed on
11 Aug 2018

Score
7/441.0 - 1.59%

Audit - 7/441 1.59%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (6/440) 1.36%
Enter Initial Time of Wildlife Sighting	10 Aug 2018 06:40 AM	
Department/Individual Who Reported Wildlife:	Luke - UG	
Environment On Scene		
Environment at Call-out Location	10 Aug 2018 07:00 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	2 grizzlies; same bears	
Photo (If Possible):		
Chronological Events		
	06:40 bears called in crossing road toward Winter Road Approach of Shallow Bays, ENV issues alert 07:00 AH arrives on scene and spots bears 07:05 Ah uses CLAPPING to move bears away from road, no movement 07:14 AH uses ROCKS to move bears, no movement 07:34 AH uses TRUCK to move bears across road to rocks near N8 Laydown 07:38 AH uses TRUCK to move bears away from N8 Laydown 07:40 AH uses TRUCK to move bears towards Shallow Bays, bears disappear in rock bed 07:52 Ah spots bears near entrance to Winter Road approach, AH uses TRUCK to move bears across road to Shallow Bays 08:45 bears in 418 Fish Habitat, AH updates announcement and leaves area 11:15 bears called in near entrance to 154 Dike, ENV updates announcement 11:35 bears spotted near East Dike of North Inlet, ENV updates announcement 11:52 bears headed in good direction toward East of the Runway, AH leaves area	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 1		

Deterrent Count	Score (6/440) 1.36%
Truck	4
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	2
Specify	1 Clapping, 1 Rocks

Environment Off Scene	
End of Environment Call-out	10 Aug 2018 11:52 AM
Final Location of Wildlife	Tundra East of the Runway

Closure & Sign-off			Score (1/1) 100.00%
Wildlife Report Complete	On		
Signature	Atikin Hehn	11 Aug 2018 09:57 AM	

Media

Appendix 1

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly-2018-08-13

Document No.
WildlifeReport000011

13 Aug 2018

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	13 Aug 2018 07:00 PM	
Department/Individual Who Reported Wildlife:	Ken site services	
Environment On Scene		
Environment at Call-out Location	13 Aug 2018 07:15 AM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Blonde bear with dark face and legs and rear	
Photo (If Possible):		
Chronological Events		
	19:00 env called on radio about bear on tundra near batch plant 19:10ENV makes announcement 19:30 ENV on scene has bear in visual. Bear in Shallow Bays by east bay grazing on tundra 20:05 loose visual ENV leaves bear far on the tundra near lake in Shallow bay 22:00 bear called in at Backfill ditch bedside south haul road. ENV issues announcement 22:15 ENV on scene and has visual bear goes into backfill yard floor ENV calls Backfill supervisor to inform. 22:30 ENV uses TRUCK to push bear across north Haul Road. Bear runs up till pile. 22:45 ENV updates location on all announce channel ENV looses visual 23:00 no visual ENV leaves to office	
Movement Map (Import NotePlus Site Map)		
Deterrent Count		Score (1/440) 0.23%
Truck	1	
Air Horn	0	

Question	Response	Details
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		
Environment Off Scene		
End of Environment Call-out	14 Aug 2018 11:00 AM	
Final Location of Wildlife	Till pile	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	14 Aug 2018 11:42 AM	

Wildlife Report - 2018

Audit Title (Animal - yyyy-mm-dd - Location)
Grizzly - 2018-10-04 - A154 Dike

Document No.
WildlifeReport000288

04 Oct 2018

Completed on
05 Oct 2018

Score
7/441.0 - 1.59%

Audit - 7/441 1.59%

Question	Response	Details
Wildlife Report		
Type of Wildlife Report	Deterrent Reporting	
Deterrent Report		Score (6/440) 1.36%
Enter Initial Time of Wildlife Sighting	04 Oct 2018 03:10 PM	
Department/Individual Who Reported Wildlife:		
Environment On Scene		
Environment at Call-out Location	04 Oct 2018 03:22 PM	
Animal Type	Grizzly Bear	
Description (eg. number of individuals, colour, age, size, etc.):	Resident bear	
Photo (If Possible):		
Chronological Events		
	15:10 ENV receives call of bear on 154 Dike 15:22 AH arrives on scene, find tracks at Hanging Tree headed in direction of 154 Dike 15:30 AH continues search for bear 16:00 ENV receives call of bear on Tundra near entrance to 418 Dike 16:15 AH has eyes on bear headed in direction of Vegetation Plots 16:40 AH uses TRUCK and CLAPPING to move bear away from Shallow Bays side 16:41 AH uses TRUCK to move bear, bear moves to edge of shore near Shallow Bays 17:47 bear crosses South Haul Road, AH uses TRUCK to move bear across road toward Backfill Plant 17:49 AH uses TRUCK to move bear up wall in direction of Till Pile 17:50 AH uses TRUCK to move bear toward North Inlet 17:55 AH searches area, cannot locate bear, leaves area	

Question	Response	Details
Movement Map (Import NotePlus Site Map)  Appendix 1		
Deterrent Count		Score (6/440) 1.36%
Truck	5	
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	clapping	
Environment Off Scene		
End of Environment Call-out	04 Oct 2018 05:55 PM	
Final Location of Wildlife	Till Pile	
Closure & Sign-off		Score (1/1) 100.00%
Wildlife Report Complete	On	
Signature	Atikin Hehn	05 Oct 2018 03:11 PM

Media

Appendix 1

APPENDIX M

Wolverine Snow Track Survey Results 2018

Date	UTM Easting	UTM Northing	Snow Cover	Snow Condition	Days Since		Observation Type	Number of Individuals	Age of Track	Comments
					Last Snow	Last Wind				
26/03/2018	535647	7156405	100	Packed	1	-	Tracks	1	Before	Off transect enroute to WT33-1. Tracks heading southwest
26/03/2018	548976	7157145	100	Packed	1	1	Tracks	1	After	At old hunting camp. Tracks heading southwest
26/03/2018	536604	7157494	100	Packed	1	1	Tracks	1	Before	Heading south
02/04/2018	523109	7137424	100	Packed	7	1.5	Tracks	1	Before	Heading southwest
02/04/2018	541730	7131574	100	Packed	7	1.5	Tracks	1	Before	Heading north
02/04/2018	532507	7139411	100	Packed	7	1.5	Tracks	3	After	Wolverine and wolf tracks crossing each other, wolverine heading east
10/04/2018	529792	7157063	100	Packed	7	-	Tracks	1	After	West, after weather, hard packed
10/04/2018	527757	7154916	100	Packed	7	5	Tracks	1	After	Hard packed, wind blown, DofT west
10/04/2018	521052	7158378	100	Packed	7	5	Tracks	2	Before	North, hard packed
13/04/2018	557388	7140252	100	Packed	10	-	Tracks	1	After	Off transect close to WT39
19/04/2018	537496	7148368	100	Packed	0.5	-	Animal	1	NA	Spotted wolverine on the Ice road
13/04/2018	549701	7143423	-	-	10	0.5	Tracks	1	-	Heading north
17/04/2018	535965	7137231	-	-	0.5	3	Den	0	NA	Wolverine den
19/04/2018	541632	7131039	-	-	0.5	0.5	Tracks	1	-	South travel
22/04/2018	526892	7154969	-	-	2.5	2.5	Tracks	1	-	Heading northwest
22/04/2018	525878	7147124	-	-	2.5	2.5	Tracks	1	NA	Heading southwest. Saw individual

Note: Snow track surveys occurred 25 March to 22 April. Only detection of wolverine sign is reported.

APPENDIX N

Wolverine Incidental Observations Summary 2018

Date	Animals	Location	Descriptive Characteristics
15/01/2018	1	Metcon	Unknown
30/01/2018	1	By A21	Unknown
09/06/2018	1	Around the burn pit at WTA	Unknown
25/03/2018	1	At the airport on night shift	Unknown
20/04/2018	1	Seen by lake shore boulevard heading south	Unknown
25/04/2018	1	On lake far southwest of site	Unknown
26/04/2018	1	On lake far east of site	Unknown
28/04/2018	1	Future fish habitat of 154 pit	Unknown
17/05/2018	1	Near Zone 2 on ice	Unknown
07/11/2018	1	Crossed Airport Road toward NCRP	Unknown
08/11/2018	1	Near Pond 5	Unknown
18/11/2018	1	Heading up ramp to NCRP	Unknown
20/11/2018	1	NCRP heading for Ring Road	Unknown
11/12/2018	1	Crossing road near PKC lunch room	Unknown
11/12/2018	1	Crossing road near Batch Plant	Unknown
12/12/2018	1	UG Old Mine Dry inside waste bin 23	Unknown
12/12/2018	1	Passing through the SCAP fab shop area @ 9:05	Unknown

Date	Animals	Location	Descriptive Characteristics
15/12/2018	1	WTA	Dark individual, unknown age
20/12/2018	1	Laydown where A21 waste bins are located	Unknown
21/12/2018	1	Truck shop	Unknown
21/12/2018	1	Brown sea can near old Nuna shop	Unknown
21/12/2018	1	Warehouse bay doors	Unknown
22/12/2018	1	Near white sprung at Old Mine Dry	Unknown
26/12/2018	1	WTA burn pit heading towards AN road	Unknown
27/12/2018	1	A21 Zone 1 drill	Unknown
27/12/2018	1	Walking through Steel Laydown headed in direction of CS1	Unknown
28/12/2018	1	Hanging around WTA, trying to get into sea can	Unknown
31/12/2018	1	WTA, Alabama	Unknown

