2004 WILDLIFE MONITORING REPORT

March 2005

DIAVIK
DIAMOND MINES INC.

EXECUTIVE SUMMARY

As a requirement of the Environmental Agreement, Diavik Diamond Mines Inc. (DDMI) conducts a Wildlife Monitoring Program (WMP). The objective of the WMP is to collect information that will assist in determining if there are effects on wildlife in the study area (Figure 1-1) and if these effects were accurately predicted in the Environmental Assessment (DDMI, 1998). The WMP also permits the collection of data to determine the effectiveness of site specific mitigation measures and the need for any modifications. The following report documents results collected for the 2004 Wildlife Monitoring Program for the Diavik Diamond Mine located at Lac de Gras, Northwest Territories. The data was collected according to procedures outlined in the revised 2002 Wildlife Monitoring Program. Wherever possible, comparisons to the information gathered during the previous monitoring years (2000 to 2003) and the pre-construction baseline (June 1995 to August 1997), have been included.

In response to reviewer requests, a comprehensive statistical analysis of data collected from baseline through current operation in the Lac de Gras area has also been conducted to test impact predictions. The report titled, "Analysis of Environmental Effects from the Diavik Diamond Mine on Wildlife in the Lac de Gras Region" is included as Appendix A and is referenced throughout this report (Golder 2005).

General observations and recommendations for possible improvement in each program, are as follows:

Vegetation/Habitat Loss

- The direct vegetation/habitat loss in 2004 due to the mine footprint was 0.98 km^2, which is within the expected amount. Total habitat loss to date from mining activities is 7.31 km^2.
- Habitat analysis was conducted on DDMI permanent vegetation plots during 2004.

Barren-ground Caribou

- Direct summer habitat loss in 2004 from the mine footprint was 0.32 habitat units (HU's), which is within the expected amount.
- One mortality to caribou occurred due to the mine during 2004.
- The level of caribou advisory monitoring remained at "no concern" (no caribou or fewer than 100 caribou) for 365 days during 2004.

Grizzly Bear

- Direct terrestrial habitat loss in 2004 from the mine footprint was within the expected amount at 0.93 km^2.
- Grizzly bears are still present in the Diavik Wildlife Study Area.
- One bear mortality occurred in 2004.

Wolverine

- Wolverines were present on the East Island in 2004.
- No mining related wolverine mortalities, injuries or relocations occurred during 2004.
- It is recommended that a DNA analysis study be added to the wolverine monitoring program for 2005.

Waste Management

- Regular inspections were conducted at the Waste Transfer Area (WTA) and Inert Landfill in 2004.
- Food and food packaging were found during 24% and 34% of inspections, respectively, at the WTA.
- Food and food packaging were found during 11% and 37% of inspections, respectively, at the Inert Landfill.

Raptors

- Raptor monitoring was performed in June and July 2004, with this being the first year DDMI conducted June monitoring.
- During 2004, one Peregrine Falcon nest was occupied and productive.
- One nest in the study area never before occupied, was occupied but unproductive during 2004.
- A pair of Peregrine Falcons established a nest on the high wall of the A154 pit.
- One potential project related mortality occurred during 2004 (exact cause of death could not be determined).

Waterfowl

- Habitat loss in 2004 was within the expected range and equaled 0.04 km^2 of shallow and deep water.
- Waterfowl were present at the East Island Shallow Bays.
- Waterfowl and shorebird numbers increased during 2004.
- Waterfowl are utilizing mine-altered wetlands, particularly the PKC and North Inlet.

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1.0 INTRODUCTION

Diavik Diamond Mines Inc. (DDMI) conducted wildlife baseline studies from 1995 to 1997. Information gathered was used to describe ecological conditions found in the Lac de Gras area in support of the Project Description and Environmental Assessment (DDMI, March 1998a, 1998b). Information was used by DDMI throughout the project design to identify mitigation measures to minimize impacts on wildlife species and to formulate predictions of the effects on wildlife due to mining activities. This information was used to develop a Wildlife Monitoring Program (WMP) for the Diavik Diamond Mine. Documents that were utilized in developing the WMP include:

- Comprehensive Study Report, The Canadian Environmental Assessment Act June 1999;
- Environmental Assessment Overview, Diavik Diamonds Project, September 1998;
- Environmental Effects Report, Wildlife, Diavik Diamonds Project, September 1998; and
- Wildlife Baseline Report, Diavik Diamonds Project, Penner and Associates, July 1998.

A Wildlife Monitoring Program (DDMI, 2002) was designed specifically to monitor and manage wildlife issues of concern identified by communities and regulatory agencies. The year 2004 was the fifth year of monitoring, and the second year that the complete revised WMP was initiated. Revisions to the WMP took place during meetings with the Environmental Monitoring Advisory Board (EMAB) and Resources, Wildlife and Economic Development (RWED). Recommendations from the interested parties included a joint effort with BHP Billiton (BHPB) in conducting the caribou and raptor monitoring. John Virgl of Golder Associates was contracted to assist in the development of the WMP and has provided his expertise in the data collection methods for the majority of programs to ensure similarity to the BHPB wildlife effects monitoring program.

The primary objectives of the monitoring program are:

- To collect information that will assist DDMI in determining if there are effects on wildlife and if these effects were accurately predicted in the Environmental Assessment (EA);
- To assist in determining the effectiveness of mitigation measures intended to minimize project related effects on wildlife and whether or not these measures require enhancements; and
- To determine if new effects are found that were not predicted in the Environmental Assessment.

This report is divided into nine sections that make up the core-monitoring program:

1. Vegetation/Wildlife Habitat
2. Caribou
3. Caribou Advisory
4. Caribou Mitigation Effectiveness
5. Grizzly Bear
6. Wolverine
7. Waste Management
8. Raptors
9. Waterfowl

The appendices include an Analysis of Environmental Effects from the Diavik Diamond Mine on Wildlife in the Lac de Gras Region (Appendix A) completed by Golder Associates Ltd., which provides a comprehensive analysis of data collected on each Valued Ecosystem Component

(except wildlife habitat) from pre-construction/baseline through to present. Analysis includes both the DDMI and BHP Billiton's wildlife study areas, where applicable. The report by Golder (2005) discusses the results of statistical analysis for each VEC and compares these results to original impact predictions made in the Environmental Effects Report (DDMI, 1998). Appendix B includes procedures for wildlife monitoring conducted at DDMI. Appendix C outlines plant species percent cover in the DDMI permanent vegetation plots. Appendices D and E provide a caribou mortality report as well as raw data from the caribou road observations. Appendices F and H outline raw data from the grizzly bear and wolverine observations on East Island, while Appendix G contains the grizzly bear mortality report. Appendix I provides raw data from the waterfowl surveys conducted at the Diavik site.

Within each section of the report, data analysis is presented that will be tracked over the life of the mine. Recommendations for enhancement to the WMP are presented at the end of each section for consideration. Key recommendations based on technical experience gained throughout the baseline period and the ongoing monitoring program (in this case the 2004 program) are described in this report and will be incorporated into the Wildlife Monitoring Program for subsequent years. The DDMI WMP will be an evolving program that will reflect recommendations during previous years, as well as advances in project development.

The wildlife study area (Figure 1.1) encompasses approximately 1200 square kilometers. Its boundaries are roughly the southwest arm of Lac de Gras to the west, Thonokeid Lake to the east, north to the BHPB wildlife survey area and the north shore of MacKay Lake to the south. An extension to the northwest was revised to include the Lac du Sauvage narrows. The local study area during baseline studies (Penner, 1998) covered an area of approximately 805 square kilometers and the rationale for increasing the study area during current and future monitoring was to take into account the eastern portion of Lac du Sauvage, as this area was identified in the Wildlife Baseline Report (Penner, 1998) as an important movement corridor for caribou.

During 2004, an addition was constructed at the permanent accommodation complex. All haul roads required for mining activities to date are complete. During 2004, while the mine was in operations, a maximum of approximately 425 people were present on East Island, with the average being 397.

Figure 1-1 Diavik's Wildlife Study Area

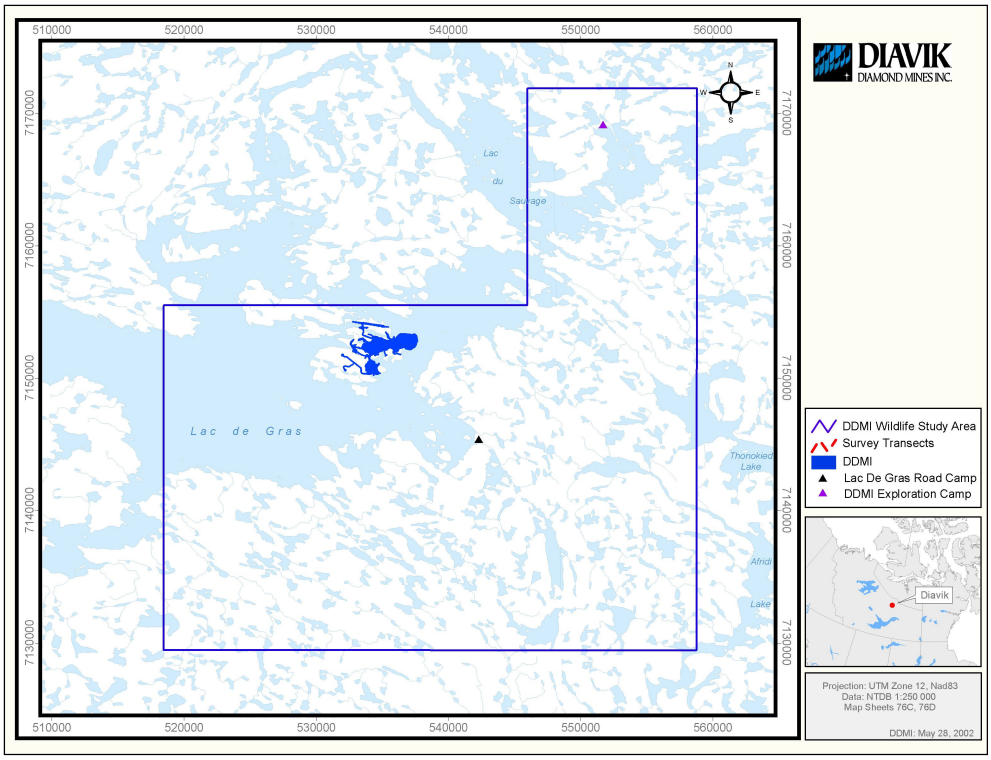
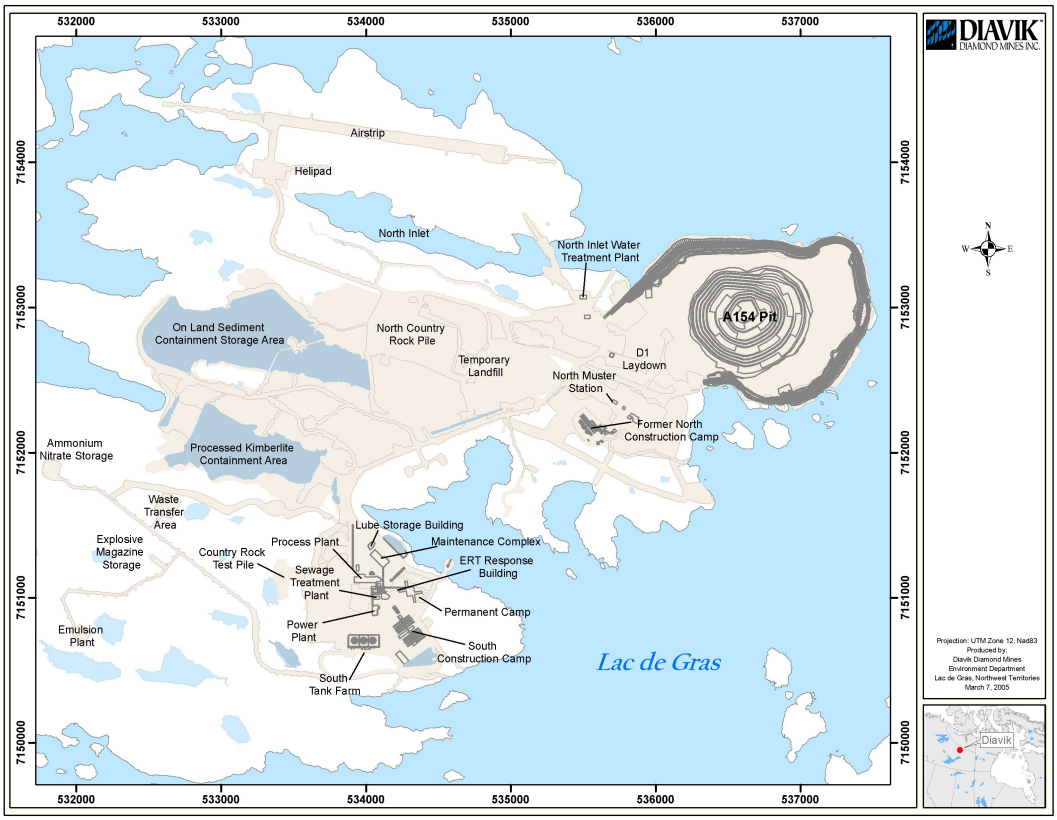


Figure 1-2 Infrastructure Present on East Island in 2004



2.0 VEGETATION/WILDLIFE HABITAT

2.1 WILDLIFE HABITAT LOSS

East Island's vegetation cover is predominantly characterized by heath tundra, heath tundra with boulders and/or bedrock and tussock/hummock habitat types. The main effect on vegetation during operations is the reduction in the aerial extent of all vegetation/land cover types due to disturbance caused by the mine and the mine infrastructure. The recovery of vegetation life would be slow, which is characteristic of arctic environments (Burt, 1997). The direct loss of vegetation/wildlife habitat due to mining activities is important as it decreases the biodiversity at the landscape, community and species level (DDMI, 1998a). This would be a direct loss of habitat utilization for wildlife, but also altered landscapes may attract certain wildlife species such as caribou that could make use of the airstrip and hauls roads for insect relief (Mueller and Gunn, 1996).