APPENDIX O

Pit Wall / Mine Infrastructure Raptor Survey Results 2018

Date	Area	Method Used[(a)]	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y / N)	Young / Fledglings (Y / N)	Comments
20-May-18	A154 Lookout #1	D	Rough-legged hawk	2	N	N	N	Adult spotted flying overhead x2
20-May-18	A154 Lookout #2	D	NA	0	N	N	N	can hear Rough-legged hawk but cannot locate
20-May-18	A418 Lookout #1	D	Rough-legged hawk	1	N	N	N	flying above south side of pit
20-May-18	A418 Lookout #2	D	NA	0	N	N	N	-
20-May-18	South Tank Farm	D	NA	0	N	N	N	Old nest was removed last year
20-May-18	Process Plant	D	NA	0	N	N	N	-
20-May-18	Powerhouse 1	D	NA	0	N	N	N	-
20-May-18	Powerhouse 2	D	NA	0	N	N	N	-
20-May-18	Boiler House	D	NA	0	N	N	N	Nest not active
20-May-18	Site Services Line up	D	NA	0	N	N	N	-
20-May-18	Backfill Plant	D	Peregrine falcon	1	N	N	N	-
23-May-18	A154 Lookout #1	L	NA	0	N	N	N	-
23-May-18	A154 Lookout #2	L	NA	0	N	N	N	-
23-May-18	A418 Lookout #1	L	Peregrine falcon	2	N	N	N	F/O the pit
23-May-18	A418 Lookout #2	L	NA	0	N	N	N	-
23-May-18	South Tank Farm	D	NA	0	UNK	Y	N	Maybe an old nest?
23-May-18	Process Plant	D	NA	0	N	N	N	-
23-May-18	Powerhouse 1	D	NA	0	N	N	N	-
23-May-18	Powerhouse 2	D	NA	0	N	N	N	-
23-May-18	Boiler House	D	NA	0	N	N	N	Old nest on smoke stacks
23-May-18	Site Services Line up	D	Peregrine falcon	2	N	N	N	1 F/O. 1 perched on corner of the truck shop above bay 11
23-May-18	Backfill Plant	D	NA	0	N	N	N	-
26-May-18	A154 Lookout #1	D	NA	0	N	N	N	-
26-May-18	A154 Lookout #2	D	NA	0	N	N	N	-
26-May-18	A418 Lookout #1	D	Peregrine falcon	1	N	N	N	Fly over the Pit
26-May-18	A418 Lookout #2	D	NA	0	N	N	N	-
26-May-18	South Tank Farm	D	NA	0	N	N	N	1 stick built Nest on the stairs of tank 103. No birds around
26-May-18	Process Plant	D	NA	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
26-May-18	Powerhouse 1	D	NA	0	N	N	N	-
26-May-18	Powerhouse 2	D	NA	0	N	N	N	-
26-May-18	Boiler House	D	NA	0	N	N	N	Old nest on the smoke stacks
26-May-18	Site Services Line up	D	NA	0	N	N	N	-
26-May-18	Backfill Plant	D	Peregrine falcon	1	N	N	N	-
29-May-18	A154 Lookout #1	L	NA	0	N	N	N	-
29-May-18	A154 Lookout #2	L	NA	0	N	N	N	-
29-May-18	A418 Lookout #1	L	Rough-legged hawk	1	N	N	N	Fly over the Pit
29-May-18	A418 Lookout #2	L	NA	0	N	N	N	-
29-May-18	South Tank Farm	D	NA	0	N	N	N	-
29-May-18	Process Plant	D	NA	0	N	N	N	-
29-May-18	Powerhouse 1	D	NA	0	N	N	N	-
29-May-18	Powerhouse 2	D	NA	0	N	N	N	-
29-May-18	Boiler House	D	Common raven	0	N	Y	N	Old nest on the smoke stacks
29-May-18	Site Services Line up	D	NA	0	N	N	N	-
29-May-18	Backfill Plant	D	NA	0	N	N	N	-
01-Jun-18	A154 Lookout #1	L	NA	0	N	N	N	-
01-Jun-18	A154 Lookout #2	L	NA	0	N	N	N	-
01-Jun-18	A418 Lookout #1	L	Common raven	1	N	N	N	Flyby Common raven
01-Jun-18	A418 Lookout #2	L	Rough-legged hawk	2	N	Y	N	Perched at potential nesting site and flying
01-Jun-18	South Tank Farm	D	Common raven	2	Y	Y	N	2 ravens in nest on Tank 106. Empty nest on Tank 103 (533959, 7150707)
01-Jun-18	Process Plant	D	Peregrine falcon	1	N	N	N	Perched
01-Jun-18	Powerhouse 1	D	NA	0	N	N	N	-
01-Jun-18	Powerhouse 2	D	NA	0	N	N	N	-
01-Jun-18	Boiler House	D	NA	0	N	N	N	-
01-Jun-18	Site Services Line up	D	NA	0	N	N	N	-
01-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
04-Jun-18	A154 Lookout #1	L	NA	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
04-Jun-18	A154 Lookout #2	L	NA	0	N	N	N	-
04-Jun-18	A418 Lookout #1	L	NA	0	N	N	N	-
04-Jun-18	A418 Lookout #2	L	NA	0	N	N	N	-
04-Jun-18	South Tank Farm	D	Common raven	1	Y	Y	N	1 raven in nest on Tank 106. Empty nest on Tank 103 (533959, 7150707)
04-Jun-18	Process Plant	D	NA	0	N	N	N	-
04-Jun-18	Powerhouse 1	D	NA	0	N	N	N	-
04-Jun-18	Powerhouse 2	D	NA	0	N	N	N	-
04-Jun-18	Boiler House	D	NA	0	N	N	N	-
04-Jun-18	Site Services Line up	D	NA	0	N	N	N	-
04-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
07-Jun-18	A154 Lookout #1	L	NA	0	N	Y	N	-
07-Jun-18	A154 Lookout #2	L	NA	0	N	N	N	-
07-Jun-18	A418 Lookout #1	L	NA	0	N	N	N	Coordinate location of Rough-legged hawk perched on powerlines
07-Jun-18	A418 Lookout #2	L	NA	0	N	N	N	-
07-Jun-18	South Tank Farm	D	Common raven	1	Y	Y	N	1 raven in nest on Tank 106. Empty nest on Tank 103 (533959, 7150707)
07-Jun-18	Process Plant	D	NA	0	N	N	N	-
07-Jun-18	Powerhouse 1	D	NA	0	N	N	N	-
07-Jun-18	Powerhouse 2	D	NA	0	N	N	N	-
07-Jun-18	Boiler House	D	NA	0	N	N	N	-
07-Jun-18	Site Services Line up	D	NA	0	N	N	N	-
07-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
10-Jun-18	A154 Lookout #1	L	NA	0	N	N	N	-
10-Jun-18	A154 Lookout #2	L	NA	0	N	N	N	-
10-Jun-18	A418 Lookout #1	L	NA	0	N	N	N	-
10-Jun-18	A418 Lookout #2	L	NA	0	N	N	N	-
10-Jun-18	South Tank Farm	D	Common raven	1	Y	Y	N	1 raven in nest on Tank 106. Empty nest on Tank 103 (533959, 7150707)

Date	Area	Method Used[(a)]	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y / N)	Young / Fledglings (Y / N)	Comments
10-Jun-18	Process Plant	D	NA	0	N	N	N	-
10-Jun-18	Powerhouse 1	D	NA	0	N	N	N	-
10-Jun-18	Powerhouse 2	D	NA	0	N	N	N	-
10-Jun-18	Boiler House	D	NA	0	N	N	N	-
10-Jun-18	Site Services Line up	D	NA	0	N	N	N	-
10-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
13-Jun-18	A154 Lookout #1	L	NA					-
13-Jun-18	A154 Lookout #2	L	Peregrine falcon	2	N	Y	N	Saw 2 Peregrine falcon and 1 Rough-legged hawk flying above pit. Flying and enjoying the wind. Could not see nest
13-Jun-18	A418 Lookout #1	L	Rough-legged hawk	1	Y	Y	N	Rough-legged hawk building a nest
13-Jun-18	A418 Lookout #2	L	Rough-legged hawk	1	Y	Y	N	Same Rough-legged hawk flying above pit
13-Jun-18	South Tank Farm	D	NA	0	N	N	N	Old nest present on stairs of tank
13-Jun-18	Process Plant	D	NA	0	N	N	N	-
13-Jun-18	Powerhouse 1	D	NA	0	N	N	N	-
13-Jun-18	Powerhouse 2	D	NA	0	N	N	N	-
13-Jun-18	Boiler House	D	NA	0	N	N	N	Old nest present on stacks of Boiler house
13-Jun-18	Site Services Line up	D	Peregrine falcon	1	Y	Y	N	Bird in nest. Hard to determine of fledgling or eggs present
13-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
16-Jun-18	A154 Lookout #1	L	NA	0	N	Y	N	White wash present on wall of suspected nest
16-Jun-18	A154 Lookout #2	L	NA	0	N	Y	N	White wash on pit wall near suspected nest
16-Jun-18	A418 Lookout #1	L	NA	0	Y	Y	N	Did not see birds but saw white wash in area of nest found from 2018-06-13
16-Jun-18	A418 Lookout #2	L	NA	0	Y	Y	N	See what looks like white wash on rocks near area of potential nest from 2018-06-13
16-Jun-18	South Tank Farm	D	NA	0	N	N	N	Common raven nest on stairs of Tank
16-Jun-18	Process Plant	D	NA	0	N	N	N	-
16-Jun-18	Powerhouse 1	D	NA	0	N	N	N	-
16-Jun-18	Powerhouse 2	D	NA	0	N	N	N	-
16-Jun-18	Boiler House	D	NA	0	N	N	N	Old Common raven nest on stacks

Date	Area	Method Used[(a)]	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y / N)	Young / Fledglings (Y / N)	Comments
16-Jun-18	Site Services Line up	D	NA	0	Y	Y	N	Saw nest but no birds present
16-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
19-Jun-18	A154 Lookout #1	L	NA	0	N	N	N	-
19-Jun-18	A154 Lookout #2	L	NA	0	N	N	N	-
19-Jun-18	A418 Lookout #1	L	NA	0	N	Y	N	Looks like there's a bird in the Rough-legged hawk nest, but cannot confirm
19-Jun-18	A418 Lookout #2	L	NA	0	N	Y	N	See comments from Lookout 1
19-Jun-18	South Tank Farm	D	NA	0	N	N	N	There's an old Common raven nest on Tank 103
19-Jun-18	Process Plant	D	Peregrine falcon	1	N	N	N	One Peregrine falcon perched on the process plant
19-Jun-18	Powerhouse 1	D	NA	0	N	N	N	-
19-Jun-18	Powerhouse 2	D	NA	0	N	N	N	-
19-Jun-18	Boiler House	D	NA	0	N	N	N	-
19-Jun-18	Site Services Line up	D	Peregrine falcon	1	Y	NA	N	-
19-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
22-Jun-18	A154 Lookout #1	L	NA	0	N	N	N	Could not scan as bear was called in
22-Jun-18	A154 Lookout #2	L	NA	0	N	N	N	-
22-Jun-18	A418 Lookout #1	L	NA	0	N	Y	N	Same area of potential nest
22-Jun-18	A418 Lookout #2	L	NA	0	N	N	N	-
22-Jun-18	South Tank Farm	D	Common raven	1	Y	Y	N	2 Common raven nests, tanks 103 and 106, one nest active
22-Jun-18	Process Plant	D	NA	0	N	N	N	-
22-Jun-18	Powerhouse 1	D	NA	0	N	N	N	-
22-Jun-18	Powerhouse 2	D	NA	0	N	N	N	-
22-Jun-18	Boiler House	D	NA	0	N	N	N	1 Old Common raven nest
22-Jun-18	Site Services Line up	D	Peregrine falcon	1	Y	NA	N	1 Peregrine falcon in nest
22-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
26-Jun-18	A154 Lookout #1	L	Rough-legged hawk	1	N	N	N	soaring and display flights, eventually heading west
26-Jun-18	A154 Lookout #2	L	NA	0	N	N	N	-
26-Jun-18	A418 Lookout #1	L	NA	0	N	N	N	-
26-Jun-18	A418 Lookout #2	L	NA	0	N	Y	N	-

Date	Area	Method Used[(a)]	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y / N)	Young / Fledglings (Y / N)	Comments
25-Jun-18	South Tank Farm	D	NA	0	Y	NA	NA	2 Common raven nests, tanks 103 and 106, one nest active
25-Jun-18	Process Plant	D	NA	0	N	NA	NA	-
25-Jun-18	Powerhouse 1	D	NA	0	N	NA	NA	-
25-Jun-18	Powerhouse 2	D	NA	0	N	N	NA	-
25-Jun-18	Boiler House	D	NA	0	N	NA	NA	1 Old Common raven nest
25-Jun-18	Site Services Line up	D	Peregrine falcon	1	Y	NA	N	1 Peregrine falcon in nest
26-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
28-Jun-18	A154 Lookout #1	L	NA	0	N	N	N	-
28-Jun-18	A154 Lookout #2	L	NA	0	N	N	N	-
28-Jun-18	A418 Lookout #1	L	NA	0	N	N	N	-
28-Jun-18	A418 Lookout #2	L	NA	0	N	Y	N	-
28-Jun-18	South Tank Farm	D	Common raven	4	Y	Y	Y	2 adult Common raven and 2 fledgling Common ravens at tank 106. Potential nest at tank 103
28-Jun-18	Process Plant	D	NA	0	N	NA	NA	-
28-Jun-18	Powerhouse 1	D	NA	0	N	N	NA	-
28-Jun-18	Powerhouse 2	D	NA	0	N	N	NA	-
28-Jun-18	Boiler House	D	NA	0	N	Y	NA	1 Old Common raven nest
28-Jun-18	Site Services Line up	D	Peregrine falcon	1	Y	Y	N	1 Peregrine falcon in nest
28-Jun-18	Backfill Plant	D	NA	0	N	N	N	-
01-Jul-18	A154 Lookout #1	L	NA	0	N	N	N	-
01-Jul-18	A154 Lookout #2	L	NA	0	N	N	N	-
01-Jul-18	A418 Lookout #1	L	NA	0	N	N	N	-
01-Jul-18	A418 Lookout #2	L	NA	0	N	Y	N	-
02-Jul-18	South Tank Farm	D	Common raven	3	Y	Y	Y	Common raven nest on tank 106 with fledgling. Nest on 103 still empty
02-Jul-18	Process Plant	D	NA	0	N	N	N	-
02-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
02-Jul-18	Powerhouse 2	D	NA	0	N	N	N	-
02-Jul-18	Boiler House	D	NA	0	N	Y	N	1 Old Common raven nest