The intent for this program is to determine if vegetation loss is within the extent predicted in the Environmental Effects Report (DDMI, 1998b). The objective is:

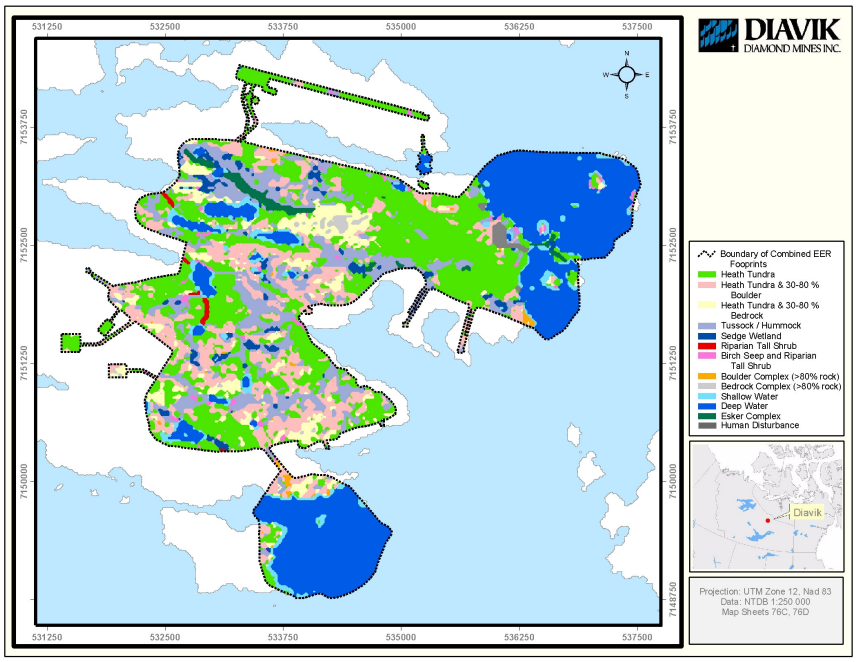
> ***To determine if direct vegetation/habitat loss due to the mine footprint exceeds the prediction of 12.67 km^2.***

2.1.1 METHODS

A map showing the final mine footprint (12.67 km^2) has been superimposed on the vegetation classification map used in the vegetation/land cover section of the Environmental Effects Report (DDMI, 1998b) (Figure 2.1.1-1). This analysis estimated the absolute and relative area of each habitat type within the final footprint. The vegetation classification map from the EER was used because the map used in the wildlife section of the EER report was created at a coarser scale (lower resolution). The vegetation map with the higher resolution allowed for a more precise estimate of the relative areas of each habitat type and is consistent with both the vegetation maps used in this report and the habitat analyses conducted since 1998.

Similar to 2000-2003, an Ikono's satellite image of the mine site area in July 2004 was obtained. Once the image was geo-referenced (using a geographical information system - GIS), it was used to update the current mine footprint. This footprint was then overlaid on the vegetation baseline image which shows each vegetation/habitat type based on the Ecological Landscape Classification developed by RWED (Matthews *et. al* 2001). Each vegetation/habitat type that has been replaced by the mine footprint was selected and area calculations made to determine how many square kilometers have been replaced by the mine footprint.

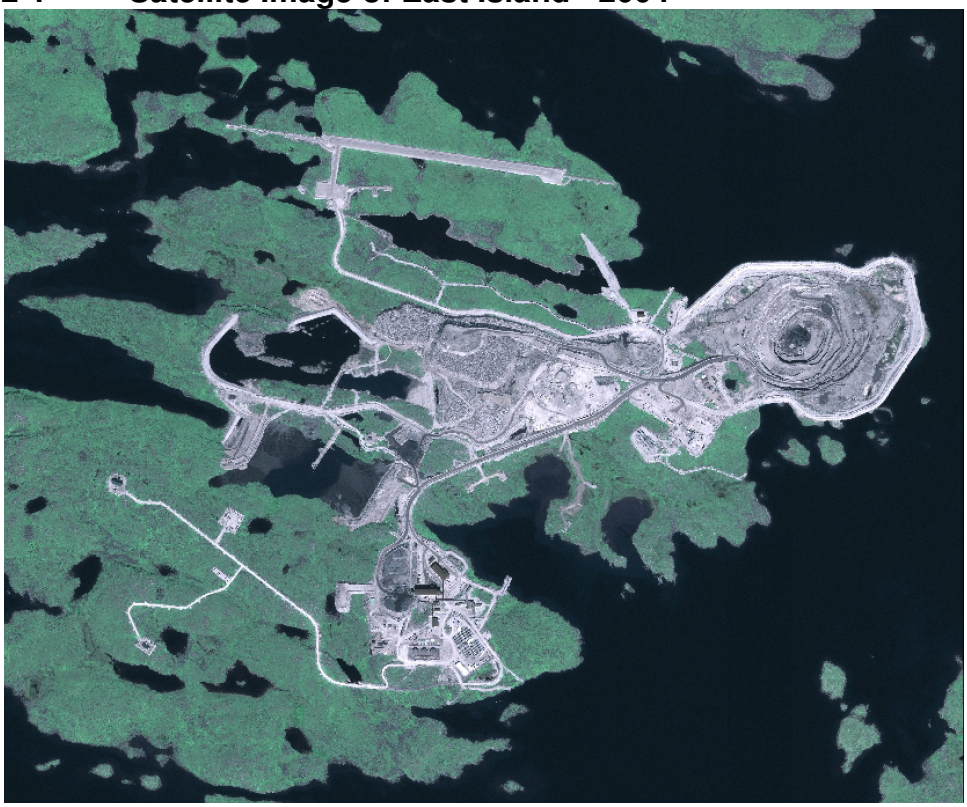
Figure 2.1.1-1 Reconciliation of Predicted Total Habitat Loss on East Island



2.1.2 RESULTS

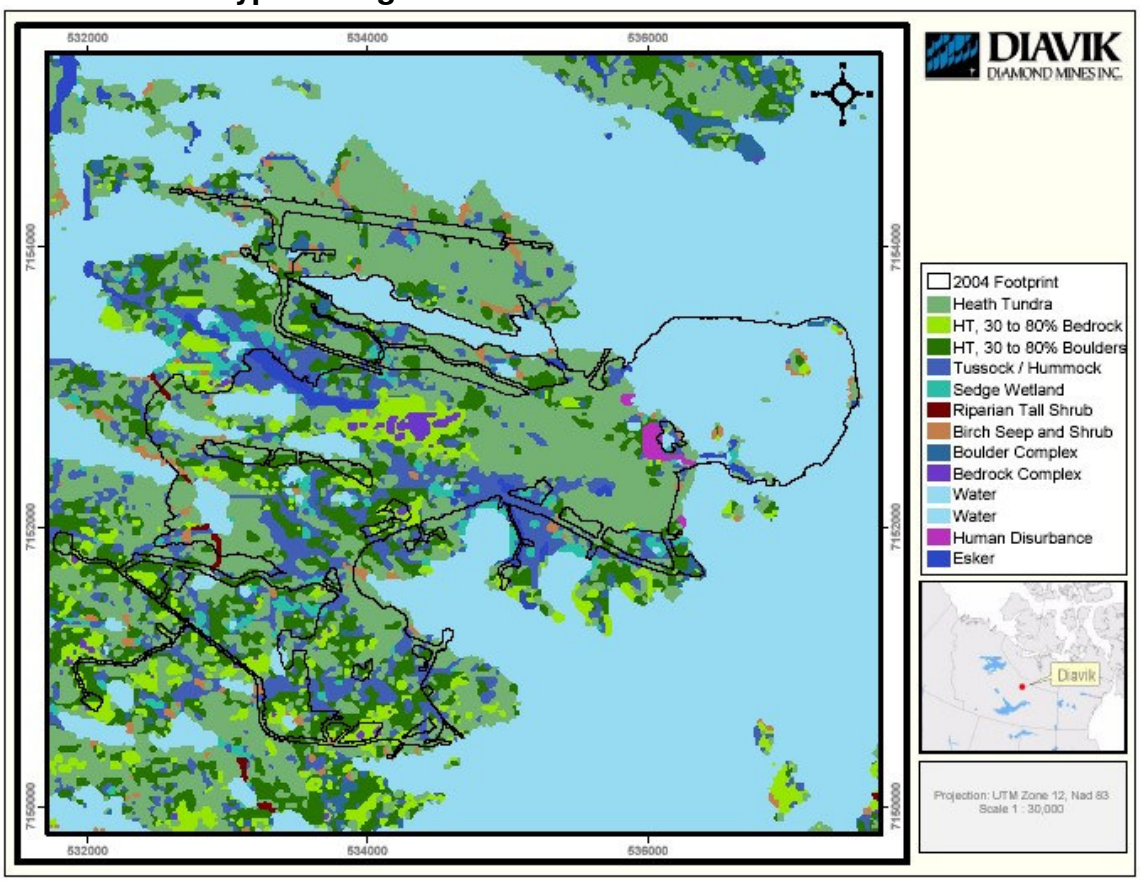
The mine footprint is restricted to the East Island and consists of haul roads, an airstrip, country rock piles, A154 pit and all mine infrastructure (Figure 2.1.2-1).

Figure 2.1.2-1 Satellite Image of East Island - 2004



As of December 2004, a total of 7.31 km^2 of habitat has been altered due to the mine footprint since construction began in 2000. This represents a total loss of 57.7% of the predicted mine disturbance (Figure 2.1.2-2). Direct habitat loss in 2004 was 0.98 km^2. Heath tundra represents the largest cumulative loss on East Island (Table 2.1.2-1), and represented the largest predicted vegetation habitat type loss due to mining activities.

Figure 2.1.2-2 Type of Vegetation Loss on East Island - 2004

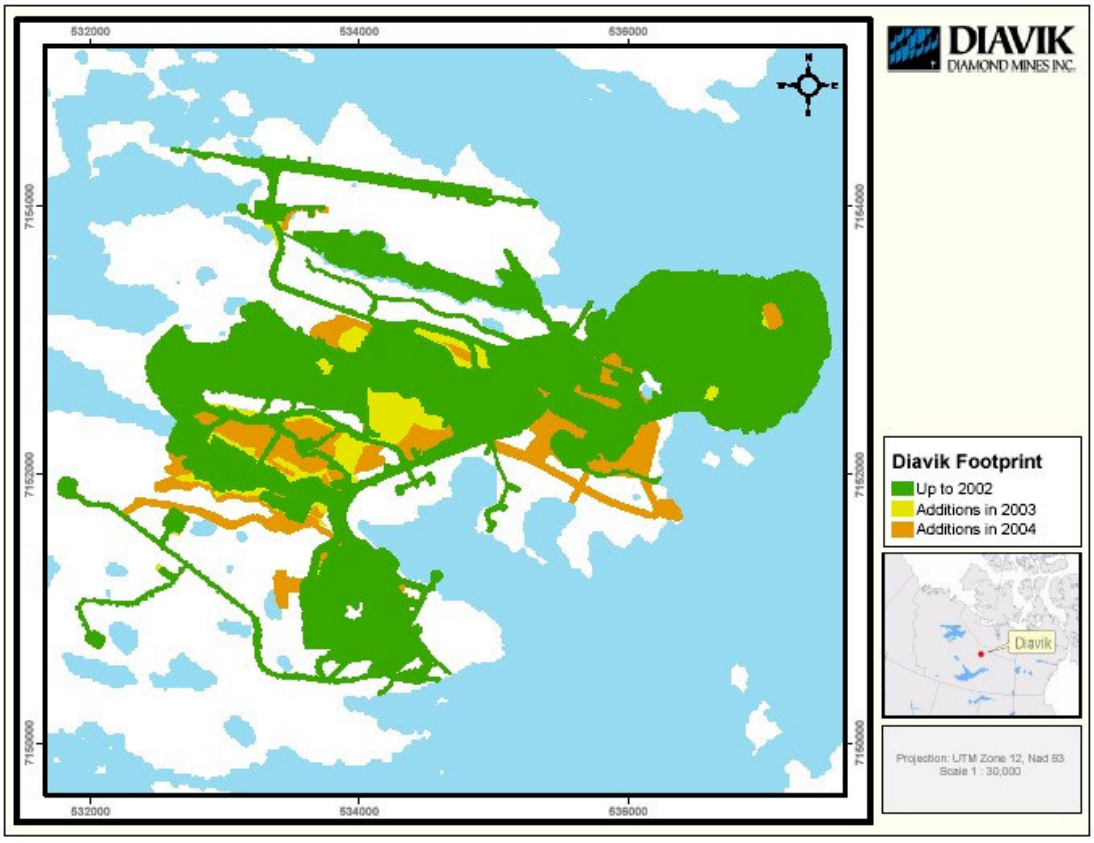


In 2004, heath tundra represented the greatest loss of habitat (0.37 km^2) due to the completion of the south spigot road and A418 construction pads. Other habitat losses that were higher in 2004 compared to last year were heath tundra/boulder and tussock/hummock (Table 2.1.2-1). Incorrect areas were reported in the 2003 WMP due to GIS miscalculations. The value for human disturbance (0.05 km^2) in 2002 was repeated in the 2003 data though no further habitat loss had occurred. Updated values for this area can be found in Table 2.1.2-1. A progression of habitat loss from the mine footprint can be seen in Figure 2.1.2-3.

Table 2.1.2-1 Predicted Mine Disturbance versus Actual Mine Disturbance for All Years (2000-2004)

Vegetation/Land Cover Type	Disturbed Area (km^2) - Predicted	Disturbed Area (km^2) – up to 2001	Disturbed Area (km^2) - 2002	Disturbed Area (km^2) - 2003	Disturbed Area (km^2) - 2004	Disturbed Area (km^2) - Total
Heath Tundra	**3.68**	1.45	0.41	0.14	0.37	**2.37**
Heath Tundra 30-80% Bedrock	**0.78**	0.26	0.08	0.03	0.04	**0.41**
Heath Tundra 30-80% Boulders	**1.89**	0.45	0.19	0.08	0.23	**0.95**
Tussock/Hummock	**1.64**	0.45	0.19	0.15	0.22	**1.01**
Sedge Wetland	**0.26**	0.02	0.02	0.01	0.04	**0.09**
Riparian Tall Shrub	**0.03**	0.01	0.01	0.00	0.00	**0.02**
Birch Seep and Riparian Shoreline Shrub	**0.11**	0.03	0.02	0.01	0.02	**0.08**
Boulder Complex	**0.05**	0.01	0.01	0.00	0.01	**0.03**
Bedrock Complex	**0.07**	0.05	0.01	0.00	0.00	**0.06**
Shallow Water	**0.48**	0.11	0.12	0.01	0.03	**0.27**
Deep Water	**3.46**	0.15	1.66	0.01	0.01	**1.83**
Esker Complex	**0.16**	0.13	0.00	0.00	0.00	**0.13**
Human Disturbance	**0.06**	0.00	0.05	0.00	0.00	**0.05**
Total	**12.67**	**3.12**	**2.77**	**0.44**	**0.98**	**7.31**

Figure 2.1.2-3 Progression of Habitat Loss on East Island, 2002 – 2004



Diavik's exploration camp is found on the northeastern shore of Lac du Savauge and is used as a base for diamond exploratory work. Although vegetation loss due to Diavik's exploration camp was not a component of the EA, it was included in the 2003 Wildlife Monitoring Program Report at the request of reviewers. The value previously reported (0.00051 km^2) did not change during 2004.

2.2 HABITAT ASSESSMENT

A habitat assessment on East Island vegetation is performed to observe vegetation conditions, providing plant species identification and percent coverage in a given plot and habitat type. The analysis will be used to determine if any change is occurring in habitat communities in areas of dust deposition.

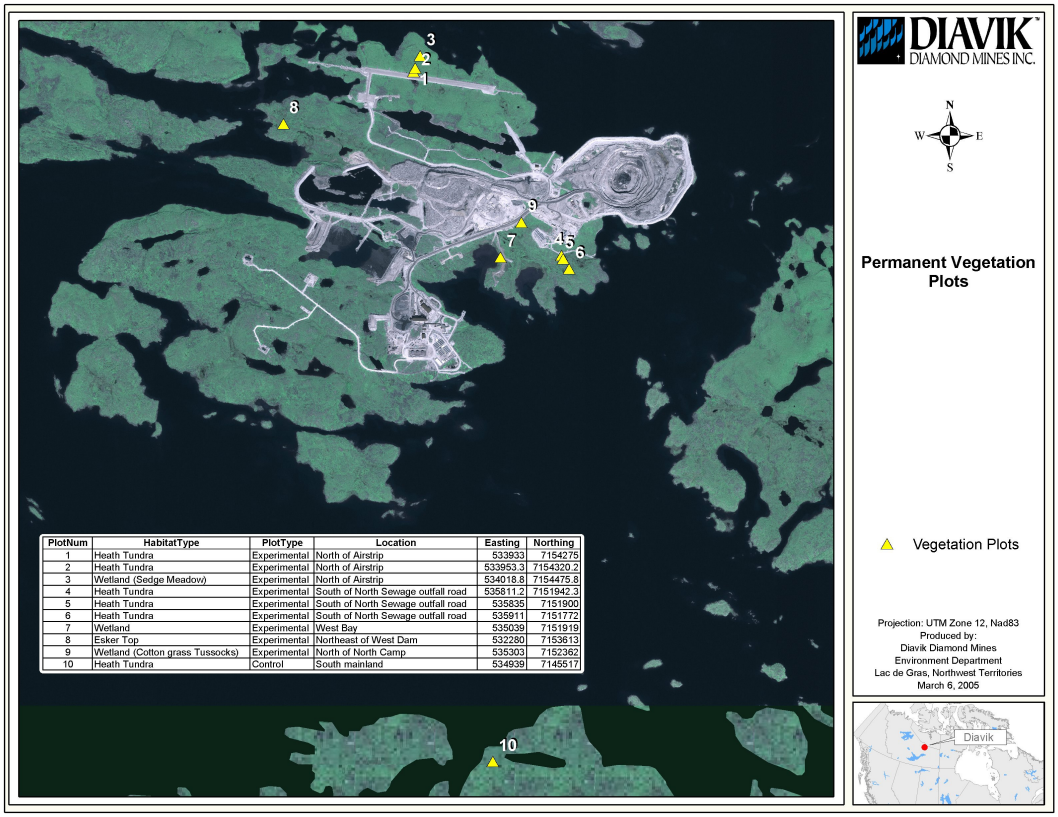
During baseline studies, Page Burt and Dave Penner Associates conducted a plant species and habitat assessment study to determine plant species, habitat type and soil content at a regional and local scale. Baseline studies determined there were 11 habitat types; 8 associated with land and 3 with water.

Heath tundra habitat was the most common classification from the habitat types determined during baseline studies. For this reason, 6 out of 10 permanent vegetation plots consist of heath tundra, including the control site located on the southern mainland. Vegetation plots were chosen in conjunction with snow sample sites to allow comparison with dust levels.

2.2.1 METHODS

Ten permanent vegetation plots (PVP) established in 2001 for habitat analysis were reassessed in the summer of 2004 by Sarah Wilkinson, University of Alberta with assistance from Bonnie Kwaitkowski (University of Alberta) (Figure 2.2.1-1). Nine PVPs were established on East Island; five were within heath tundra, three within wet tundra and one on an esker. The tenth PVP was a control and was located on the adjacent mainland within heath tundra.

Figure 2.2.1-1 Permanent Vegetation Plots Assessed for the Diavik Mine Site



PlotNum	HabitatType	PlotType	Location	Easting	Northing
1	Heath Tundra	Experimental	North of Airstrip	533933	7154275
2	Heath Tundra	Experimental	North of Airstrip	533953.3	7154320.2
3	Wetland (Sedge Meadow)	Experimental	North of Airstrip	534018.8	7154475.8
4	Heath Tundra	Experimental	South of North Sewage outfall road	535811.2	7151942.3
5	Heath Tundra	Experimental	South of North Sewage outfall road	535835	7151900
6	Heath Tundra	Experimental	South of North Sewage outfall road	535911	7151772
7	Wetland	Experimental	West Bay	535039	7151919
8	Esker Top	Experimental	Northeast of West Dam	532280	7153613
9	Wetland (Cotton grass Tussocks)	Experimental	North of North Camp	535303	7152362
10	Heath Tundra	Control	South mainland	534939	7145517

Plots were assessed between 27 July and 2 August 2004. Each 2 meter (m) x 2 m PVP was located by GPS and divided with string into four 1 square meter (m^2) quadrats (Photo 2.2.1-1). At most PVPs, no less than 2 wooden stakes remained. However, at PVP 8 (esker) only one stake remained, so the orientation of the PVP was estimated and the plot re-staked.

Photo 2.2.1-1. Permanent Vegetation Plot (PVP) 2

Standard Operating Procedures developed in 2001 were followed, although a few changes were made where deemed appropriate. The new SOP resulting from this years work is located in Appendix B. Starting with the NW quadrat and working clock-wise, percent vegetation cover by species was visually assessed by the same person. Only those plants rooted in the PVPs were counted. Vegetation cover could add up to more than 100% due to overlap in vegetation layers.

Lichen and moss species were grouped and their cover recorded. Percent cover of bare ground, rock and animal pellets was also recorded. Samples of unidentifiable plant species were taken from outside the PVPs and stored in individually labeled plastic bags under cool conditions until a more detailed identification could be conducted. Samples of two *Carex* species were not confirmed before samples deteriorated. Density of non-rhizomatous or mat-forming species was also recorded. Accurate densities for rhizomatous or creeping species were not possible to obtain because the delineation of separate individual plants is difficult. A digital photograph was taken of each quadrat.

2.2.2 RESULTS

Mean cover and density data are presented in Tables 2.2.2-1 and 2.2.2-2, respectively. Twenty-seven plant species were identified across all plots. All PVPs, except the one located on an esker, had greater species richness than the control, which contained 6 plant species. Lichen cover, however, was much greater in the control plot compared to all other plots. The esker plot only contained 4 species, perhaps partially due to increased bare ground.

Loiseleuria procumbens, Astragalus alpinus and a number of grass species were unique to the heath tundra plots; *Oxycoccus microcarpus*, two cottongrass and two sedge species were unique to the wet tundra plots. Sedges were the dominant vegetation cover in two of the three wetland plots. Cover in four of the five heath plots was dominated by *Betula glandulosa* and *Vaccinium vitis-idaea*. Moss cover was much greater in wet tundra compared to heath or esker communities. Lichen cover, however, was lower in wet tundra.

A comparison of mean percent cover for each PVP is provided in Appendix C. The comparison accounts for all plant species and PVPs are segregated by habitat type. While speciation was slightly more comprehensive in 2004 than 2001, species noted and percent cover are similar in both years.

Table 2.2.2-1 Mean Percent Cover (±SD) in Permanent Vegetation Plots During 2004 Assessment

	PVP1	PVP2	PVP3	PVP4	PVP5	PVP6	PVP7	PVP8	PVP9	PVP10
Vegetation Cover										
Betula glandulosa Dwarf Birch	13 (9)	19 (22)	14 (5)	16 (13)	1 (1)	18 (12)	1 (1)	7 (8)	6 (4)	5 (8)
Ledum decumbens Labrador Tea	7 (4)	14 (15)	20 (4)	7 (5)	16 (3)	11 (8)	1 (2)	-	1 (1)	12 (7)
Vaccinium vitis-idaea Dry-ground Cranberry	6 (3)	10 (5)	14 (4)	15 (8)	18 (4)	7 (4)	-	1 (1)	4 (3)	16 (4)
Vacccinium uliginosum Alpine Bilberry	1 (3)	1 (3)	-	1.3 (1)	3 (2)	1 (1)	2 (3)	2 (3)	1 (1)	1 (2)
Empetrum nigrum Black Crowberry	9 (3)	4 (2)	1 (1)	11 (7)	8 (8)	3 (4)	-	33 (9)	2 (2)	-
Arctostaphylos rubra Red Bearberry	7 (4)	2 (3)	1 (1)	12 (7)	9 (2)	1 (2)	-	-	-	18 (4)
Salix glauca White Willow	6 (10)	5 (4)	-	4 (8)	-	-	-	-	-	-
Salix planifolia Flat-leaved Willow	1 (2)	3 (5)	-	-	-	-	-	-	-	-
Salix herbacea Least Willow	-	-	-	-	-	-	-	-	1 (1)	-
Salix fuscescens Alaska Bog Willow	-	-	-	-	-	2 (1)	2 (1)	-	11 (5)	-
Salix spp. Willow spp.	-	-	-	1 (3)	-	-	-	-	-	-
Betula spp. Birch spp.	-	-	-	-	-	-	1 (1)	-	-	-

	PVP1	PVP2	PVP3	PVP4	PVP5	PVP6	PVP7	PVP8	PVP9	PVP10
Vegetation Cover										
Rubus chameamorus Cloudberry	-	-	-	-	1 (1)	2 (1)	-	-	5 (7)	-
Loiseleuria procumbens Alpine Azalea	29 (9)	2 (4)	-	5 (7)	0 (1)	-	-	-	-	0 (0)
Tolfieldia pusilla False Asphodel	1 (1)	-	-	-	-	-	0	-	-	-
Andromeda polifolia Bog Rosemary	-	-	-	-	2 (1)	6 (5)	8 (4)	-	3 (2)	-
Oxycoccus microcarpus Small Bog Cranberry	-	-	-	-	-	-	1 (1)	-	-	-
Astragalus alpinus Alpine milk-vetch	3 (2)	1 (1)	-	-	-	-	-	-	-	-
Eriophorum angustifolium Cottongrass	-	-	-	-	-	-	-	-	6 (10)	-
Eriophorum vaginatum Sheathed Cottonsedge	-	-	18 (7)	-	-	-	-	-	5 (7)	-
Pedicularis lapponica Lapland Lousewort	0 (0)	-	1 (1)	-	-	1 (1)	-	-	-	-
Calamagrostis inexpansa Northern Reedgrass	-	-	0 (0)	-	-	0 (0)	-	-	-	-
Agrostis borealis Northern Bentgrass	-	-	1 (0)	-	-	-	-	-	-	-
Poaceae Grass spp.	1 (1)	0 (0)	-	-	-	-	-	-	-	-
Carex aqualtilis Water Sedge	1 (1)	1 (1)	0 (0)	-	1 (0)	2 (1)	0 (0)	-	20 (22)	-
Carex #1 Sedge spp.	-	-	-	-	-	-	-	-	8 (2)	-
Carex #2 Sedge spp.	-	-	-	-	-	-	12 (5)	-	-	-
Moss	34 (6)	30 (7)	48 (20)	1 (2)	8 (5)	26 (15)	83 (15)	3 (4)	68 (9)	1 (1)
Lichen	5 (2)	7 (4)	1 (1)	5 (3)	11 (7)	3 (3)	1 (3)	10 (1)	-	60 (8)
Other Cover										
Bare ground	-	-	-	3 (2)	2 (2)	3 (2)	1 (1)	15 (4)	-	2 (2)
Rock	-	-	-	2 (1)	1 (1)	-	-	2 (1)	-	14 (15)
Animal Pellets	-	-	-	1 (1)	1 (0)	0 (0)	0 (0)	2 (2)	-	-

- Mean and SD are rounded to the nearest whole number
- PVPs 1, 2, 4, 5, 6 are in heath tundra; PVPs 3, 6, 9 are in wet tundra; PVP 8 is on an esker; and PVP 10 is a control on the adjacent mainland in heath tundra.