Date	Area	Method Used[(a)]	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y / N)	Young / Fledglings (Y / N)	Comments
01-Jul-18	Site Services Line up	D	Peregrine falcon	1	Y	N	N	1 Peregrine falcon in nest
02-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
05-Jul-18	A154 Lookout #1	L	Rough-legged hawk	2	N	Y	N	Flying over pits
05-Jul-18	A154 Lookout #2	L	Rough-legged hawk	1	N	Y	N	Flying over pits
05-Jul-18	A418 Lookout #1	L	NA	0	N	N	N	-
05-Jul-18	A418 Lookout #2	L	Rough-legged hawk	1	N	Y	N	Flying over pits
05-Jul-18	South Tank Farm	D	Common raven	4	Y	NA	Y	4 Common raven present in nest on Tank 106
05-Jul-18	Process Plant	D	NA	0	N	N	N	-
05-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
05-Jul-18	Powerhouse 2	D	NA	0	N	N	N	-
05-Jul-18	Boiler House	D	NA	0	N	N	N	Old Common raven nest
05-Jul-18	Site Services Line up	D	Peregrine falcon	1	Y	NA	N	REFA in nest
05-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
07-Jul-18	A154 Lookout #1	L	Rough-legged hawk	1	N	Y	N	One Rough-legged hawk lying around pit, landed a few times in different directions. Hard to tell if nest is present. Potential nest in area below lookout two.
07-Jul-18	A154 Lookout #2	L	NA	0	N	N	N	-
07-Jul-18	A418 Lookout #1	L	NA	0	N	N	N	-
07-Jul-18	A418 Lookout #2	L	NA	0	N	N	N	-
07-Jul-18	South Tank Farm	D	Common raven	4	Y	NA	Y	Four Common raven perched in and around nest on the staircase of tank #106. Nest present on the staircase of tank #103 but no activity.
07-Jul-18	Process Plant	D	NA	0	N	N	N	-
07-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
07-Jul-18	Powerhouse 2	D	NA	0	N	N	N	-
07-Jul-18	Boiler House	D	NA	0	N	N	N	-
07-Jul-18	Site Services Line up	D	Peregrine falcon	1	Y	NA	N	REFA in nest
07-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
10-Jul-18	A154 Lookout #1	L	NA	0	N	Y	N	-
10-Jul-18	A154 Lookout #2	L	Rough-legged hawk	2	N	Y	N	2 Rough-legged hawks flying over lookout 2 of 154

Date	Area	Method Used[(a)]	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y / N)	Young / Fledglings (Y / N)	Comments
10-Jul-18	A418 Lookout #1	L	NA	0	N	Y	N	White wash present on rocks of suspected nest
10-Jul-18	A418 Lookout #2	L	NA	0	N	Y	N	White wash present on rocks of suspected nest
10-Jul-18	South Tank Farm	D	Common raven	3	Y	NA	Y	3 Common ravens in nest on Tank 106. Inactive nest on Tank 103
10-Jul-18	Process Plant	D	NA	0	N	N	N	-
10-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
10-Jul-18	Powerhouse 2	D	NA	0	N	N	N	-
10-Jul-18	Boiler House	D	NA	0	N	N	N	Old Common raven nest
10-Jul-18	Site Services Line up	D	Peregrine falcon	1	Y	NA	Y	Could see 1 Peregrine falcon fledgling in nest
10-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
13-Jul-18	A154 Lookout #1	L	NA	0	N	Y	N	No activity
13-Jul-18	A154 Lookout #2	L	NA	0	N	Y	N	-
13-Jul-18	A418 Lookout #1	L	NA	0	N	Y	N	Can see potential nest. No birds present
13-Jul-18	A418 Lookout #2	L	NA	0	N	Y	N	-
13-Jul-18	South Tank Farm	D	Common raven	1	Y	Y	N	Nest was active 3 days ago. No birds spotted in nest
13-Jul-18	Process Plant	D	NA	0	N	N	N	-
13-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
13-Jul-18	Powerhouse 2	D	NA	0	N	N	N	-
13-Jul-18	Boiler House	D	NA	0	N	N	N	Old nest present
13-Jul-18	Site Services Line up	D	Peregrine falcon	1	Y	NA	Y	1 adult visible in nest. Fledglings confirmed last survey
13-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
16-Jul-18	A154 Lookout #1	L	NA	0	N	N	N	-
16-Jul-18	A154 Lookout #2	L	NA	0	N	N	N	-
16-Jul-18	A418 Lookout #1	L	Rough-legged hawk	1	N	Y	N	Fly by and perched
16-Jul-18	A418 Lookout #2	L	NA	0	N	Y	N	-
16-Jul-18	South Tank Farm	D	NA	0	Y	NA	N	-
16-Jul-18	Process Plant	D	NA	0	N	N	N	-
16-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
16-Jul-18	Powerhouse 2	D	NA	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
16-Jul-18	Boiler House	D	NA	0	N	N	N	-
16-Jul-18	Site Services Line up	D	Peregrine falcon	4	Y	NA	Y	Adult feeding three babies
16-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
19-Jul-18	A154 Lookout #1	L	Peregrine falcon	1	N	N	N	Can hear Rough-legged hawk but no visual. Peregrine falcon flew in front of lookout as we parked
19-Jul-18	A154 Lookout #2	L	Rough-legged hawk	1	N	N	N	Rough-legged hawk flying over the pit
19-Jul-18	A418 Lookout #1	L	Rough-legged hawk	1	N	N	N	1 Rough-legged hawk flying over pit. Suspected nest was confirmed not present
19-Jul-18	A418 Lookout #2	L	NA	0	N	N	N	Bird scat on wall to right of lookout on second bench
19-Jul-18	South Tank Farm	D	Common raven	1	N	N	N	Birds not present in nest on Tank 106. Old Common raven nest on Tank 103
19-Jul-18	Process Plant	D	Peregrine falcon	1	N	N	N	Peregrine falcon perched on Process Plant watching nest in Site Services Line-up
19-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
19-Jul-18	Powerhouse 2	D	NA	0	N	N	N	-
19-Jul-18	Boiler House	D	NA	0	N	N	N	Old Common raven nest
19-Jul-18	Site Services Line up	D	Peregrine falcon	2	Y	NA	Y	2 Peregrine falcon fledglings confirmed in nest
19-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
25-Jul-18	A154 Lookout #1	L	Rough-legged hawk	2	N	Y	N	Two soaring about E side of dike
25-Jul-18	A154 Lookout #2	L	NA	0	N	N	N	-
25-Jul-18	A418 Lookout #1	L	NA	0	N	N	N	-
25-Jul-18	A418 Lookout #2	L	NA	0	N	N	N	-
25-Jul-18	South Tank Farm	D	NA	0	N	N	N	-
25-Jul-18	Process Plant	D	NA	0	N	N	N	-
25-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
25-Jul-18	Powerhouse 2	D	NA	0	N	N	N	-
25-Jul-18	Boiler House	D	NA	0	N	N	N	-
25-Jul-18	Site Services Line up	D	NA	0	N	N	N	-
25-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
28-Jul-18	A154 Lookout #1	L	Rough-legged hawk	2	N	Y	N	One Rough-legged hawk flyby and one perched on rock face