Table 2.2.2-2 Mean Density (±SD) of Select Plant Species in Permanent Vegetation Plots During 2004 Assessment

	PVP 1	PVP 2	PVP 3	PVP 4	PVP 5	PVP 6	PVP 7	PVP 8	PVP 9	PVP 10
Betula glandulosa Dwarf Birch	5 (2)	5 (3)	19 (9)	3 (2)	2 (1)	11 (5)	4 (4)	1 (1)	6 (2)	1 (1)
Betula spp. Birch spp.	-	-	-	-	-	-	7 (10)	-	-	-
Salix glauca White Willow	2 (1)	2 (1)	-	0 (1)	-	-	-	-	-	-
Salix planifolia Flat-leaved Willow	1 (1)	0 (1)	-	-	-	-	-	-	-	-
Salix herbacea Least Willow	-	-	-	-	-	-	-	-	2 (4)	-
Salix fuscescens Alaska Bog Willow	-	-	-	-	-	8 (5)	17 (11)	-	13 (7)	-
Salix spp. Willow spp.	-	-	-	0 (1)	-	-	-	-	-	-
Pedicularis lapponica Lapland Lousewort	1 (1)	-	2 (2)	-	-	1 (2)	-	-	-	-
Toefieldia pusilla False Asphodel	10 (13)	-	-	-	-	-	1 (1)	-	-	-
Calamagrostis inexpansa Northern Reedgrass	-	-	4 (6)	-	-	0 (1)	-	-	-	-
Agrostis borealis Northern Bentgrass	-	-	20 (14)	-	-	-	-	-	-	-
Poaceae Grass spp.	3 (3)	3 (3)	-	-	-	-	-	-	-	-

- Mean and SD are rounded to the nearest whole number

2.3 RECOMMENDATIONS FOR THE 2005 PROGRAM

Stake plots with more durable material such as PVC piping or rebar. It would be sufficient to stake one corner and then note compass direction for orientation of PVP.

Add three controls for each vegetation community; heath tundra, esker and wet tundra. Currently, the one control PVP represents only heath tundra. Also increase the number of PVPs in esker and wet tundra so sampling intensity is equal among communities.

Identify lichen and mosses to species where possible as they form an important part of tundra communities.

Increase monitoring frequency to once every two years, and within the same period of plant phenology in those years, to enable detection of changes in vegetation composition and structure.

3.0 CARIBOU MONITORING

The Bathurst caribou herd is currently the largest of the four major barren-land caribou herds found on the mainland of the NWT. New estimates of the Bathurst herd suggest this herd has been in decline for the last decade at approximately five percent per year. The latest population estimate suggests numbers of about 186,000 caribou (RWED, 2003).

The Bathurst caribou utilize a migration corridor that passes through the Lac de Gras area on their way to and from their calving grounds at Bathurst Inlet (Gunn *et. al* 2002). A portion of the herd frequently forages and moves through the Lac de Gras area during the summer and fall periods, sometimes following shorelines along the lake and onto the west and east islands (DDMI, 1998b).

The Bathurst herd is the most heavily harvested of any barren-ground caribou herd in the Northwest Territories. The herd is an important food source for hunters of both western Nunavut and the communities of the western Northwest Territories. The barren-ground caribou was selected as one of the key indicator species for impact assessment because of its cultural and economic value to northern residents, ecological importance, management status, and biological vulnerability (DDMI, 1998b).

3.1 HABITAT LOSS

Habitat change on East Island has resulted from physical alteration of the landscape due to mine infrastructure. Infrastructure includes country rock piles, PKC and supporting infrastructure (i.e. camp, roads and the airstrip). The physical alteration of the landscape can have an influence on caribou as the vegetation can no longer be exploitable as a source of life basics (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 for predators (DDMI, 1998b). To address how the change of habitat may affect caribou on East Island, a habitat suitability index (HSI) model was developed for DDMI during the EA by Rowell and Van Egmond (1998). The HSI model was used to determine the value of each habitat type based on the presence of important forage species for caribou and cover concealment for predators (DDMI, 1998b). Important foraging species were determined from the analysis of plant fragments found within caribou pellet samples collected in 13 randomly selected plots in the Lac de Gras area (Van Egmond and Rowell, 1997b). The results of the caribou pellet analysis were used to rank caribou food availability during the summer within each habitat type; willow (*Salix)*, lichens (*Cladonia and Cetraria*), Labrador Tea (*Ledum)* and sedges (*Carex)* represented approximately 94.8% of the major plant groups identified during the pellet analysis. Therefore, habitats that contained these plant types scored the highest HSI value (DDMI, 1998b). Habitats were rated on a scale of 0 to 1 for their capability to support use for caribou, with values >0.30 regarded as highly suitable habitat and values <0.25 rated as low suitability for caribou. The area of each habitat type on East Island (Table 2.2-1) was multiplied by its HSI value to determine the number of foraging habitat units available to caribou.

One objective of the caribou monitoring program is to determine if direct summer habitat loss (in habitat units [HUs]) is greater than predicted. The following section summarizes methods used and results obtained. The impact prediction in the Environmental Effects Report (DDMI, 1998b) is:

> ***At full development, direct summer habitat loss from the project is predicted to equal 2.965 habitat units (HU's).***

3.1.1 METHODS

The vegetation classification map used in the vegetation/land cover section of the Environmental Effects Report (DDMI, 1998b) was used to determine the loss of caribou summer habitat. This approach is similar to methods used in the Vegetation/Wildlife Habitat Loss section of this report (see Section 2.1). The area (km^2) of vegetation type lost was multiplied by its habitat suitability index value (DDMI, 1998b) to determine habitat units lost (HUs).

3.1.2 RESULTS

Direct summer habitat loss to date from the mine totalled 1.73 habitat units (Table 3.1-1). Heath tundra, which has the highest habitat suitability rating, represented 2.37 km^2 of the lost vegetation. Caribou summer habitat loss was greatest in 2001, when the majority of haul roads and laydown areas for mine infrastructure were constructed. Although construction of infrastructure pads for the A418 dike construction began in 2004, habitat units lost due to mining activities this past year represent the second smallest loss since the start of construction in 2000 (Table 3.1-1). Overall, direct loss of suitable summer habitat for caribou is currently below that predicted in the EER.

Table 3.1-1 Predicted Area of Summer Caribou Habitat - Disturbed versus Actual Area of Summer Caribou Habitat Disturbed on East Island

Vegetation/ Land Cover Type	Habitat Suitability Class	Predicted Habitat Units Lost	Actual Habitat Units Lost 2000	Actual Habitat Units Lost 2001	Actual Habitat Units Lost 2002	Actual Habitat Units Lost 2003	Actual Habitat Units Lost 2004	Total Habitat Units Lost to Date
Heath tundra	**High**	**2.13**	0.30	0.42	0.19	0.09	0.23	**1.23**
Heath boulder								
Tall shrub								
Bedrock	**Moderate**	**0.63**	0.07	0.12	0.07	0.05	0.08	**0.39**
Tussock hummock								
Sedge Meadow								
Esker								
Birch Seep	**Low**	**0.20**	0.02	0.05	0.02	0.01	0.01	**0.11**
Boulder field								
Heath bedrock								
	Total	2.96	0.39	0.59	0.28	0.15	0.32	**1.73**

3.2 ZONE OF INFLUENCE

Mining activities have the potential to decrease the use of habitat adjacent to human developments for caribou due to behavioural disturbance (DDMI, 1998b). Miller and Gunn (1979) explained the expression of 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". Zones of Influence were established during Diavik's Wildlife EER to ensure a conservative approach in the assessment of the possible impacts of human activity on caribou. The zones of influence were based on literature and the experience of barren-ground caribou biologists.

Information collected on the activity of caribou, as part of DDMI's Wildlife Monitoring Program, is used to determine whether a change in behaviour is detected in relation to distance from mining activities. Aerial surveys (see Section 3.2.1) provide a quick "snap-shot" of caribou behaviour. In addition, scan sampling is conducted on East Island where the foraging behaviour of animals may be influenced by mining activities. Observations are also made on the mainland ("control site"), to determine whether or not "changes in behaviour were a response to human activity" (Gunn, 1983).

The objective for this program is to determine if the zone of influence (ZOI) from mining activities is greater than predicted. The following section summarizes the methods used and results obtained from aerial surveys. The impact prediction found in the Environmental Effects Report (Wildlife, 1998) is:

The zone of influence from project-related activities would be within 3 to 7 km.

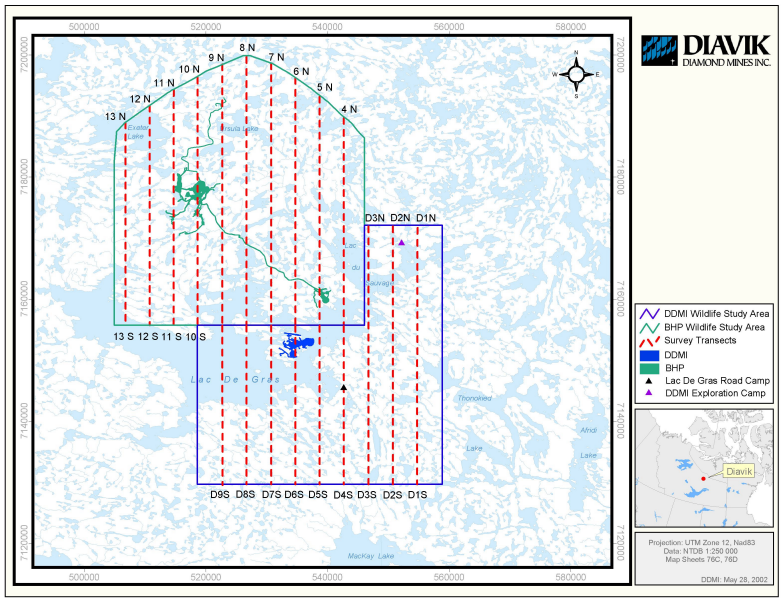
3.2.1 METHODS

Weekly aerial surveys (Figure 3.2.1-1) were used to collect information on caribou numbers, habitat type associated with the caribou groups, and the dominant activity of caribou with respect to distance from the mine site. Surveys were flown once per week from April to September, when weather permitted, except for mid- June to mid-July, where every second transect was flown to coincide with few numbers of caribou within the study area. A helicopter was used and all surveys were conducted from 120 to 180 meters (m) above ground level (agl) at a speed of 145 to 160 kilometers per hour. Transects were spaced 4 km apart and the observation width along any transect was 1200 m. This allowed for 30% coverage of the study area.

Habitat type associated with the caribou groups was recorded. During the northern migration, habitat type was broken down into four classes, which included heath tundra, frozen lakes, sedge wetland and other (esker, disturbed, and bedrock). During the southern migration, habitat classifications included heath tundra, esker, sedge wetland, riparian shrub and other (water, bedrock, disturbed, and boulder).

Analysis of caribou behaviour was classified as feeding/resting (bedded, feeding or standing) or moving (running, walking or trotting) for each migration period (northern and southern), and all observations were classified based on location relative to the mine site (<3 km and >3 km). Data collected for observations of caribou behaviour greater than 3 km from site only include observations made within the Diavik wildlife study area. Northern migration includes all observations before June 30th and southern migration includes observations following June 30th.

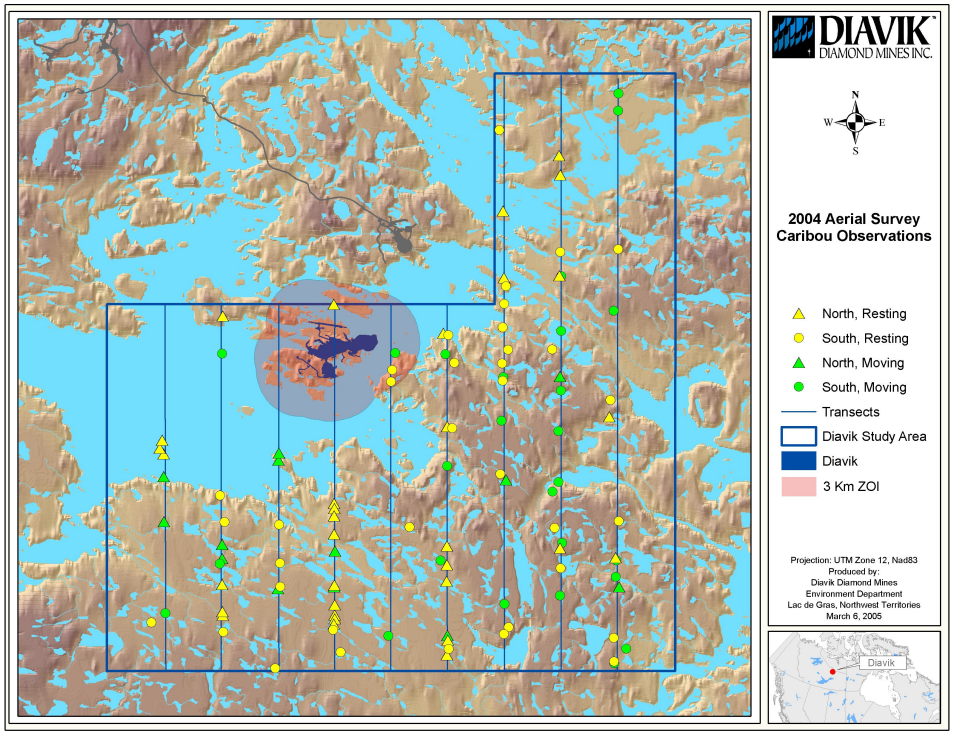
Figure 3.2.1-1 Aerial Survey Transects for Caribou Effects Monitoring



3.2.2 RESULTS

A map showing the DDMI study area with observations of caribou groups for 2004 is included as Figure 3.2.2-1. A total of 23 surveys were conducted from April to October 2004.