Date	Area	Method Used[(a)]	Bird Species	Number Observed	Confirm Active Nest (Y/N)	Potential Nesting (Y / N)	Young / Fledglings (Y / N)	Comments
28-Jul-18	A154 Lookout #2	L	Rough-legged hawk	1	N	Y	N	One Rough-legged hawk calling from perch
28-Jul-18	A418 Lookout #1	L	NA	0	N	N	N	-
28-Jul-18	A418 Lookout #2	L	NA	0	N	N	N	-
28-Jul-18	South Tank Farm	D	NA	0	N	N	N	-
28-Jul-18	Process Plant	D	NA	0	N	N	N	-
28-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
28-Jul-18	Powerhouse 2	D	NA	0	N	N	N	-
28-Jul-18	Boiler House	D	NA	0	N	N	N	-
28-Jul-18	Site Services Line up	D	NA	0	N	N	N	-
28-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
31-Jul-18	A154 Lookout #1	L	Rough-legged hawk	1	N	Y	N	One Rough-legged hawk flew from perch and was soaring around top bench beneath lookout two
31-Jul-18	A154 Lookout #2	L	NA	0	N	N	N	-
31-Jul-18	A418 Lookout #1	L	NA	0	N	N	N	-
31-Jul-18	A418 Lookout #2	L	NA	0	N	N	N	-
31-Jul-18	South Tank Farm	D	NA	0	N	N	N	-
31-Jul-18	Process Plant	D	NA	0	N	N	N	-
31-Jul-18	Powerhouse 1	D	NA	0	N	N	N	-
31-Jul-18	Powerhouse 2	D	NA	0	N	N	N	-
31-Jul-18	Boiler House	D	NA	0	N	N	N	Old nest present but no activity
31-Jul-18	Site Services Line up	D	Peregrine falcon	3	Y	NA	Y	Three Peregrine falcon fledglings sleeping in nest
31-Jul-18	Backfill Plant	D	NA	0	N	N	N	-
03-Aug-18	A154 Lookout #1	L	Rough-legged hawk	0	N	Y	N	Able to hear Rough-legged hawk in the distance but no visual; previously Rough-legged hawk have been seen in area
03-Aug-18	A154 Lookout #2	L	NA	0	N	N	N	-
03-Aug-18	A418 Lookout #1	L	Peregrine falcon	1	N	Y	N	One Peregrine falcon soaring above A418 pit to the right of lookout one
03-Aug-18	A418 Lookout #2	L	NA	0	N	N	N	-
03-Aug-18	South Tank Farm	D	NA	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
03-Aug-18	Process Plant	D	NA	0	N	N	N	-
03-Aug-18	Powerhouse 1	D	NA	0	N	N	N	-
03-Aug-18	Powerhouse 2	D	NA	0	N	N	N	-
03-Aug-18	Boiler House	D	NA	0	N	N	N	Old nest present but no activity
03-Aug-18	Site Services Line up	D	Peregrine falcon	3	Y	NA	Y	Three Peregrine falcon fledglings sleeping in nest
03-Aug-18	Backfill Plant	D	NA	0	N	N	N	-
06-Aug-18	A154 Lookout #1	L	NA	0	N	N	N	-
06-Aug-18	A154 Lookout #2	L	NA	0	N	N	N	-
06-Aug-18	A418 Lookout #1	L	NA	0	N	N	N	-
06-Aug-18	A418 Lookout #2	L	NA	0	N	N	N	-
06-Aug-18	South Tank Farm	D	NA	0	N	N	N	-
06-Aug-18	Process Plant	D	NA	0	N	N	N	-
06-Aug-18	Powerhouse 1	D	NA	0	N	N	N	-
06-Aug-18	Powerhouse 2	D	NA	0	N	N	N	-
06-Aug-18	Boiler House	D	NA	0	N	N	N	Old nest present but no activity
06-Aug-18	Site Services Line up	D	Peregrine falcon	4	Y	NA	Y	Three Peregrine falcon fledglings sleeping and one perched above nest
06-Aug-18	Backfill Plant	D	NA	0	N	N	N	-
09-Aug-18	A154 Lookout #1	L	NA	0	N	Y	N	-
09-Aug-18	A154 Lookout #2	L	NA	0	N	N	N	-
09-Aug-18	A418 Lookout #1	L	NA	0	N	Y	N	-
09-Aug-18	A418 Lookout #2	L	NA	0	N	Y	N	-
09-Aug-18	South Tank Farm	D	NA	0	N	N	N	-
09-Aug-18	Process Plant	D	NA	0	N	N	N	-
09-Aug-18	Powerhouse 1	D	NA	0	N	N	N	-
09-Aug-18	Powerhouse 2	D	NA	0	N	N	N	-
09-Aug-18	Boiler House	D	NA	0	N	N	N	Old Common raven nest present
09-Aug-18	Site Services Line up	D	Peregrine falcon	1	Y	NA	Y	1 fledgling present in nest. Shedding fine feathers
09-Aug-18	Backfill Plant	D	NA	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-Aug-18	A154 Lookout #1	L	NA	0	N	Y	N	-
12-Aug-18	A154 Lookout #2	L	Rough-legged hawk	1	N	N	N	Rough-legged hawk flying underneath Lookout 2, potential nest under Lookout
12-Aug-18	A418 Lookout #1	L	NA	0	N	Y	N	-
12-Aug-18	A418 Lookout #2	L	NA	0	N	Y	N	-
12-Aug-18	South Tank Farm	D	NA	0	N	N	N	-
12-Aug-18	Process Plant	D	NA	0	N	N	N	-
12-Aug-18	Powerhouse 1	D	NA	0	N	N	N	-
12-Aug-18	Powerhouse 2	D	NA	0	N	N	N	-
12-Aug-18	Boiler House	D	NA	0	N	N	N	Old Common raven nest
12-Aug-18	Site Services Line up	D	Peregrine falcon	3	Y	NA	Y	2 fledglings shedding fine feathers, 1 adult
12-Aug-18	Backfill Plant	D	NA	0	N	N	N	-
15-Aug-18	A154 Lookout #1	L	Rough-legged hawk	1	N	N	N	-
15-Aug-18	A154 Lookout #2	L	NA	0	N	Y	N	-
15-Aug-18	A418 Lookout #1	L	NA	0	N	Y	N	-
15-Aug-18	A418 Lookout #2	L	NA	0	N	Y	N	-
15-Aug-18	South Tank Farm	D	NA	0	N	N	N	-
15-Aug-18	Process Plant	D	NA	0	N	N	N	-
15-Aug-18	Powerhouse 1	D	NA	0	N	N	N	-
15-Aug-18	Powerhouse 2	D	NA	0	N	N	N	-
15-Aug-18	Boiler House	D	NA	0	N	N	N	Old Common raven nest
15-Aug-18	Site Services Line up	D	Peregrine falcon	2	Y	NA	Y	-
15-Aug-18	Backfill Plant	D	NA	0	N	N	N	-
18-Aug-18	A154 Lookout #1	L	NA	0	N	Y	N	-
18-Aug-18	A154 Lookout #2	L	NA	0	N	N	N	-
18-Aug-18	A418 Lookout #1	L	NA	0	N	Y	N	-
18-Aug-18	A418 Lookout #2	L	NA	0	N	Y	N	-
18-Aug-18	South Tank Farm	D	NA	0	N	N	N	-
18-Aug-18	Process Plant	D	NA	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
18-Aug-18	Powerhouse 1	D	NA	0	N	N	N	-
18-Aug-18	Powerhouse 2	D	NA	0	N	N	N	-
18-Aug-18	Boiler House	D	NA	0	N	N	N	Old Common raven nest
18-Aug-18	Site Services Line up	D	NA	0	Y	NA	N	Birds not in area
18-Aug-18	Backfill Plant	D	NA	0	N	N	N	-
22-Aug-18	A154 Lookout #1	L	Rough-legged hawk	0	N	N	N	Heard a Rough-legged hawk screeching
22-Aug-18	A154 Lookout #2	L	Rough-legged hawk	0	N	N	N	Heard a Rough-legged hawk screeching
22-Aug-18	A418 Lookout #1	L	NA	0	N	N	N	-
22-Aug-18	A418 Lookout #2	L	Peregrine falcon	1	N	N	N	One Peregrine falcon flying over dike and water
22-Aug-18	South Tank Farm	D	NA	0	N	N	N	-
22-Aug-18	Process Plant	D	NA	0	N	N	N	-
22-Aug-18	Powerhouse 1	D	NA	0	N	N	N	-
22-Aug-18	Powerhouse 2	D	NA	0	N	N	N	-
22-Aug-18	Boiler House	D	NA	0	N	N	N	Old nest present but no activity
22-Aug-18	Site Services Line up	D	NA	0	Y	NA	N	-
22-Aug-18	Backfill Plant	D	NA	0	N	N	N	-
30-Aug-18	A154 Lookout #1	L	Rough-legged hawk	1	N	N	N	Heard a Rough-legged hawk screeching
30-Aug-18	A154 Lookout #2	L	Rough-legged hawk	1	N	N	N	Heard a Rough-legged hawk screeching
30-Aug-18	A418 Lookout #1	L	NA	0	N	N	N	-
30-Aug-18	A418 Lookout #2	L	NA	0	N	N	N	-
30-Aug-18	South Tank Farm	D	NA	0	N	N	N	-
30-Aug-18	Process Plant	D	Peregrine falcon	2	N	N	N	Heard a Peregrine falcon screeching
30-Aug-18	Powerhouse 1	D	NA	0	N	N	N	-
30-Aug-18	Powerhouse 2	D	NA	0	N	N	N	-
30-Aug-18	Boiler House	D	NA	0	N	N	N	Old nest present but no activity
30-Aug-18	Site Services Line up	D	NA	0	Y	NA	N	-
30-Aug-18	Backfill Plant	D	NA	0	N	N	N	-
03-Sep-18	A154 Lookout #1	D	NA	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
03-Sep-18	A154 Lookout #2	D	NA	0	N	N	N	-
03-Sep-18	A418 Lookout #1	D	NA	0	N	N	N	-
03-Sep-18	A418 Lookout #2	D	NA	0	N	N	N	-
03-Sep-18	South Tank Farm	D	NA	0	N	N	N	-
03-Sep-18	Process Plant	D	NA	0	N	N	N	-
03-Sep-18	Powerhouse 1	D	NA	0	N	N	N	-
03-Sep-18	Powerhouse 2	D	NA	0	N	N	N	-
03-Sep-18	Boiler House	D	NA	0	N	N	N	Old nest present but no activity
03-Sep-18	Site Services Line up	D	NA	0	Y	NA	N	-
03-Sep-18	Backfill Plant	D	NA	0	N	N	N	-
05-Sep-18	A154 Lookout #1	L	Rough-legged hawk	1	Y	NA	N	Bird perched to right of Lookout 1 at edge of grassy area closest to Lookout 1. Bird squawking
05-Sep-18	A154 Lookout #2	L	NA	0	N	N	N	-
05-Sep-18	A418 Lookout #1	L	NA	0	N	N	N	-
05-Sep-18	A418 Lookout #2	L	NA	0	N	N	N	-
05-Sep-18	South Tank Farm	D	NA	0	N	N	N	-
05-Sep-18	Process Plant	D	NA	0	N	N	N	-
05-Sep-18	Powerhouse 1	D	NA	0	N	N	N	-
05-Sep-18	Powerhouse 2	D	NA	0	N	N	N	-
05-Sep-18	Boiler House	D	NA	0	N	N	N	-
05-Sep-18	Site Services Line up	D	NA	0	N	N	N	-
05-Sep-18	Backfill Plant	D	NA	0	N	N	N	-
08-Sep-18	A154 Lookout #1	L	NA	0	N	N	N	-
08-Sep-18	A154 Lookout #2	L	NA	0	N	N	N	-
08-Sep-18	A418 Lookout #1	L	NA	0	N	N	N	-
08-Sep-18	A418 Lookout #2	L	NA	0	N	N	N	-
08-Sep-18	South Tank Farm	D	NA	0	N	N	N	-
08-Sep-18	Process Plant	D	NA	0	N	N	N	-
08-Sep-18	Powerhouse 1	D	NA	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
08-Sep-18	Powerhouse 2	D	NA	0	N	N	N	-
08-Sep-18	Boiler House	D	NA	0	N	N	N	-
08-Sep-18	Site Services Line up	D	Peregrine falcon	2	N	N	N	2 Peregrine falcons perched above Bay door 15 of Truck Shop
08-Sep-18	Backfill Plant	D	NA	0	N	N	N	-
11-Sep-18	A154 Lookout #1	L	NA	0	N	N	N	-
11-Sep-18	A154 Lookout #2	L	Peregrine falcon	1	N	N	N	1 Peregrine falcon flew by Lookout 2
11-Sep-18	A418 Lookout #1	L	NA	0	N	N	N	-
11-Sep-18	A418 Lookout #2	L	NA	0	N	N	N	-
11-Sep-18	South Tank Farm	D	NA	0	N	N	N	-
11-Sep-18	Process Plant	D	NA	0	N	N	N	-
11-Sep-18	Powerhouse 1	D	NA	0	N	N	N	-
11-Sep-18	Powerhouse 2	D	NA	0	N	N	N	-
11-Sep-18	Boiler House	D	NA	0	N	N	N	Old Common raven nest present
11-Sep-18	Site Services Line up	D	NA	0	N	N	N	-
11-Sep-18	Backfill Plant	D	NA	0	N	N	N	-
15-Sep-18	A154 Lookout #1	L	NA	0	N	N	N	-
15-Sep-18	A154 Lookout #2	L	NA	0	N	N	N	-
15-Sep-18	A418 Lookout #1	L	NA	0	N	N	N	-
15-Sep-18	A418 Lookout #2	L	NA	0	N	N	N	-
15-Sep-18	South Tank Farm	D	NA	0	N	N	N	-
15-Sep-18	Process Plant	D	NA	0	N	N	N	-
15-Sep-18	Powerhouse 1	D	NA	0	N	N	N	-
15-Sep-18	Powerhouse 2	D	NA	0	N	N	N	-
15-Sep-18	Boiler House	D	NA	0	N	N	N	-
15-Sep-18	Site Services Line up	D	NA	0	N	N	N	-
15-Sep-18	Backfill Plant	D	NA	0	N	N	N	-
17-Sep-18	A154 Lookout #1	L	Peregrine falcon	1	N	N	N	1 Peregrine falcon flying overhead
17-Sep-18	A154 Lookout #2	L	NA	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
17-Sep-18	A418 Lookout #1	L	NA	0	N	N	N	-
17-Sep-18	A418 Lookout #2	L	NA	0	N	N	N	-
17-Sep-18	South Tank Farm	D	NA	0	N	N	N	-
17-Sep-18	Process Plant	D	NA	0	N	N	N	-
17-Sep-18	Powerhouse 1	D	NA	0	N	N	N	-
17-Sep-18	Powerhouse 2	D	NA	0	N	N	N	-
17-Sep-18	Boiler House	D	NA	0	N	N	N	-
17-Sep-18	Site Services Line up	D	NA	0	N	N	N	-
17-Sep-18	Backfill Plant	D	NA	0	N	N	N	-

(a) Method used to survey: L = look out scan, D = Driving.

N/A = information not available; Y = yes; N = no; – = none; * = potential typo.

APPENDIX P

Waste Inspections Summary 2018

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
03/01/2018	Landfill	Yes	Drink Containers Recyclable	2	1 pop can 1 water bottle	No	-	-	-	No	-	-	-
07/01/2018	Landfill	Yes	Gloves	4	Very clean. Mostly UG metal scrap.	No	-	-	-	No	-	-	-
09/01/2018	Landfill	Yes	Batteries, Gloves, Other	10	4 D batteries found, 1 propane tank	No	-	-	-	Yes	Unspecified	Tracks	-
13/01/2018	Landfill	Yes	Cigarette Packaging, Gloves, Oily Rags, Other	10	-	No	-	-	-	No	-	-	-
15/01/2018	Landfill	No	-	0	Nothing new dumped since last time	No	-	-	-	No	-	-	-
18/01/2018	Landfill	No	-	0	Piles recently pushed, nothing to inspect	No	-	-	-	No	-	-	-
21/01/2018	Landfill	Yes	Gloves	1	-	No	-	-	-	Yes	Unspecified	Tracks	-
24/01/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
27/01/2018	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Other	21	Wood pallet and lots of cardboard boxes containing filters. 10 aerosol cans. 1 pop can.	No	-	-	-	Yes	Common raven	Tracks	-
30/01/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
02/02/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
05/02/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
08/02/2018	Landfill	Yes	Gloves	3	-	No	-	-	-	Yes	Red fox	Tracks	-
11/02/2018	Landfill	Yes	Gloves, Oily Rags	9	-	No	-	-	-	No	-	-	-
14/02/2018	Landfill	Yes	Drink Containers Recyclable, Gloves	8	-	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
17/02/2018	Landfill	Yes	Food Packaging Gloves	11	-	No	-	-	-	Yes	Unspecified	Tracks	-
20/02/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
23/02/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
27/02/2018	Landfill	Yes	Other	20	20 pieces of cardboard	No	-	-	-	No	-	-	-
01/03/2018	Landfill	No	-	0	-	No	-	-	-	Yes	Canine	Tracks	-
04/03/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
07/03/2018	Landfill	No	Cigarette Packaging	0	Plowed by dozer	No	-	-	-	No	-	-	-
10/03/2018	Landfill	Yes	Drink Containers Recyclable, Gloves	26	-	No	-	-	-	No	-	-	-
14/03/2018	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves	28	-	No	-	-	-	No	-	-	-
16/03/2018	Landfill	Yes	Cigarette Butts	50	-	No	-	-	-	No	-	-	-
19/03/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
22/03/2018	Landfill	No	-	0	-	Yes	Red fox	1	Red fox in the landfill	No	-	-	-
27/03/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
29/03/2018	Landfill	Yes	Other	2	2 beds that should have been put in burnables	No	-	-	-	No	-	-	-
01/04/2018	Landfill	Yes	Gloves, Oily Rags	9	-	Yes	Red fox	1	-	No	-	-	-
03/04/2018	Landfill	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
08/04/2018	Landfill	No	-	0	Not enough time due to snowcore sampling	No	-	-	-	No	-	-	-
09/04/2018	Landfill	No	-	0		No	-	-	-	No	-	-	-
12/04/2018	Landfill	No	-	0	Piles recently pushed, nothing to inspect	No	-	-	-	No	-	-	-
15/04/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
17/04/2018	Landfill	Yes	Drink Containers Recyclable, Oily Rags	8	-	No	-	-	-	No	-	-	-
21/04/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
26/04/2018	Landfill	No	-	0	Crew out in field for AEMP	No	-	-	-	No	-	-	-
27/04/2018	Landfill	Yes	Batteries, Drink Containers Recyclable	5	-	No	-	-	-	Yes	Red fox	Tracks	1 fox in area tracks present
29/04/2018	Landfill	No	-	0	Not collected all staff conducting field work	No	-	-	-	No	-	-	-
30/04/2018	Landfill	Yes	Food Packaging, Gloves	5	-	Yes	Common raven	2	-	Yes	Red fox	Tracks	-
03/05/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
06/05/2018	Landfill	No	-	0	Area pushed by dozer	No	-	-	-	No	-	-	-
09/05/2018	Landfill	Yes	Gloves, Oily Rags	33	-	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
12/05/2018	Landfill	Yes	Drink Containers Recyclable, Food, Food Packaging, Gloves, Oily Rags	11	2 apples, 2 bananas, 1 pop can, 1 water bottle, twizzler package	No	-	-	-	No	-	-	-
15/05/2018	Landfill	Yes	Aerosol Cans, Batteries, Cigarette Packaging, Drink Containers Recyclable, Food, Food Packaging, Gloves, Oily Rags	58	-	No	-	-	-	No	-	-	-
18/05/2018	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves	12	-	No	-	-	-	No	-	-	-
21/05/2018	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Oily Rags	29	-	No	-	-	-	No	-	-	-
24/05/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
27/05/2018	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable	2	-	No	-	-	-	No	-	-	-
30/05/2018	Landfill	Yes	Cigarette Butts, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Oil Contaminated Waste	24	Old land fill	No	-	-	-	No	-	-	-
02/06/2018	Landfill	Yes	Food Packaging, Gloves, Oily Rags	27	-	No	-	-	-	No	-	-	-
05/06/2018	Landfill	Yes	Cigarette Packaging, Drink Containers	31	Bag containing food, pop cans, gloves, food packaging from	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
			Recyclable, Food, Gloves, Oily Rags		Underground. Large meal lid with grease								
08/06/2018	Landfill	No	-	0	No new waste	No	-	-	-	No	-	-	-
11/06/2018	Landfill	Yes	Gloves, Oily Rags	3	-	No	-	-	-	Yes	Red fox	Chew	-
14/06/2018	Landfill	Yes	Batteries, Food Packaging, Gloves, Oily Rags, Other	14	2 wood pallets. 1 gum container	No	-	-	-	No	-	-	-
17/06/2018	Landfill	Yes	Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	30	2 spill pads in waste pile	No	-	-	-	No	-	-	-
20/06/2018	Landfill	Yes	Aerosol Cans, Cigarette Packaging, Drink Containers Recyclable, Gloves, Oil Products and Containers, Oily Rags	47	Lots of gloves and oily rags, KG and AH cleaned up and disposed of properly	No	-	-	-	No	-	-	-
23/06/2018	Landfill	Yes	Aerosol Cans, Gloves, Oily Rags, Other	12	-	No	-	-	-	No	-	-	-
26/06/2018	Landfill	Yes	Aerosol Cans, Batteries, Food, Gloves, Oil Contaminated Waste, Oily Rags, Other	15	Laptop	No	-	-	-	No	-	-	-
29/06/2018	Landfill	Yes	Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	13	-	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
05/07/2018	Landfill	Yes	Oily Rags	6	5 oil t-shirts 1 spill pad	No	-	-	-	No	-	-	-
08/07/2018	Landfill	Yes	Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags	12	-	No	-	-	-	No	-	-	-
11/07/2018	Landfill	Yes	Drink Containers Recyclable, Gloves	13	Landfill is full and should be plowed soon	No	-	-	-	No	-	-	-
14/07/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
16/07/2018	Landfill	Yes	Aerosol Cans, Cigarette Butts, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oil Contaminated Waste, Oily Rags, Other	17	New pile from D1. A21 pile has rags gloves pop cans and two aerosol cans.	Yes	Common raven	1	-	No	-	-	-
20/07/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
23/07/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
26/07/2018	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Oil Contaminated Waste, Oily Rags	11	-	No	-	-	-	No	-	-	-
29/07/2018	Landfill	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
01/08/2018	Landfill	Yes	Cigarette Packaging, Gloves, Oily Rags	26	-	No	-	-	-	No	-	-	-
04/08/2018	Landfill	Yes	Cigarette Packaging, Drink	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
			Containers Recyclable, Food, Gloves										
07/08/2018	Landfill	Yes	Cigarette Packaging, Drink Containers Recyclable, Gloves, Oily Rags	6	-	No	-	-	-	No	-	-	-
10/08/2018	Landfill	No	-	0	1 new pile of cabinets	No	-	-	-	No	-	-	-
13/08/2018	Landfill	No	-	0	Piles recently pushed/ buried. No new piles	No	-	-	-	No	-	-	-
16/08/2018	Landfill	No		0	1 new pile of bags, 1 black bag with non-burn inside	No	-	-	-	No	-	-	-
19/08/2018	Landfill	Yes	Aerosol Cans, Cigarette Packaging, Drink Containers Recyclable, Gloves, Oily Rags	15	-	No	-	-	-	No	-	-	-
22/08/2018	Landfill	Yes	Gloves, Oily Rags	3	-	No	-	-	-	No	-	-	-
27/08/2018	Landfill	No	-	0	Not completed- crews unavailable due to AEMP	No	-	-	-	No	-	-	-
30/08/2018	Landfill	No	-	0	Not collected due to AEMP	No	-	-	-	No	-	-	-
01/09/2018	Landfill	No	-	0	Waste dumped close to base of slope, no berm in place	No	-	-	-	No	-	-	-
03/09/2018	Landfill	Yes	Drink Containers Recyclable, Oil	2	Lots of burnable material, full drum from truck shop	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
			Contaminated Waste										
06/09/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
09/09/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
12/09/2018	Landfill	Yes	Food	1	1 banana in burn pit.	No	-	-	-	Yes	Common raven	Tracks	Raven tracks in burn pit
15/09/2018	Landfill	Yes	Aerosol Cans	1	-	No	-	-	-	No	-	-	-
18/09/2018	Landfill	No	-	0	Core boxes	No	-	-	-	No	-	-	-
22/09/2018	Landfill	Yes	Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
24/09/2018	Landfill	Yes	Aerosol Cans, Drink Containers Recyclable, Food Packaging, Gloves, Other	15	Two gum containers, 1 pop can, e-waste	No	-	-	-	No	-	-	-
27/09/2018	Landfill	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
30/09/2018	Landfill	Yes	Aerosol Cans, Drink Containers, Recyclable, Gloves	13	-	No	-	-	-	No	-	-	-
03/10/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
06/10/2018	Landfill	No	-	0	Fresh cover of snow	No	-	-	-	Yes	Red fox	Tracks	-
09/10/2018	Landfill	Yes	Gloves, Oil Contaminated Waste, Oily Rags	6	-	No	-	-	-	No	-	-	-
12/10/2018	Landfill	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
15/10/2018	Landfill	No	-	0	Material recently pushed	No	-	-	-	No	-	-	-
18/10/2018	Landfill	Yes	Aerosol Cans, Gloves, Oily Rags, Other	12	-	No	-	-	-	Yes	Unspecified	Unknown	-
21/10/2018	Landfill	Yes	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
24/10/2018	Landfill	Yes	Drink Containers Recyclable, Gloves	21	-	No	-	-	-	No	-	-	-
27/10/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
30/10/2018	Landfill	Yes	Oily Rags	2	-	No	-	-	-	No	-	-	-
02/11/2018	Landfill	Yes	Drink Containers Recyclable, Gloves, Oily Rags	12	-	No	-	-	-	No	-	-	-
05/11/2018	Landfill	Yes	Gloves	5	-	No	-	-	-	Yes	Unspecified	Tracks	-
08/11/2018	Landfill	Yes	Gloves	1	-	No	-	-	-	Yes	Unspecified	Tracks	-
11/11/2018	Landfill	Yes	Gloves, Oil Contaminated Waste, Oily Rags	10	-	No	-	-	-	Yes	Unspecified	Tracks	-
14/11/2018	Landfill	Yes	Food Packaging Gloves, Oily Rags	10	-	No	-	-	-	No	-	-	-
17/11/2018	Landfill	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
20/11/2018	Landfill	Yes	Aerosol Cans, Gloves, Oily Rags	7	-	No	-	-	-	Yes	Unspecified	Tracks	-
23/11/2018	Landfill	Yes	Oily Rags	50	-	No	-	-	-	Yes	Unspecified	Tracks	-
27/11/2018	Landfill	No	-	0	All piles covered in snow/frost	No	-	-	-	Yes	Unspecified	Tracks	-
29/11/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
02/12/2018	Landfill	Yes	Gloves	1	-	No	-	-	-	Yes	Unspecified	Tracks	-
05/12/2018	Landfill	Yes	Aerosol Cans, Gloves, Oily Rags	4	-	No	-	-	-	Yes	Unspecified	Tracks	-
08/12/2018	Landfill	No	-	0	-	No	-	-	-	Yes	Unspecified	Tracks	-
18/12/2018	Landfill	Yes	Gloves, Oily Rags	6	-	No	-	-	-	Yes	Red fox	Tracks and scat	-
20/12/2018	Landfill	Yes	Cigarette Packaging, Drink Containers Recyclable, Food	10	Coffee cup, pop can, 2 creamers	No	-	-	-	Yes	Red 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
			Packaging, Gloves, Oily Rags										
23/12/2018	Landfill	No	-	0	-	No	-	-	-	No	-	-	-
26/12/2018	Landfill	Yes	Cigarette Packaging, Food Packaging, Gloves, Oily Rags	7	-	No	-	-	-	Yes	Red fox	Tracks	-
30/12/2018	Landfill	No	-	0	-	No	-	-	-	Yes	Unspecified	Tracks	-
03/01/2018	Underground	Yes	Other	1	A whole load of non burn waste was dumped in the burnables bin	No	-	-	-	No	-	-	-
07/01/2018	Underground	Yes	Other	1	-	No	-	-	-	No	-	-	-
09/01/2018	Underground	Yes	Cigarette Butts, Drink Containers Recyclable, Food, Gloves, Oily Rags	30	Stack of 10 used spill pads	No	-	-	-	Yes	Unspecified	Tracks	-
13/01/2018	Underground	Yes	Cigarette Butts, Oily Rags	11	-	No	-	-	-	No	-	-	-
15/01/2018	Underground	Yes	Cigarette Packaging	1	Non burn bin too full to see inside, needs to be dumped	No	-	-	-	No	-	-	-
18/01/2018	Underground	Yes	Cigarette Butts, Gloves	12	-	No	-	-	-	No	-	-	-
21/01/2018	Underground	Yes	Aerosol Cans, Cigarette Butts	11	-	No	-	-	-	Yes	Unspecified	Tracks	-
24/01/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
27/01/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
30/01/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
02/02/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
05/02/2018	Underground	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
08/02/2018	Underground	Yes	Cigarette Butts, Food Packaging, Gloves, Oily Rags	15	-	No	-	-	-	No	-	-	-
11/02/2018	Underground	Yes	Cigarette Packaging, Gloves, Oily Rags	4	One spill kit won't open	No	-	-	-	No	-	-	-
14/02/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
17/02/2018	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
20/02/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
23/02/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
27/02/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
01/03/2018	Underground	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
04/03/2018	Underground	Yes	Gloves, Oily Rags	2	-	No	-	-	-	Yes	Red fox	Tracks	-
07/03/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
10/03/2018	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
14/03/2018	Underground	Yes	Cigarette Butts, Gloves, Oily Rags	7	Better storage for oily rags needed, Bins far away from ladder / platform therefore hard to see, non burn bin overflowing	No	-	-	-	No	-	-	-
16/03/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
19/03/2018	Underground	Yes	Cigarette Butts, Food Packaging, Gloves, Oily Rags	31	-	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
22/03/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
27/03/2018	Underground	Yes	Food Packaging	1	-	No	-	-	-	No	-	-	-
29/03/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
01/04/2018	Underground	Yes	Gloves	6	-	No	-	-	-	No	-	-	-
03/04/2018	Underground	Yes	Cigarette Butts	20	-	No	-	-	-	No	-	-	-
08/04/2018	Underground	No	-	0	Not enough time due to snowcore sampling	No	-	-	-	No	-	-	-
10/04/2018	Underground	Yes	Cigarette Butts, Oily Rags	23	-	No	-	-	-	No	-	-	-
12/04/2018	Underground	Yes	Cigarette Butts, Cigarette Packaging, Gloves, Oily Rags	24	-	No	-	-	-	No	-	-	-
15/04/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
17/04/2018	Underground	Yes	Gloves, Oil Contaminated Waste	2	-	No	-	-	-	No	-	-	-
21/04/2018	Underground	Yes	Aerosol Cans	1	-	No	-	-	-	No	-	-	-
26/04/2018	Underground	No	-	0	Crew out in field for AEMP	No	-	-	-	No	-	-	-
27/04/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
29/04/2018	Underground	No	-	0	Not collected all staff conducting field work	No	-	-	-	No	-	-	-
01/05/2018	Underground	No	-	0	Housekeeping needed	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
03/05/2018	Underground	Yes	Gloves	2	Housekeeping needed	No	-	-	-	No	-	-	-
06/05/2018	Underground	Yes	Gloves	4	Housekeeping needed in the area	No	-	-	-	No	-	-	-
09/05/2018	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
12/05/2018	Underground	Yes	Cigarette Butts, Food Packaging, Gloves, Oily Rags	106	Smarties box by oily rag storage	No	-	-	-	No	-	-	-
15/05/2018	Underground	Yes	Food Packaging, Gloves, Oily Rags	3	-	No	-	-	-	No	-	-	-
18/05/2018	Underground	Yes	Oily Rags	1	Lots of burnables outside of burn bin. Stairs very far from bin. Difficult to see in	No	-	-	-	No	-	-	-
21/05/2018	Underground	Yes	Drink Containers Recyclable, Oily Rags	6	Lots of garbage outside of bins. Needs to be cleaned. Stairs not close to bins	No	-	-	-	No	-	-	-
24/05/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
27/05/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
30/05/2018	Underground	Yes	Food Packaging, Oil Contaminated Waste	6	Hydraulic hoses dirty still in non-burnables bin	No	-	-	-	No	-	-	-
02/06/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
05/06/2018	Underground	Yes	Cigarette Butts, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves	111	1 coffee cup, 3 water bottles, 1 sandwich bag	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
08/06/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
11/06/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
14/06/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
17/06/2018	Underground	Yes	Gloves, Oily Rags	4	-	No	-	-	-	No	-	-	-
20/06/2018	Underground	Yes	Gloves, Oil Contaminated Waste	3	Various small spills around yard. Some near totes, small ones near waste bins, one across from refuelling bay. See photos	No	-	-	-	No	-	-	-
23/06/2018	Underground	Yes	Gloves, Oil Contaminated Waste, Oily Rags	7	-	No	-	-	-	No	-	-	-
26/06/2018	Underground	Yes	Cigarette Butts, Food Packaging, Gloves, Oily Rags, Other	103	1 gum package, 50 ear plugs	No	-	-	-	No	-	-	-
29/06/2018	Underground	Yes	Cigarette Butts	100	-	No	-	-	-	No	-	-	-
02/07/2018	Underground	Yes	Cigarette Butts, Gloves, Other	54	-	No	-	-	-	No	-	-	-
05/07/2018	Underground	Yes	Cigarette Butts, Cigarette Packaging, Gloves, Oily Rags	55	-	No	-	-	-	No	-	-	-
08/07/2018	Underground	Yes	Aerosol Cans, Oil Contaminated Waste	7	-	No	-	-	-	No	-	-	-
11/07/2018	Underground	Yes	Oily Rags	1	Both bins are full	No	-	-	-	No	-	-	-
14/07/2018	Underground	Yes	Drink Containers Recyclable	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
16/07/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
20/07/2018	Underground	No	-	0	-	Yes	Common raven	1	-	No	-	-	-
23/07/2018	Underground	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
26/07/2018	Underground	Yes	Cigarette Butts, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	55	-	No	-	-	-	No	-	-	-
29/07/2018	Underground	Yes	Cigarette Butts, Food Packaging, Gloves, Oily Rags	103	-	No	-	-	-	No	-	-	-
01/08/2018	Underground	Yes	Cigarette Packaging, Gloves, Oily Rags, Other	16	-	No	-	-	-	No	-	-	-
05/08/2018	Underground	Yes	Cigarette Butts	51	-	No	-	-	-	No	-	-	-
07/08/2018	Underground	Yes	Drink Containers Recyclable, Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
10/08/2018	Underground	Yes	Oily Rags, Other	2	Pressure treated wood in burn bin	No	-	-	-	No	-	-	-
13/08/2018	Underground	Yes	Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	4	-	No	-	-	-	No	-	-	-
16/08/2018	Underground	Yes	Gloves	3	Chair outside of non-burn bin	No	-	-	-	No	-	-	-
19/08/2018	Underground	Yes	Gloves, Oily Rags	2	-	No	-	-	-	No	-	-	-
22/08/2018	Underground	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
27/08/2018	Underground	No	-	0	Not completed - crews unavailable due to AEMP	No	-	-	-	No	-	-	-
30/08/2018	Underground	No	-	0	Not collected due to AEMP	No	-	-	-	No	-	-	-
01/09/2018	Underground	Yes	Cigarette Butts, Cigarette Packaging, Gloves, Oily Rags	118	Spill under UG Haul truck 610	No	-	-	-	No	-	-	-
03/09/2018	Underground	Yes	Cigarette Butts, Cigarette Packaging, Gloves, Oily Rags	101	-	No	-	-	-	No	-	-	-
06/09/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
09/09/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
12/09/2018	Underground	Yes	Other	1	Metal strips in burn bin	No	-	-	-	No	-	-	-
15/09/2018	Underground	Yes	Cigarette Packaging, Food	4	-	No	-	-	-	No	-	-	-
18/09/2018	Underground	Yes	Cigarette Butts, Cigarette Packaging, Oily Rags	62	Aerosol can container needs a lid	No	-	-	-	No	-	-	-
22/09/2018	Underground	Yes	Gloves	2	Strong diesel smell at refuelling station but can't determine where it is coming from because the ground is wet	No	-	-	-	No	-	-	-
24/09/2018	Underground	Yes	Cigarette Butts, Cigarette Packaging, Food, Food Packaging	54	-	No	-	-	-	No	-	-	-