Figure 3.2.2-1 Behaviour of Caribou Within the DDMI Study Area Based on Aerial Survey Data Obtained During the 2004 Northern and Southern Migration Periods

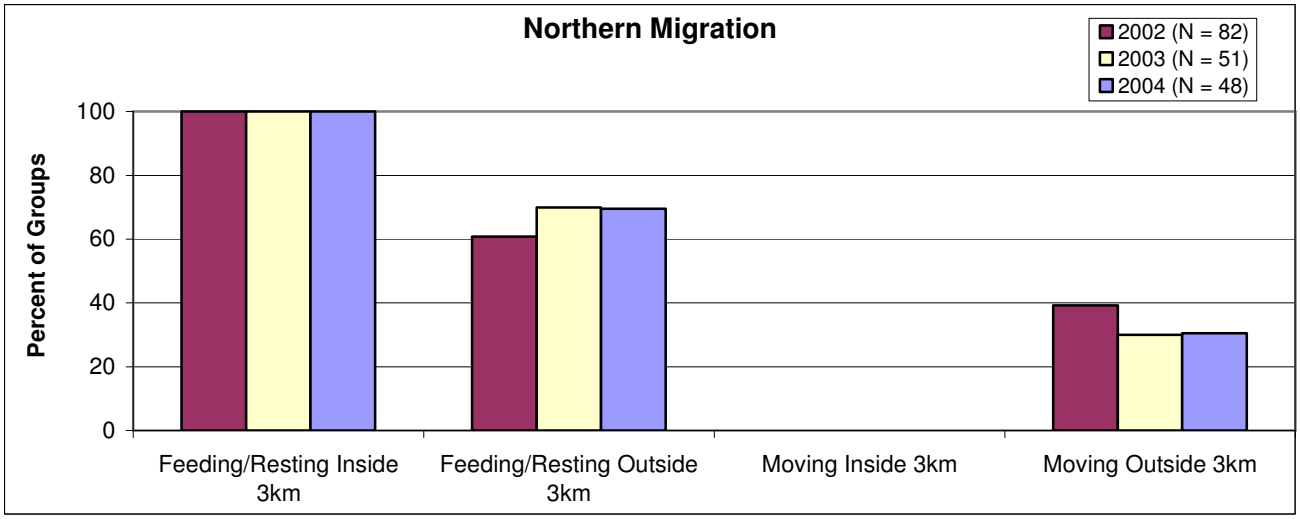


In 2004, one caribou group was observed feeding/resting within 3 km of the mine site during the northern migration. Similarly, in 2003, 1 group was feeding/resting within 3 km of the mine footprint, while in 2002, 3 groups were feeding/resting within this zone. No caribou groups were moving within this predicted zone of influence, thus 100% of the groups observed within 3 km of the mine were feeding, standing or bedded (Figure 3.2.2-2).

In contrast, observations of caribou located greater than 3 km from the mine during the northern migration indicated that an average of 70% (n = 47) of caribou groups were resting during the northern migration in 2004 (Figure 3.2.2-2). From 2002 to 2004 inclusive, 66% (n = 176) of caribou outside the 3 km zone were resting.

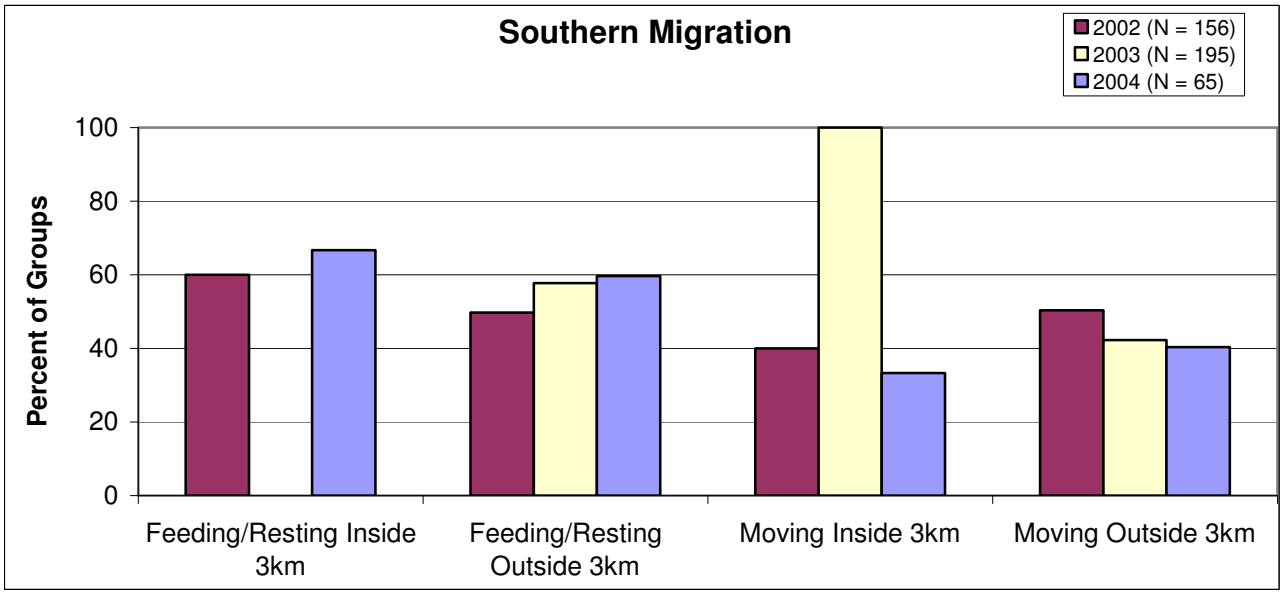
Sample size within 3 km of the mine is not sufficient to provide meaningful comparisons with caribou located greater than 3 km from the mine. For a complete analysis of regional data (i.e., including Diavik and Ekati study areas), refer to Appendix A (Golder 2005).

Figure 3.2.2-2 Behaviour of Caribou Based on Aerial Survey Data, within 3 Kilometers and Greater than 3 Kilometers of the Diavik Site During the 2002 to 2004 Northern Migration Periods



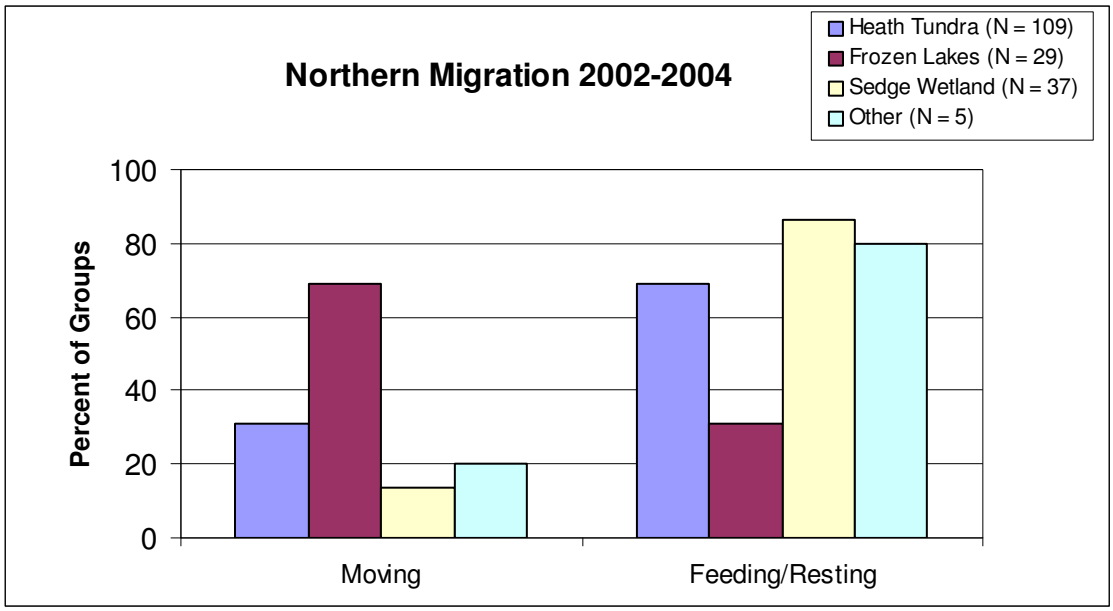
A total of nine caribou groups were observed within 3 km of the mine during the southern migration in 2004 (n = 3), 2003 (n = 1) and 2002 (n= 5). Combining data for all three years indicated that 56% (n = 9) of the groups were resting within this predicted zone of influence. In contrast, for 2002 to 2004, an average of 54% (n = 413) of caribou groups located greater than 3 km from the mine were feeding/resting (Figure 3.2.2-3). For 2004 alone, 60% (n = 62) caribou groups outside the 3 km zone were feeding/resting.

Figure 3.2.2-3 Behaviour of Caribou Based on Aerial Survey Data, within 3 Kilometers and Greater than 3 Kilometers of the Diavik Site During the 2002 to 2004 Southern Migration Periods



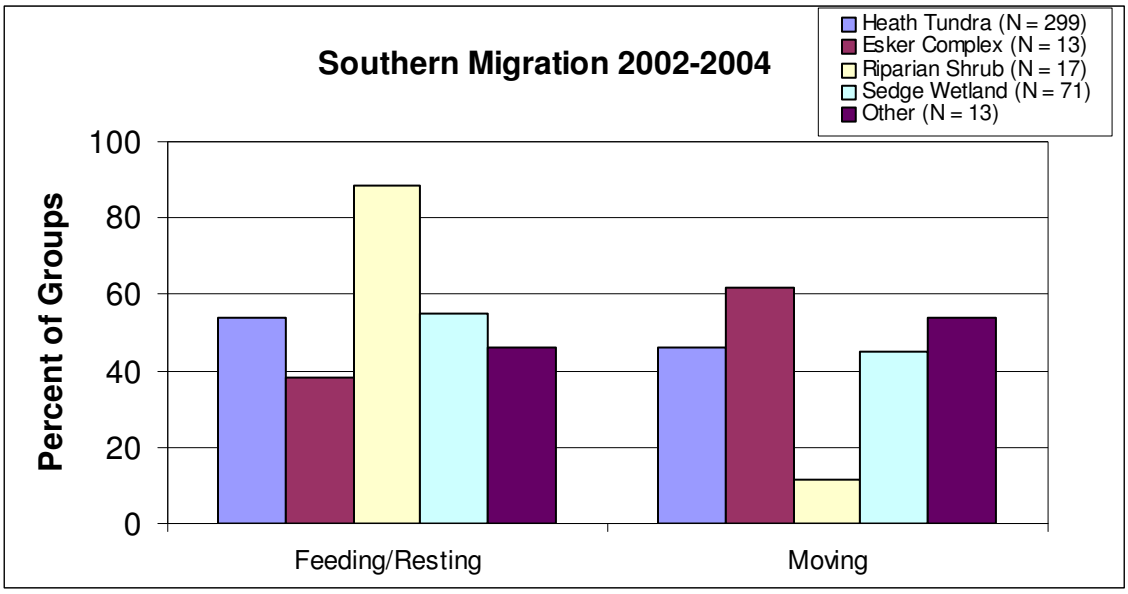
During the northern migration, point observations of caribou behaviour were strongly correlated to habitat (Golder 2005). Pooled data from 2002 - 2004 shows that caribou were more likely to be observed moving on frozen lakes (69%) relative to other habitats (Figure 3.2.2-4). Sedge wetland (86%) and other habitats (esker, disturbed and bedrock - 80%) maintained a slightly higher proportion of feeding/resting groups during the northern migration.

Figure 3.2.2-4 Behaviour of Caribou Among Habitats within the Diavik Study Area During the Northern Migration Period, 2002 – 2004



Similar to the northern migration, caribou behaviour was associated with habitat during the southern migration. For example, 88% of groups observed in riparian shrub habitat from 2002 - 2004 were feeding/resting (Figure 3.2.2-5). The chance of observing a group feeding/resting in heath tundra and sedge wetland habitats was similar at 54% and 55%, respectively.

Figure 3.2.2-5 Behaviour of Caribou Among Habitats within the Diavik Study Area During the Southern Migration Period, 2002 - 2004



In summary, a total of 14 caribou groups have been located within 3 km of the mine site during aerial surveys conducted from 2002 to 2004. Five groups were observed during the northern migration and 9 groups have been recorded during the southern migration. Although 71% of these groups were observed feeding/resting, current sample size is too small to conduct a statistical analysis using this categorical approach. Appendix A (Golder 2005) provides a comprehensive analysis of regional data to test impact predictions related to the zone of influence from the mine on caribou behaviour, group composition, and distribution.

Point observations of caribou behaviour within the study area for 2002 - 2004 indicated that 33% of caribou groups (n = 180 groups) were feeding/resting during the northern migration. In contrast, 55% of caribou groups (n = 416 groups) were feeding/resting during the southern migration. Data from 2004 aerial surveys indicated that 55% and 53% of caribou groups were observed to be feeding/resting at the time of initial sighting during the northern and southern migrations, respectively, within both the Ekati and Diavik study areas. It is recognized that annual changes in weather, insect abundance, foraging conditions, nutritional state of individuals and mining activities may alter the behaviour of caribou. Therefore longer-term data have been analysed in relation to caribou behaviour in Appendix A (Golder 2005).