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		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
27/09/2018	Underground	Yes	Cigarette Butts, Cigarette Packaging, Drink Containers Recyclable, Gloves	56	-	No	-	-	-	No	-	-	-
30/09/2018	Underground	Yes	Aerosol Cans, Cigarette Butts	51	-	No	-	-	-	No	-	-	-
03/10/2018	Underground	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
06/10/2018	Underground	Yes	Aerosol Cans, Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
09/10/2018	Underground	No	-	0	Pallet outside of burn-bin, leaning on bin	No	-	-	-	No	-	-	-
12/10/2018	Underground	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
15/10/2018	Underground	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
18/10/2018	Underground	Yes	Aerosol Cans, Batteries, Drink Containers Recyclable, Oily Rags	14	2 plastic water bottles, 1 cordless hand drill with battery attached	No	-	-	-	No	-	-	-
21/10/2018	Underground	Yes	Cigarette Butts, Oil Contaminated Waste, Oil Products and Containers, Oily Rags	40	-	No	-	-	-	No	-	-	-
24/10/2018	Underground	Yes	Cigarette Butts, Gloves, Oily Rags	25	Drum of carbide bit shavings near oily rag storage	No	-	-	-	Yes	Unspecified	Unknown	-
27/10/2018	Underground	Yes	Cigarette Butts, Food Packaging, Gloves, Oily Rags	17	-	No	-	-	-	Yes	Unspecified	Tracks	-
30/10/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
02/11/2018	Underground	No	-	0	-	No	-	-	-	Yes	Unspecified	Tracks	-

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		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
05/11/2018	Underground	Yes	Food Packaging, Gloves	3	-	No	-	-	-	No	-	-	-
08/11/2018	Underground	Yes	Oily Rags	2	Lots of burnable garbage and some non-burn outside of burn bin	No	-	-	-	Yes	Unspecified	Tracks	-
11/11/2018	Underground	Yes	Gloves	1	Lots of burnable garbage outside of burn bin	No	-	-	-	Yes	Unspecified	Tracks	-
14/11/2018	Underground	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
17/11/2018	Underground	Yes	Cigarette Butts	10	Coffee dumped in front of front door	No	-	-	-	Yes	Unspecified	Tracks	-
20/11/2018	Underground	Yes	Cigarette Butts, Cigarette Packaging, Gloves, Oily Rags	14	-	No	-	-	-	Yes	Red fox	Tracks	-
23/11/2018	Underground	Yes	Cigarette Butts, Food Packaging, Gloves	27	-	No	-	-	-	Yes	Unspecified	Tracks	-
27/11/2018	Underground	No	-	0	Non-burn garbage outside of non-burn bin	No	-	-	-	No	-	-	-
29/11/2018	Underground	Yes	Oil Contaminated Waste, Oily Rags	2	Used spill pad in burn bin	No	-	-	-	No	-	-	-
02/12/2018	Underground	Yes	Food Packaging, Gloves, Oily Rags	24	Lunch bag contents spread around bin area	Yes	Common raven	1	-	Yes	Unspecified	Tracks	-
05/12/2018	Underground	No	-	0	-	No	-	-	-	Yes	Unspecified	Tracks	-
08/12/2018	Underground	Yes	Gloves, Oily Rags	4	Lots of non-burn garbage outside of non-burn bin	No	-	-	-	Yes	Unspecified	Tracks	-
14/12/2018	Underground	Yes	Other	2	-	No	-	-	-	Yes	Red fox	Tracks	-
18/12/2018	Underground	Yes	Cigarette Butts	10	-	No	-	-	-	Yes	Red fox	Tracks	-