The low number of caribou traveling through the study area during the past two years has limited the opportunity to study caribou behaviour on the ground through scanning observations. During 2003 and 2004, ground observations of caribou behaviour were successfully conducted for 12 and 14 caribou groups, including 3 control sites within the Diavik study area, respectively. During each

scan, behavioural observations were recorded every 8 minutes, and a minimum of 4 behavioural observations (32 minutes) was required in order for the scan to be considered successful. Data collection will continue through 2005.

3.3 DISTRIBUTION OF MOVEMENT

Due to construction of mining areas, infrastructure, roads and the airstrip, a deflection of caribou movements may be associated with mining activities (DDMI, 1998b). A friction model was developed by Wierzchowski *et. al* (1998) as one tool to evaluate the possible effects of mining activities on caribou distribution in the Lac de Gras area. The friction model was used to calculate pathways of least resistance for caribou during pre-development, development and post-closure, based on the degree of friction of the landscape. The model allowed Diavik to make general predictions about the effect of the mine on the distribution of caribou movement (DDMI, 2002). Data collection to fully test the accuracy of the model is beyond the scope of this program and would require killing caribou to measure empty body weight, which was used as an input and output variable in the friction model. Therefore, information collected from aerial surveys and caribou collar locations will be used to examine the distribution of caribou within the wildlife study area. These observations are then compared with predicted trends in movement. A technical report produced by Golder Associates Ltd. (Appendix A), describes the caribou data collected from 1998-2004 for both the Diavik and BHPB wildlife study areas, and results are presented in a statistical manner. For the purpose of this report, general observations will be presented relative to the DDMI study area and readers are referred to Appendix A for regional statistical conclusions.

The following section describes the methods used and the results obtained from aerial surveys and information provided by caribou collar locations supplied by Resources, Wildlife and Economic Development (RWED). The impact prediction found in the Environmental Effects Report (DDMI, 1998) is:

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

3.3.1 METHODS

Caribou aerial survey information was broken down into migration periods (northern and southern) and quadrants within the regional study area (Figure 3.3.1-1). See Section 3.2.1 in this report and Technical Procedures – Aerial Surveys for Caribou in Appendix B for aerial survey methods that were utilized in 2004. Information was evaluated to provide metrics such as first date observed, last date observed, maximum number, total number and densities of caribou within each of the quadrants. Density of caribou was calculated as the mean number of caribou per survey per survey area. During the northern migration, the survey area contained all habitat types including frozen lakes, while during the southern migration all deep water habitat was removed from the calculation (Table 3.3.1-1). An important reminder while reading this section is that total number of caribou (actual caribou counted) observed will be reported throughout this portion of the report.

For the purpose of this section, the BHPB survey area was separated into two quadrants (quadrants A and B), as it was apparent that these were natural geographic areas of caribou movement within the Lac de Gras area (Golder Associates, 2004). Quadrant C consists of the Diavik wildlife study area and quadrant D contains the East Island where the Diavik mine is located.

RWED provided weekly maps on the geographic location of collared cows and this information can be used to show general locations of the Bathurst caribou herd during their migration periods (Gunn *et. al*, 2002). Maps provided in Appendix A show the movement of the collared Bathurst caribou during the northern (Appendix A - Figure 2.2-1 to 2.2-2) and southern migrations (Appendix A - Figures 2.2-3 to 2.2-7).

Figure 3.3.1-1 Quadrants within the Regional Study Area

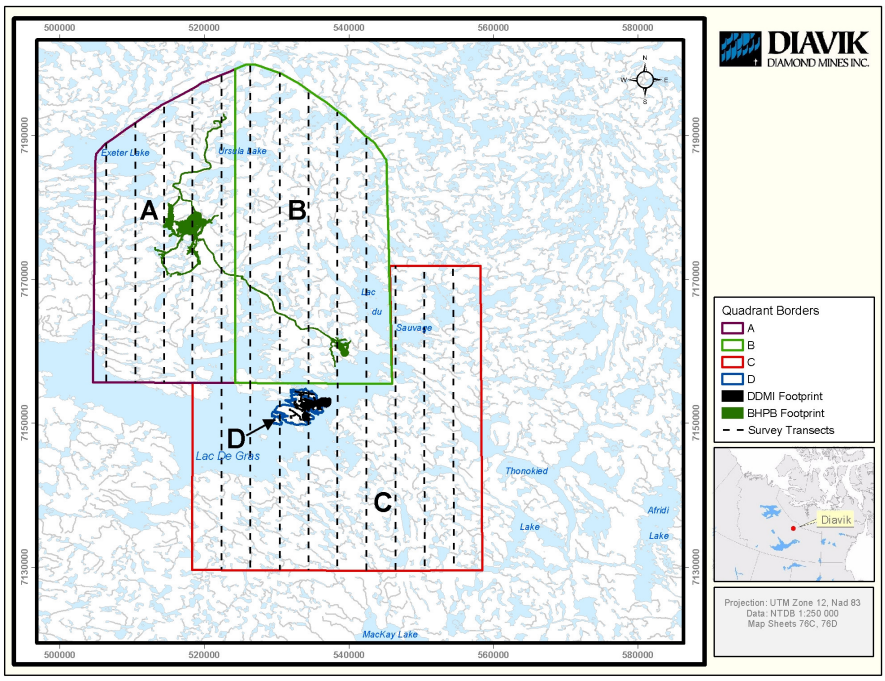


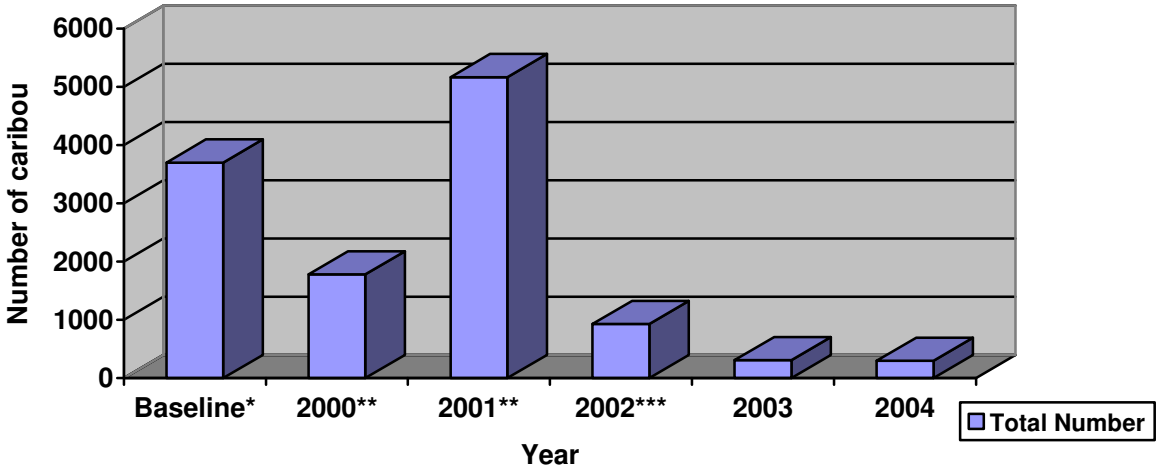
Table 3.3.1-1 Areas (km^2) Surveyed During the Northern and Southern Migration Periods 2004

Quadrant	Northern Migration (km^2)	Southern Migration (km^2)
A	229.8	166.5
B	239.6	154.0
C	332.9	221.0
D	6.5	6.5

3.3.2 RESULTS

Although differences exist in aerial survey methods used throughout baseline (Penner, 1998), construction and post-construction, general observations can be made. In 2004, 295 caribou were observed in the Diavik wildlife study area during the northern migration, similar to the 306 animals observed in 2003. In contrast, approximately 6000 animals were observed during the northern migration in 1996, and an estimated 5000 caribou were counted in 2001 (Figure 3.3.2-1). A similar number of animals were estimated in 1997 (1400 caribou), 2000 (1700 caribou) and 2002 (979). No caribou were observed on East Island during the northern migration period in 2004. This result is the same as observations made in 2001 (no animals).

Figure 3.3.2-1 Total Number of Caribou in the DDMI Wildlife Study Area During the Northern Migration



*Baseline observations conducted between 1996-1997 and consists of mean numbers on the east and west islands of Lac de Gras (Penner, 1998)
**Caribou numbers based on East Island ground counts and aerial survey observations.
***Caribou numbers based on weekly aerial surveys of Diavik's wildlife study area (2002-present).

The total number and average density of caribou during the northern migration in 2004 was higher in quadrants B and C than quadrants A and D (Table 3.3.2-1). This pattern is similar in total numbers of caribou observed among quadrants in 2003, with the exception of quadrant B in which approximately double the number of caribou were seen as compared to last year (Figure 3.3.2-2). The increase in caribou observed in quadrant B during the 2004 northern migration correlates with the movement of satellite collared animals through the northeast portion of the regional study area (Golder 2005). In contrast, during the northern migration in 2003, satellite collared caribou traveled far west of the regional study area (Golder 2005).

During the northern migration in 2004, a total of 844 caribou were observed in the regional study area. The date that caribou were first sighted was similar among quadrants, but no caribou were observed in quadrant D (East Island). In general, the date of the first sighting of caribou in the regional study area occurred approximately 1 to 2 weeks earlier in 2004 than 2003 for all quadrants (Table 3.3.2-1).

Figure 3.3.2-2 Total Number of Caribou Observed in Each Quadrant During the Northern Migration

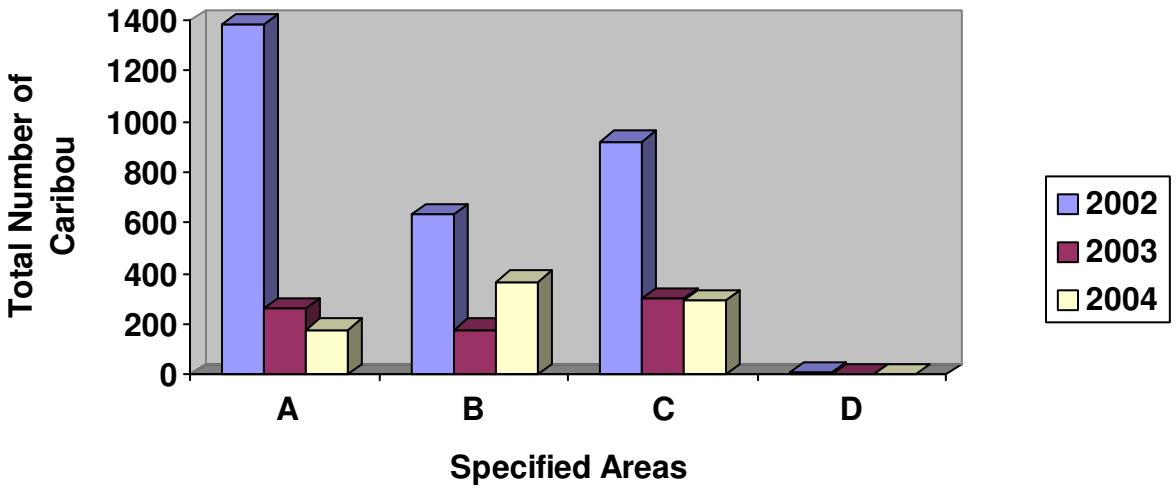
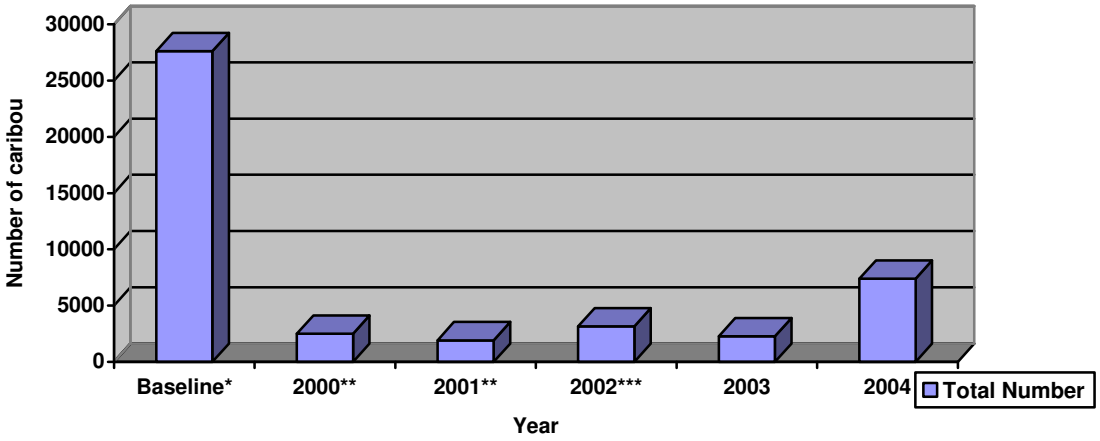


Table 3.3.2-1 Caribou Observations within Quadrants (A-D) During the 2004 Northern and Southern Migrations

	Northern Migration (N = 11 surveys)				Southern Migration (N = 14 Surveys)			
	A	**B**	**C**	**D**	**A**	**B**	**C**	**D**
Survey Date Caribou First Observed	22 April	23 April	23 April	-	31 July	23 July	18 July	-
Survey Date Caribou Last Observed	12 June	06 June	19 June	-	25 Sept	18 Sept	25 Sept	-
Maximum Caribou Observed in Single Survey (survey date)	69 (30 May)	115 (30 April)	83 (06 June)	0 -	208 (31 July)	36 (03 Sept)	7000 (23 July)	0 -
Total Caribou Observed in Quadrant, in Migration Period	180	369	295	0	312	116	7399	0
Surveys in Which Caribou were Observed	6	7	8	0	9	8	9	0
Mean $\pm$ SD Caribou / Survey / km^2	0.09 $\pm$ 0.11	0.17 $\pm$ 0.17	0.10 $\pm$ 0.09	0.00 $\pm$ 0.00	0.17 $\pm$ 0.36	0.07 $\pm$ 0.08	3.04 $\pm$ 9.51	0.0 $\pm$ 0.0

During the southern migration in 2004, approximately 7399 caribou were observed in the Diavik wildlife study area, which is an increase in the number of caribou observed from 2000 through 2003 (Figure 3.3.2-3). The greater part of this value (7000) is from two observations made in quadrant C on 23 July 2004. In contrast, an annual average of approximately 27,000 caribou were observed during three years of baseline studies (1995 – 1997).