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		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
20/12/2018	Underground	No	-	0	-	No	-	-	-	Yes	Red fox	Tracks	-
23/12/2018	Underground	No	-	0	-	No	-	-	-	No	-	-	-
26/12/2018	Underground	Yes	Aerosol Cans	1	-	No	-	-	-	Yes	Unspecified	Tracks	-
30/12/2018	Underground	No	-	0	Garbage outside of non-burn bin	No	-	-	-	Yes	Unspecified	Tracks	-
03/01/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	Red fox	Tracks	-
07/01/2018	Waste Transfer Area	Yes	Gloves, Other	10	-	No	-	-	-	Yes	Red fox	Tracks	-
09/01/2018	Waste Transfer Area	No	-	0	Cardboard Boxes with stainless steel boxes inside.	No	-	-	-	No	-	-	-
13/01/2018	Waste Transfer Area	Yes	Food	10	10 bases of Romaine lettuce	No	-	-	-	No	-	-	-
15/01/2018	Waste Transfer Area	Yes	Food Packaging	3	3 coffee cups in non burn bin	No	-	-	-	No	-	-	-
18/01/2018	Waste Transfer Area	Yes	Gloves	2	-	No	-	-	-	Yes	Unspecified	Scat	-
21/01/2018	Waste Transfer Area	Yes	Gloves	3	-	No	-	-	-	Yes	Red fox	Tracks	-
24/01/2018	Waste Transfer Area	No	-	0	-	Yes	Red fox	1	1 red fox in the burn pit	No	-	-	-
27/01/2018	Waste Transfer Area	No	-	0	-	Yes	Red fox	1	1 red fox in the burn pit and some tracks	Yes	Red fox	Tracks	-