Figure 3.3.2-3 Total Number of Caribou in the Diavik Wildlife Study Area During the Southern Migration

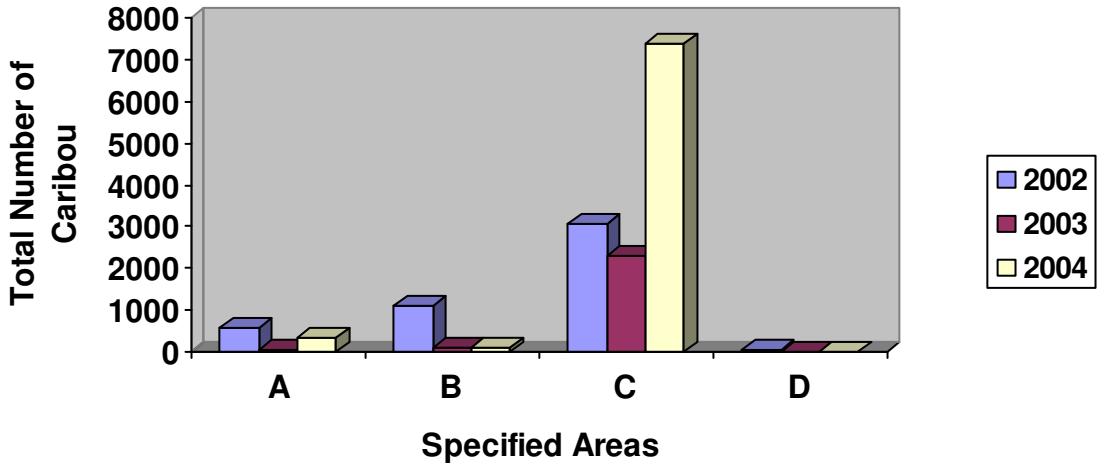


*Baseline observations conducted between 1995-1997 and consists of mean numbers on the east and west islands of Lac de Gras (Penner, 1998)
**Caribou numbers based on East Island ground counts and aerial survey observations.
***Caribou numbers based on weekly aerial surveys of Diavik's wildlife study area (2002 – present).

During the southern migration in 2004, a total of 7827 caribou were observed in the regional study area (Table 3.3.2-1). However, no caribou were observed in quadrant D (East Island). The date that caribou were first sighted in quadrants A, B and C was within one week of the first sighting of caribou in 2003, and within days for quadrants A and B (DDMI, 2003). The date of first sightings within each quadrant varied over a two week period for 2004, as compared to within 5 days during 2003. The date that caribou were last observed in the regional study area was similar among quadrants and between years from 2002 to 2004 (DDMI, 2003).

Similar to years past, the number of caribou observed and the average density of caribou were highest in quadrant C during 2004 (Figure 3.3.2-4). These results reflect the movement of satellite collared caribou through the regional study area. For example, from 2002 - 2004, the majority of collared caribou traveled adjacent to or through quadrant C in the southeast corner of the regional study area (Appendix A: Figure 2.2-6 and Figure 2.2-7). To date, data collected for the southern migration appears to agree with the impact prediction found in the Environmental Effects Report (DDMI, 1998), stating that caribou would travel east of the mine site during the southern migration.

Figure 3.3.2-4 Total Number of Caribou Observed in Quadrants During the Southern Migration



In summary, the number of caribou observed within the Diavik wildlife study area was higher during baseline (1996-1997) than from 2000 through 2004, especially during the southern migration. However, data from the 2004 southern migration showed higher numbers of caribou than all years from 2000-2003, and 58% more animals than in 2002. The particular factors associated with this pattern are not known, but are likely associated with changes in aerial survey methods, variables influencing the geographic distribution of caribou within their annual home range, and changes in population size. For example, recent information collected by RWED (2003) suggests that the number of animals in the Bathurst herd has decreased by approximately 50% since 1996. Some studies have shown that long-term changes in habitat condition, and caribou foraging and movement patterns can be associated with periodic range shifts and large fluctuations in population size (Messier et al. 1988; Ferguson et al. 2001). Thus, there are a number of factors that can affect the annual distribution and movement of caribou across their home range, which can create year-to-year changes in the abundance of animals in the study area, and other local areas (e.g., communities) within the Slave Geological Province.

The timing of the first caribou sighted among quadrants in the regional study area (i.e., combined Diavik and BHPB study areas) during the northern migration in 2004 occurred approximately two weeks earlier than in 2003, and at a similar time to dates recorded for 2002. In contrast, initial observations of caribou among quadrants in the regional study area during the southern migration in 2004 occurred within one week of the first sightings in both 2002 and 2003. However, longer term studies have shown that the variation in timing of the northern migration is less than the southern migration (Gunn et al. 2002; Golder Associates 2004). Analysis conducted by Golder (2005) indicate that year-to-year variation in the likelihood of caribou presence was related to the annual number of caribou observed during surveys (Appendix A).

The number and density of caribou among quadrants in the regional study area provides some support for the prediction that caribou would move west of East Island during the northern migration, and east of Lac de Gras during the southern migration (DDMI 1998). For example, the mean density of caribou was highest in quadrant A (northwest section of regional study area) during the northern migration in 2002, and corresponded to the movement of satellite collared caribou through the Lac de Gras area. In 2003, the number and density of caribou was similar among quadrants indicating that animals were more or less evenly distributed throughout the regional study area. Most collared caribou migrated along a route that was far west of the study area during the spring of 2003

(Appendix A). During 2004, the mean density of caribou was highest in quadrant B (north of East Island) for the northern migration. Given the low number of caribou seen on and south of East Island during the spring, it is likely that these animals moved in from the west, which is supported by the movement of the satellite collared caribou provided by RWED (Appendix A).

During southern migrations from 2002 - 2004, the number and mean density of caribou was highest in quadrant C. In particular, the location of caribou groups observed during aerial surveys showed that most of the largest groups were observed in the southeast corner (quadrant C) of the regional study area. These data are supported by the migration paths of collared caribou which showed that from 2002 to 2003, the majority of collared animals traveled through or adjacent to the eastern portion of the regional study area during the early part of the southern migration (Appendix A).

3.4 MORTALITY

Mineral development in the Bathurst caribou herd range has caused concerns about increased mortality, which include: ground-vehicle collisions, collisions with aircraft and accidental losses associated with caribou moving in hazardous areas around mining activities (DDMI, 1998b). Mitigation measures have been developed that are designed to reduce the potential for mortalities such as, wildlife have the “right of way” on all haul roads, suspension of blasts when caribou are within the “safe zone” of the blast, and the caribou traffic advisory. The objective for this program is to determine if the number of caribou deaths or injuries associated with DDMI mining activities is greater than predicted. The following section summarizes methods applied and the results produced from incident reporting and road observations. The impact prediction in the Environmental Effects Report (DDMI, 1998b) is:

Project-related mortality is expected to be low.

3.4.1 METHODS

Project related caribou mortalities are monitored in a number of ways. All personnel undergo environmental orientation where it is stipulated that should a wildlife incident occur, an incident report is to be completed. Numerous environmental data collection programs occur on East Island such as water quality sampling and dust and vegetation monitoring programs; any caribou mortalities located during these sampling events are investigated by Environment personnel. Weekly caribou aerial surveys also provide information on observed mortalities.

3.4.2 RESULTS

Two natural caribou mortalities occurred on East Island in 2004. Both were kills by grizzly bear and occurred near the west dam of the PKC and south of the Emulsion Plant around 28 September 2004. Three grizzlies (a sow and two cubs) were observed feeding on the carcass near the west dam on 28 September, while a solitary bear was observed feeding on the kill near the Emulsion Plant later that same day. The remains were not investigated by Environment personnel due to safety concerns relating to bears in the area and remote location of the carcasses.

There was also one project related mortality that was discovered on 16 August 2004, at the Traditional Knowledge (TK) camp located on the mainland east of East Island. Between programs being conducted at the TK camp, an electric fence surrounding the tents remained active. After a caribou became entangled in this fence, the animal broke the strand, preventing further electric shock. However, by being caught up in the fence the caribou became easy prey for a grizzly bear in the area. When the TK camp was re-opened by a representative from Discovery Mining Services on 16 August,

a grizzly bear was seen feeding on the carcass. Once the bear had left the area, the remnants of the carcass were collected by DDMI Environment staff and taken to the Diavik site for incineration to prevent further wildlife attraction at the TK camp.

The incident report, documented and submitted to RWED and the Environmental Monitoring Advisory Board, is included as Appendix D.

Table 3.4.2-1 Caribou Mortalities on East Island During Baseline (1995-1997) and All Monitoring Years (2000-2004)

	Baseline	2000	2001	2002	2003	2004
Natural Caribou mortalities on East Island	8	7	1	1	0	2
Project-related mortalities	0	0	0	0	0	1

3.5 RECOMMENDATIONS FOR THE 2005 PROGRAM

Transects flown for the caribou aerial surveys will continue to be reduced (every second transect flown) from early June to mid-July. DDMI will reassess the procedure for the aerial caribou monitoring program based on BHP-Billiton's pending determination to continue with the program. However, DDMI is committed to operating the program in the same manner as outlined above for 2005.

4.0 CARIBOU ADVISORY MONITORING

The objective of the Caribou Advisory Monitoring program is to make certain that workers are aware of the approximate numbers of caribou on or near East Island. This ensures employees are alert of the likelihood that mitigation measures would be triggered and to raise general awareness. The number of animals on the island and in specific areas dictates mitigation measures to be undertaken (e.g. haul road closure, speed reduction, etc.).

4.1 METHODS

Various methods were used to determine whether or not animals were present in the vicinity of East Island which included reports from pilots, reports from workers, Environment department road surveys on East Island and utilizing the satellite collar locations provided by Resources, Wildlife and Economic Development (RWED). If animals were reported in the general area, ground surveys were initiated. Ground based surveys were completed by searchers counting caribou from vehicles along the haul roads twice per day and documenting approximate numbers (see Appendix B – Caribou Road Observations).

4.2 RESULTS

During 2004, the caribou traffic advisory remained at “No Concern” for 365 days, as caribou numbers on the island did not exceed 100 at any given time.

When small numbers of caribou were noted in areas in the vicinity of haul roads, an announcement was made on radio Channel 7 to notify all users of the haul road as to their presence and location.

4.3 RECOMMENDATIONS FOR THE 2005 PROGRAM

There are no recommendations for this program.

5.0 CARIBOU MITIGATION EFFECTIVENESS MONITORING

Caribou mitigation effectiveness monitoring allows DDMI to evaluate whether or not mitigation measures are effective in preventing adverse impacts to wildlife. Mitigation monitoring allows DDMI to confirm their effectiveness and identify where adjustments in operating strategies are required. Monitoring investigations will determine if herding procedures are successful, if winter road alignment diverts caribou away from East Island, if there is preferential use of areas impacted by dust, and if ramps over above-ground pipelines are successful in facilitating the movement of caribou (DDMI, 2002). A number of monitoring tasks were not initiated in 2003 as caribou were not in the vicinity of project infrastructure such as country rock stockpile ramps, above-ground pipeline ramps, and dike landing areas.

5.1 CARIBOU HERDING

While on the island, caribou movements were monitored so that project personnel were aware of their presence and relative location. Of particular importance from a safety perspective (both human and animal), caribou movements in the vicinity of the airstrip and blast areas were tracked. When caribou were sighted adjacent to potentially hazardous locations in association with the airstrip and blast areas, DDMI implemented its Caribou Herding Technical Procedure (DDMI, 2001).

5.1.1 METHODS

The method used to move caribou away from hazardous areas consisted of the slow advancement of personnel behind the caribou, and encouraging the movement of the animals in a safe direction.

5.1.2 RESULTS

DDMI's Caribou Herding Technical Procedure was not employed during 2004 as caribou did not frequent the project area.

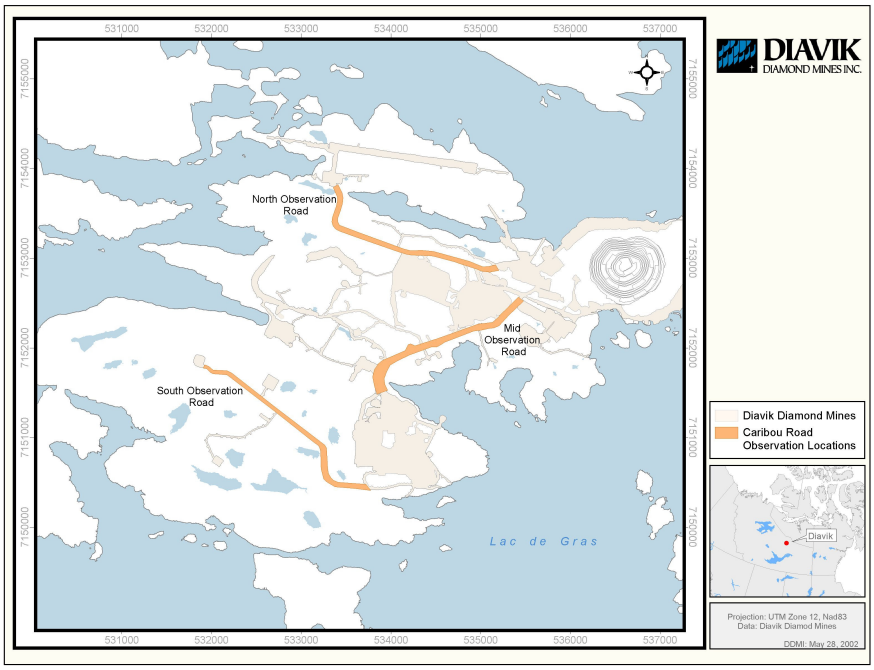
5.2 USE OF DUST DEPOSITION AREAS

Dust deposition can influence vegetation vigour, snowmelt rates, and changes in vegetation community structure. As a result, caribou may be attracted to these areas (Gunn, 1998). Dust from Diavik's mining activities is monitored and information on the 2004 program can be found in the Dust Deposition Monitoring Program 2004 Annual Report (DDMI, 2005).