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		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
30/01/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
02/02/2018	Waste Transfer Area	No	-	0	-	No	-		Red fox tracks	Yes	Red fox	Tracks	-
05/02/2018	Waste Transfer Area	No	-	0	-	Yes	Red fox	1	-	No	-	-	-
09/02/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Food, Food Packaging, Gloves, Other	16	Hair product, 7ketchup and mustard packs, bar of soap, 5 banana peels, orange peels, smarties box, paper plate, medication, pop can, shampoo bottle	Yes	Wolverine	1	-	Yes	Unspecified	Scat	-
11/02/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Gloves, Oily Rags	5	-	No	-	-	-	Yes	Unspecified	Tracks	-
15/02/2018	Waste Transfer Area	Yes	Batteries, Gloves	3	-	Yes	Red fox	1	-	No	-	-	-
17/02/2018	Waste Transfer Area	No	-	0	-	Yes	Red fox	1	-	Yes	Red fox	Tracks	-
20/02/2018	Waste Transfer Area	Yes	Other	2	2 Haul truck filters in burn pit	No	-	-	-	No	-	-	-
23/02/2018	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
27/02/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	Red fox	Tracks	-
01/03/2018	Waste Transfer Area	No	-	0	Gate has been left open intentionally	No	-	-	-	Yes	Red fox	Tracks	-
04/03/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
07/03/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	Red fox	Tracks	-
10/03/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
14/03/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Food Packaging	4	-	No	-	-	-	No	-	-	-
16/03/2018	Waste Transfer Area	Yes	Cigarette Packaging, Food Packaging	2	-	Yes	Red fox	1	-	No	-	-	-
19/03/2018	Waste Transfer Area	Yes	Gloves	2	Gloves in burn pit	No	-	-	-	No	-	-	-
22/03/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
27/03/2018	Waste Transfer Area	Yes	Drink Containers Recyclable	1	-	Yes	Red fox	1	-	Yes	Red fox	Tracks	-
29/03/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Food, Gloves	11	4 paper cup, 5 nitrile gloves, 2 banana peels and some carrots in	No	-	-	-	Yes	Red 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
					burn pit. Fox tracks in burn pit								
01/04/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
05/04/2018	Waste Transfer Area	No	-	0	Not enough time to visit	No	-	-	-	No	-	-	-
08/04/2018	Waste Transfer Area	No	-	0	Not enough time due to snowcore sampling	No	-	-	-	No	-	-	-
09/04/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
12/04/2018	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Food, Gloves	5	Two coffee cups and one bag of food	No	-	-	-	No	-	-	-
15/04/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
17/04/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
21/04/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
26/04/2018	Waste Transfer Area	No	-	0	Crew out in field for AEMP	No	-	-	-	No	-	-	-
27/04/2018	Waste Transfer Area	No	-	0	-	Yes	Red fox	1	Fox in burn pit	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
29/04/2018	Waste Transfer Area	No	-	0	Not collected all staff conducting field work	No	-	-	-	No	-	-	-
30/04/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
03/05/2018	Waste Transfer Area	No	-	0	Non-burnables plastic lid in WTA	No	-	-	-	No	-	-	-
06/05/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
09/05/2018	Waste Transfer Area	Yes	Cigarette Butts	5	-	No	-	-	-	No	-	-	-
12/05/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
15/05/2018	Waste Transfer Area	Yes	Cigarette Packaging, Food	3	-	No	-	-	-	No	-	-	-
18/05/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Food, Oily Rags	4	Chew marks on bag that had bananas in it	No	-	-	-	Yes	Unspecified	Chew	-
21/05/2018	Waste Transfer Area	Yes	Gloves, Oily Rags	5	Paper boxes outside of bin that need to be cleaned up	No	-	-	-	No	-	-	-
24/05/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
27/05/2018	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
30/05/2018	Waste Transfer Area	Yes	Food, Food Packaging	11	Non burnables bin checked - oily buckets and lots of paper- bag with food waste taken to incinerator	No	-	-	-	No	-	-	-
02/06/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Gloves, Oily Rags	6	Water bottle, coffee cup, 2 gloves and 2 oily rags in burn pit	No	-	-	-	No	-	-	-
06/06/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
08/06/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
11/06/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
14/06/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
17/06/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
20/06/2018	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Food, Food Packaging, Gloves, Oily Rags	18	-	No	-	-	-	No	-	-	-
23/06/2018	Waste Transfer Area	Yes	Cigarette Packaging, Food, Food Packaging, Gloves, Oil	22	-	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
			Contaminated Waste, Oily Rags										
26/06/2018	Waste Transfer Area	Yes	Aerosol Cans, Batteries, Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves, Oily Rags	14	-	No	-	-	-	No	-	-	-
30/06/2018	Waste Transfer Area	Yes	Cigarette Packaging, Gloves	3	Cardboard boxes and glove in non burnable bin. Two cigarette packages found in burn pile.	No	-	-	-	No	-	-	-
03/07/2018	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Food Packaging, Gloves	6	-	No	-	-	-	No	-	-	-
05/07/2018	Waste Transfer Area	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
08/07/2018	Waste Transfer Area	Yes	Food	1	-	No	-	-	-	No	-	-	-
11/07/2018	Waste Transfer Area	No	-	0	-	Yes	Common raven	1	1 Common raven in the burn pit	No	-	-	-
14/07/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
16/07/2018	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
20/07/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
23/07/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
26/07/2018	Waste Transfer Area	Yes	Gloves	5	Waste diesel spill	No	-	-	-	No	-	-	-
29/07/2018	Waste Transfer Area	Yes	Food, Gloves	3	-	No	-	-	-	No	-	-	-
01/08/2018	Waste Transfer Area	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
04/08/2018	Waste Transfer Area	Yes	Cigarette Packaging, Gloves, Oily Rags	6	-	No	-	-	-	No	-	-	-
07/08/2018	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Oily Rags	5	-	No	-	-	-	No	-	-	-
10/08/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Food, Food Packaging, Gloves	10	-	No	-	-	-	No	-	-	-
13/08/2018	Waste Transfer Area	Yes	Food Packaging, Gloves	3	-	No	-	-	-	No	-	-	-
16/08/2018	Waste Transfer Area	Yes	Cigarette Packaging, Drink Containers Recyclable, Gloves, Oil	14	-	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
			Contaminated Waste, Oily Rags										
19/08/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
22/08/2018	Waste Transfer Area	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
27/08/2018	Waste Transfer Area	No	-	0	Not completed- crews unavailable due to AEMP	No	-	-	-	No	-	-	-
30/08/2018	Waste Transfer Area	No	-	0	Not collected due to AEMP	No	-	-	-	No	-	-	-
31/08/2018	Waste Transfer Area	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
03/09/2018	Waste Transfer Area	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
06/09/2018	Waste Transfer Area	No	-	0	Lots of nails in burn pit	No	-	-	-	No	-	-	-
09/09/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
12/09/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
15/09/2018	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
18/09/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
21/09/2018	Waste Transfer Area	Yes	Food Packaging, Gloves	9	Gum package in burn pit	No	-	-	-	No	-	-	-
24/09/2018	Waste Transfer Area	Yes	Oily Rags	1	-	No	-	-	-	No	-	-	-
28/09/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
30/09/2018	Waste Transfer Area	Yes	Food Packaging	2	-	No	-	-	-	No	-	-	-
03/10/2018	Waste Transfer Area	Yes	Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
06/10/2018	Waste Transfer Area	Yes	Food, Gloves, Oily Rags	4	-	No	-	-	-	No	-	-	-
09/10/2018	Waste Transfer Area	Yes	Oil Contaminated Waste	4	Bag with spill pads in non-burn bin	No	-	-	-	No	-	-	-
12/10/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
15/10/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
18/10/2018	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
21/10/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
24/10/2018	Waste Transfer Area	Yes	Food	3	Food in burn pit, lids for battery drums, buckets on ground in front of waste fuel storage	No	-	-	-	No	-	-	-
27/10/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Food Packaging, Gloves	3	-	No	-	-	-	Yes	Red fox	Tracks	-
30/10/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	No	-	-	-
02/11/2018	Waste Transfer Area	Yes	Cigarette Packaging, Food, Food Packaging	6	-	Yes	Red fox	1	Fox wandering around yard near entrance to WTA. Prints all over yard	Yes	Red fox	Tracks	-
05/11/2018	Waste Transfer Area	Yes	Food Packaging	2	-	No	-	-	-	Yes	Unspecified	Tracks	-
08/11/2018	Waste Transfer Area	Yes	Batteries, Food Packaging	15	Small bag of batteries in burn pit	No	-	-	-	Yes	Unspecified	Tracks and scat	-
11/11/2018	Waste Transfer Area	Yes	Food Packaging	3	-	Yes	Red fox	1	Fox in yard. Came right up to vehicle and person	Yes	Unspecified	Tracks	-
15/11/2018	Waste Transfer Area	Yes	Food, Gloves, Oily Rags	5	Watermelon	No	-	-	-	Yes	Red fox	Tracks	-
17/11/2018	Waste Transfer Area	Yes	Gloves	2	-	No	-	-	-	Yes	Red fox	Tracks and scat	-
20/11/2018	Waste Transfer Area	Yes	Cigarette Butts, Drink Containers Recyclable	3	-	No	-	-	-	Yes	Red 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
23/11/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Gloves	7	-	No	-	-	-	Yes	Red fox	Tracks	-
27/11/2018	Waste Transfer Area	No	-	0	-	Yes	Red fox	2	2 foxes present in burn pit wandering around	Yes	Red fox	Tracks	-
29/11/2018	Waste Transfer Area	Yes	Food, Packaging Gloves	9	-	Yes	Red fox	2	2 foxes moving around yard. 1 fox in burn pit	Yes	Red fox	Tracks and chew	-
02/12/2018	Waste Transfer Area	Yes	Food, Food Packaging	4	-	No	-	-	-	Yes	Unspecified	Tracks	-
05/12/2018	Waste Transfer Area	Yes	Food, Food Packaging, Gloves, Oily Rags	6	-	No	-	-	-	Yes	Red fox	Tracks	-
08/12/2018	Waste Transfer Area	Yes	Food, Food Packaging, Gloves	4	-	Yes	Red fox	1	-	No	-	-	-
14/12/2018	Waste Transfer Area	No	-	0	-	No	-	-	-	Yes	Red fox	Tracks	-
18/12/2018	Waste Transfer Area	Yes	Gloves	2	-	No	-	-	-	Yes	Red fox	Tracks	-
20/12/2018	Waste Transfer Area	Yes	Gloves	1	-	Yes	Red fox	1	-	Yes	Red fox	Tracks and scat	-
23/12/2018	Waste Transfer Area	Yes	Cigarette Packaging	2	-	Yes	Red fox	3	-	Yes	Red fox	Tracks and scat	-
26/12/2018	Waste Transfer Area	Yes	Drink Containers Recyclable, Gloves	3	-	No	-	-	-	Yes	Red 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
30/12/2018	Waste Transfer Area	Yes	Food Packaging, Gloves	2	-	No	-	-	-	Yes	Unspecified	Tracks	-
03/01/2018	A21	Yes	Aerosol Cans	1	-	No	-	-	-	No	-	-	-
07/01/2018	A21	No	-	0	Bins almost empty	No	-	-	-	No	-	-	-
09/01/2018	A21	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
13/01/2018	A21	Yes	Gloves	2	-	No	-	-	-	No	-	-	-
15/01/2018	A21	No	-	0	Railing still broken, burnables bin needs to be emptied	No	-	-	-	No	-	-	-
18/01/2018	A21	No	-	0	Stairs still not fixed	No	-	-	-	No	-	-	-
21/01/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
24/01/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
27/01/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
30/01/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
02/02/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
05/02/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
08/02/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
11/02/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
14/02/2018	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
18/02/2018	A21	Yes	Cigarette Packaging, Gloves	2	-	No	-	-	-	No	-	-	-
20/02/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
23/02/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
27/02/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
01/03/2018	A21	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
04/03/2018	A21	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
07/03/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
10/03/2018	A21	No	-	0	Back of non burnables bin left open	No	-	-	-	No	-	-	-
14/03/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
16/03/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
19/03/2018	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
22/03/2018	A21	Yes	Drink Containers Recyclable	1	Coffee cup on the ground by burn bin	No	-	-	-	Yes	Red fox	Tracks	Fox tracks around coffee cup
27/03/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
29/03/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
01/04/2018	A21	Yes	Drink Containers Recyclable	1	-	No	-	-	-	No	-	-	-
05/04/2018	A21	No	-	0	Not enough time to visit	No	-	-	-	No	-	-	-
08/04/2018	A21	No	-	0	Not enough time due to snowcore sampling	No	-	-	-	No	-	-	-
09/04/2018	A21	Yes	Other	1	-	No	-	-	-	No	-	-	-
13/04/2018	A21	Yes	Drink Containers Recyclable	3	-	No	-	-	-	Yes	Red fox	Tracks	-
15/04/2018	A21	Yes	Drink Containers Recyclable, Oily Rags	3	1 pop can and 2 oily rags in the burnables bin	No	-	-	-	No	-	-	-
17/04/2018	A21	Yes	Other	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
21/04/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
26/04/2018	A21	No	-	0	Crew out in field for AEMP	No	-	-	-	No	-	-	-
27/04/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
29/04/2018	A21	No	-	0	Not collected all staff conducting field work	No	-	-	-	No	-	-	-
01/05/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
03/05/2018	A21	Yes	Cigarette Packaging, Drink Containers Recyclable, Oil Contaminated Waste, Oily Rags, Other	5	Coveralls in nonburn bin	No	-	-	-	No	-	-	-
06/05/2018	A21	Yes	Oily Rags	2	Housekeeping needed	No	-	-	-	No	-	-	-
09/05/2018	A21	Yes	Gloves, Oily Rags	4	-	No	-	-	-	No	-	-	-
13/05/2018	A21	Yes	Drink Containers Recyclable	1	One coffee cup lid	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
15/05/2018	A21	Yes	Aerosol Cans, Cigarette Butts, Drink Containers Recyclable, Food, Gloves, Oily Rags	18	-	No	-	-	-	No	-	-	-
18/05/2018	A21	Yes	Drink Containers Recyclable, Gloves, Oily Rags, Other	12	2 spill pads frozen into ice	No	-	-	-	No	-	-	-
21/05/2018	A21	Yes	Gloves, Oil Contaminated Waste	7	-	No	-	-	-	No	-	-	-
24/05/2018	A21	Yes	Drink Containers Recyclable	2	-	No	-	-	-	No	-	-	-
27/05/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
30/05/2018	A21	Yes	Food, Gloves, Other	3	Jello on ground between bins. Plastic in burnables. Glove in non burnables	No	-	-	-	No	-	-	-
02/06/2018	A21	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
06/06/2018	A21	Yes	Drink Containers Recyclable, Gloves, Oily Rags, Other	7	-	No	-	-	-	No	-	-	-
08/06/2018	A21	Yes	Drink Containers Recyclable, Food Packaging, Oily Rags	4	All items found in ground near burnables bin	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
11/06/2018	A21	Yes	Drink Containers Recyclable, Food, Food Packaging, Gloves, Oily Rags, Other	15	-	No	-	-	-	No	-	-	-
14/06/2018	A21	Yes	Drink Containers Recyclable	1	1 coffee cup in the burnables bin	No	-	-	-	No	-	-	-
17/06/2018	A21	Yes	Aerosol Cans, Drink Containers Recyclable, Gloves, Oily Rags	6	-	No	-	-	-	No	-	-	-
20/06/2018	A21	Yes	Oil Contaminated Waste, Oily Rags, Other	3	-	No	-	-	-	No	-	-	-
23/06/2018	A21	Yes	Aerosol Cans, Gloves	2	-	No	-	-	-	No	-	-	-
26/06/2018	A21	Yes	Gloves, Oily Rags, Other	21	15 clean spill pads in burn bin	No	-	-	-	No	-	-	-
30/06/2018	A21	Yes	Other	3	Work vest and two t shirts Found in burnable bin	No	-	-	-	No	-	-	-
03/07/2018	A21	Yes	Oily Rags, Other	13	Shirt, vest, plastic bag	No	-	-	-	No	-	-	-
05/07/2018	A21	Yes	Oil Contaminated Waste, Oily Rags, Other	13	-	No	-	-	-	No	-	-	-
08/07/2018	A21	Yes	Oil Contaminated Waste, Oily Rags	8	-	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
11/07/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
14/07/2018	A21	Yes	Drink Containers Recyclable, Gloves, Oil Contaminated Waste, Oily Rags	40	-	No	-	-	-	No	-	-	-
16/07/2018	A21	Yes	Drink Containers Recyclable, Oily Rags, Other	4	-	No	-	-	-	No	-	-	-
20/07/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
23/07/2018	A21	Yes	Aerosol Cans, Food Packaging, Gloves, Oil Products and Containers, Oily Rags	7	-	No	-	-	-	No	-	-	-
26/07/2018	A21	Yes	Cigarette Butts, Cigarette Packaging, Drink Containers Recyclable, Gloves, Oily Rags, Other	6	-	No	-	-	-	No	-	-	-
29/07/2018	A21	Yes	Drink Containers Recyclable, Gloves, Oily Rags	9	-	No	-	-	-	No	-	-	-
01/08/2018	A21	Yes	Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
05/08/2018	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
07/08/2018	A21	Yes	Aerosol Cans, Drink Containers Recyclable, Oily Rags	4	-	No	-	-	-	No	-	-	-
10/08/2018	A21	Yes	Gloves, Oily Rags	5	-	No	-	-	-	No	-	-	-
13/08/2018	A21	Yes	Aerosol Cans, Gloves	12	-	No	-	-	-	No	-	-	-
16/08/2018	A21	No	-	0	Nothing present in non-burn bin	No	-	-	-	No	-	-	-
19/08/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
22/08/2018	A21	Yes	Aerosol Cans, Cigarette Packaging, Drink Containers Recyclable, Food, Gloves, Oily Rags, Other	36	-	No	-	-	-	No	-	-	-
27/08/2018	A21	No	-	0	Not completed - crews unavailable due to AEMP	No	-	-	-	No	-	-	-
30/08/2018	A21	No	-	0	Not collected due to AEMP	No	-	-	-	No	-	-	-
31/08/2018	A21	Yes	Food Packaging, Gloves, Oily Rags	21	-	No	-	-	-	No	-	-	-
03/09/2018	A21	Yes	Gloves, Oily Rags	20	-	No	-	-	-	No	-	-	-
06/09/2018	A21	Yes	Gloves, Oil Contaminated Waste, Oily Rags	11	-	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
09/09/2018	A21	Yes	Gloves	4	Some gloves in non burn bin	No	-	-	-	No	-	-	-
12/09/2018	A21	Yes	Drink Containers Recyclable, Gloves	3	-	No	-	-	-	No	-	-	-
15/09/2018	A21	Yes	Gloves	3	-	No	-	-	-	No	-	-	-
18/09/2018	A21	Yes	Drink Containers Recyclable, Gloves	6	-	No	-	-	-	No	-	-	-
22/09/2018	A21	Yes	Cigarette Packaging	1	-	No	-	-	-	No	-	-	-
24/09/2018	A21	Yes	Cigarette Packaging	1	-	No	-	-	-	No	-	-	-
28/09/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
30/09/2018	A21	No	-	0	Spills in Zone 3	No	-	-	-	No	-	-	-
03/10/2018	A21	Yes	Gloves	1	-	No	-	-	-	No	-	-	-
06/10/2018	A21	No	-	0	Material in bins covered in snow	No	-	-	-	No	-	-	-
09/10/2018	A21	Yes	Oily Rags	2	-	No	-	-	-	No	-	-	-
12/10/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
15/10/2018	A21	Yes	Gloves	3	-	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
18/10/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
21/10/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
24/10/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
27/10/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
30/10/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
02/11/2018	A21	Yes	Batteries, Oily Rags	14	-	No	-	-	-	Yes	Unspecified	Tracks	-
05/11/2018	A21	Yes	Oily Rags	2	-	No	-	-	-	No	-	-	-
08/11/2018	A21	Yes	Aerosol Cans, Gloves, Oily Rags	4	-	No	-	-	-	Yes	Unspecified	Tracks	-
11/11/2018	A21	Yes	Gloves, Oily Rags, Other	5	-	No	-	-	-	Yes	Unspecified	Tracks	-
15/11/2018	A21	Yes	Cigarette Packaging, Food Packaging	2	Chip canister	No	-	-	-	No	-	-	-
17/11/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
20/11/2018	A21	No	-	0	-	No	-	-	-	Yes	Red fox	Tracks	-
23/11/2018	A21	Yes	Food Packaging, Gloves	2	-	No	-	-	-	No	-	-	-
27/11/2018	A21	No	-	0	Contents frosted over, nothing new	No	-	-	-	No	-	-	-
29/11/2018	A21	Yes	Food Packaging, Oily Rags	8	Rags and 2 baggies in burn bin	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
02/12/2018	A21	Yes	Aerosol Cans, Oil Contaminated Waste, Oily Rags	7	-	No	-	-	-	No	-	-	-
05/12/2018	A21	No	-	0	Used spill pads still present in burn bin	No	-	-	-	Yes	Unspecified	Tracks	-
08/12/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
18/12/2018	A21	No	-	0	-	No	-	-	-	No	-	-	-
20/12/2018	A21	No	-	0	-	Yes	Wolverine	1	-	Yes	Wolverine	Tracks	-
23/12/2018	A21	Yes	Drink Containers Recyclable, Food, Food Packaging, Gloves	6	-	No	-	-	-	Yes	Unspecified	Tracks and scat	-
26/12/2018	A21	Yes	Drink Containers Recyclable, Gloves	2	-	No	-	-	-	Yes	Unspecified	Chew	-
30/12/2018	A21	Yes	Food Packaging, Gloves	6	-	No	-	-	-	Yes	Red fox	Tracks	-

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