5.2.1 METHODS

Road observations were conducted twice a week from April to October to determine if caribou were utilizing areas adjacent to haul roads. These roads are chosen to represent the greatest degree of dust deposition. Information collected included number of caribou encountered at various distances (on road, <50 m of road, 50-200 m of road and greater than 200 m from the road), dominant behaviour of group, group size and group composition (Appendix E). East Island was divided up into three haul road sections (Figure 5.2.1-1) for a total of 6.91 km of roads surveyed.

Figure 5.2.1-1 Caribou Road Observation Locations



5.2.2 RESULTS

Caribou road surveys were conducted a total of 134 times during 2004. On the six occasions caribou were observed, two groups were <50m from the road, and four groups were 50-200m from the road. Feeding was the dominant behaviour most commonly exhibited by the groups (n=5).

Table 5.2.2-1 Number and Behaviour of Caribou Groups Observed During Road Observations - 2004

Behaviour of Caribou	Number of Caribou groups on the road (n=0)	Number of Caribou groups <50m of the road (n=2)	Number of Caribou groups 50-200m from the road (n=3)	Number of Caribou groups >200m from the road (n=0)
Bedded	0	0	0	0
Standing	0	0	0	0
Feeding	0	2	3	0
Alert	0	0	0	0
Walking	0	0	1	0
Trotting	0	0	0	0
Running	0	0	0	0

5.3 RECOMMENDATIONS FOR THE 2005 PROGRAM

Observations for mitigation effectiveness will continue to be conducted when caribou are present on East Island. New access roads from the construction area at the future A418 dike will be included in the 2005 survey. A dust deposition research program for vegetation on East Island will be initiated in 2005.

6.0 GRIZZLY BEAR MONITORING

The barren-ground grizzly bear ranges throughout most of the Northwest Territories. Under Federal SARA legislation, it is considered a 'Species of Special Concern', as assessed by the Committee on the Status of Endangered Species (COSEWIC, 2004). Actions are currently being taken to revise the listing of the grizzly bear under the federal SARA legislation from Schedule 3 to Schedule 1, thereby providing protection afforded by the Act. During consultations held by the Federal government, it was noted by the Nunavut Wildlife Management Board (NWMB) that the status report used for the assessment does not satisfy requirements to incorporate the best available community knowledge and aboriginal traditional knowledge, and that consultations had not been sufficient (Canada Gazette, Part II). Further consultations will take place with the NWMB, with completion planned for spring 2005. At this time, the species listing may be reconsidered.

Grizzly bears have low population densities, low reproductive rates and are sensitive to human activity (DDMI, 1998b). The barren-ground grizzly bears of the NWT are unique, as they "have not been subjected to the exploitation and habitat changes" and "have remained relatively undisturbed from human activity" (McLoughlin et al. 1999). As such, the grizzly bear is considered 'sensitive' in the Northwest Territories (RWED, 2000).

Impacts to grizzly bears from mining may occur through direct mortality, habitat suitability reduction and direct habitat loss. The focus of the monitoring program is to determine direct habitat loss, level of grizzly bear activity, zone of influence of mining activities and if project related mortalities have occurred.

6.1 HABITAT LOSS

Grizzly bears use a wide variety of vegetation and habitats types. Studies of grizzly bears in the Northwest Territories have led to an understanding of their seasonal habitat preferences (McLoughlin et al. 2002a). Loss of habitat may result in negative effects on grizzly bears; for that reason analysis has been conducted to determine if habitat loss is significantly different from the prediction (DDMI 1998b), which is:

> ***At full development, direct terrestrial habitat loss from the project is predicted to be 8.67 km^2.***

6.1.1 METHODS

Methods used to determine grizzly bear habitat loss are similar to that described in Vegetation/Wildlife Habitat (Section 2.1).

6.1.2 RESULTS

Cumulative grizzly bear habitat loss on East Island due to mining related activities was 5.17 km^2 (Table 6.1.2-1). This loss represents a value up to December 2004 and includes losses from 2000 - 2003. The wildlife study area (Figure 1-1) is approximately 1200 km^2 (including shallow and deep water) and a loss of 5.17 km^2 represents 0.43% of habitat available in the wildlife study area. Within the context of adult female and male home range size (females = 2100 km^2; males = 7245 km^2 [McLoughlin et al. 2002a]), this represent a loss of 0.25% of an individual female's home range, and 0.07% of an individual male's home range. East Island encompasses approximately 20 km^2 of

terrestrial habitat and a loss of 5.17 km^2 indicates a loss of 26%. Based on McLouhglin et al. (2002b), 23 of 56 grizzly bear dens were located in heath tundra habitat and, currently, the mine footprint has altered 2.37 km^2 of this habitat type.

Table 6.1.2-1 Predicted versus Actual Grizzly Bear Habitat Loss on East Island

Vegetation/Land Cover Type	Predicted Area lost (km^2)	Area lost (km^2) 2000	Area lost (km^2) 2001	Area Lost (km^2) 2002	Area Lost (km^2) 2003	Area Lost (km^2) 2004	Total Area lost (km^2)
Heath tundra	**3.68**	0.65	0.80	0.41	0.14	0.37	**2.37**
Heath boulder	**1.89**	0.15	0.30	0.19	0.08	0.23	**0.95**
Tall Shrub	**0.03**	0.01	0.00	0.01	0.00	0.00	**0.02**
Bedrock	**0.07**	0.02	0.03	0.01	0.00	0.00	**0.06**
Tussock hummock	**1.64**	0.19	0.26	0.19	0.15	0.22	**1.01**
Sedge Meadow	**0.26**	0.02	0.00	0.02	0.01	0.04	**0.09**
Esker	**0.16**	0.13	0.00	0.00	0.00	0.00	**0.13**
Birch seep	**0.11**	0.01	0.02	0.02	0.01	0.02	**0.08**
Boulder field	**0.05**	0.01	0.01	0.01	0.00	0.01	**0.03**
Heath bedrock	**0.78**	0.06	0.20	0.08	0.03	0.04	**0.41**
Total	**8.67**	**1.25**	**1.62**	**0.94**	**0.42**	**0.93**	**5.17**

6.2 PRESENCE

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 impact the presence of grizzly bears (Gau and Case, 1999). Consequently, monitoring was conducted 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.

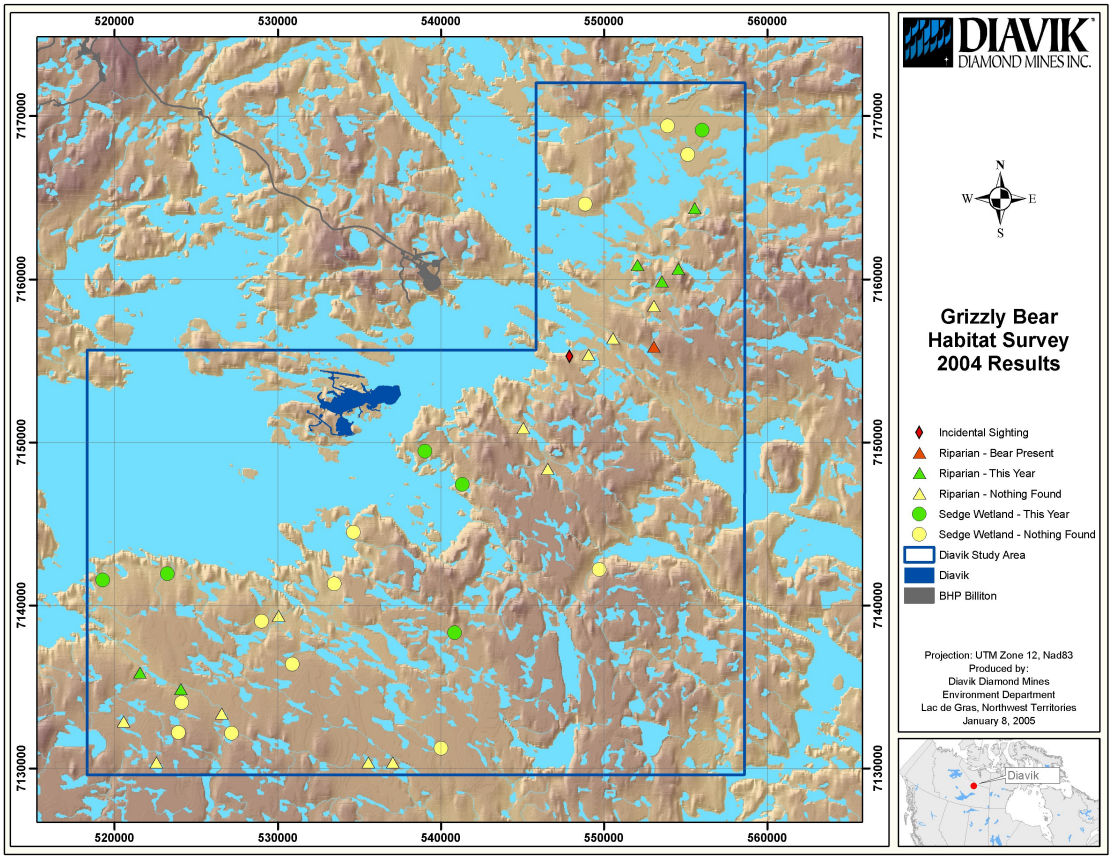
6.2.1 METHODS

Based on diet selection (Gau et al. 2002) and seasonally preferred habitats (McLoughlin et al. 2002a), the presence of bear sign within and adjacent to seasonal high quality habitats (sedge wetland in June and riparian shrub in August) was used as an index of habitat utilization by grizzly bears within the Diavik study area (Appendix B – Technical Procedure: Spring/Summer Bear Activity Surveys).

A total of 36 plots were randomly selected within the study area, consisting of a 500 m by 500 m area and comprised of at least 25% of either sedge wetland or riparian shrub habitats (Figure 6.2.1-1). Sedge wetland plots were surveyed in early July, while riparian shrub plots were surveyed in early August. Each plot was searched for bear sign for one hour by two observers. All bear sign (such as dens, diggings, tracks, scat, hair and kill sites) were documented. Only sign determined to have been left in this year (i.e. since spring den emergence) were included in the analysis. Plots with a bear present were considered to contain fresh sign, but not surveyed. This represented the second full year of data collection, as only a limited number of plots were surveyed in 2002.

In addition, incidental observations of grizzly bears within the study area were recorded and used as a measure of grizzly bear presence within the study area.

Figure 6.2.1-1 Grizzly Bear Activity Plots



6.2.2 RESULTS

Sedge wetland plots were surveyed from 2-8 July 2004, while riparian habitat was surveyed from 2-13 August. In 2004, 33% of sedge wetland plots (n = 18) and 22% of riparian plots (n = 18) contained fresh sign. Totals of 9 and 13 instances of fresh bear sign were observed in the sedge wetland and riparian plots, respectively (Table 6.2.1-1). For the sedge wetland plots, digs (usually excavations of ground squirrel dens) were the most commonly found sign. In the riparian plots, digs and scat were the most commonly found sign, followed by kills on plots. A family of three grizzly bears was observed in one of the riparian plots (R07).

Table 6.2.2-1 Total Sign Observations in Grizzly Bear Plots, 2002 to 2004

	2002	2003		2004	
	Riparian	Riparian	Sedge	Riparian	Sedge
	(8 plots)	(18 plots)	(17 plots)	(18 plots)	(18 plots)
Bed	0	3	2	0	0
Den	0	0	0	0	0
Dig	2	11	6	3	8
Track	0	6	3	0	3
Scat	0	2	0	3	1
Hair	0	2	0	0	0
Kill Site	0	1	0	2	1
Bear Present	1	1	1	1	0
Total	**3**	**26**	**12**	**9**	**13**

A total of 27 observations of grizzly bears were made on East Island on 24 separate days between 15 May and 3 November 2004 (Appendix F). This is up from 19 observations in 2003. Clearly, many of these observations were of the same bears on different occasions. Eight of these observations included a family group of three bears, while one observation was a pair of grizzlies of equal size. The residency time of these bears on East Island was usually short as deterrents were used to remove the bears from the island in most cases. DDMI Exploration crews also obtained four observations within the study area on three separate days, one of which was a family group of three bears. Nine observations of grizzly bears were made in the DDMI study area during caribou aerial surveys, where three observations included a family group of three bears, one observation included a pair of two adults and one observation included a pair comprised of an adult and cub.

Surveys of grizzly bear plots revealed fresh bear sign in only 10 of 36 plots, all within the wildlife study area. While this number is lower than the 18 plots found to have fresh sign in 2003, a total of 27 separate incidental observations were made of grizzly bears on East Island, and grizzly bears were also observed a total of 13 times within the study area during aerial surveys and exploration fieldwork. This evidence suggests that grizzly bears continue to be present and maintain active home ranges within the study area.

6.3 ZONE OF INFLUENCE

Mining activities may cause behavioural disturbances, which could result in the spatial and temporal displacement of animals from otherwise useful habitat (DDMI 1998b). The effects of disturbance may cause bears to become displaced or habituated to industrial activities. Information is limited on the zone of influence (ZOI) for bears in response to mining activities, but Harding and Nagy (1980) reported disrupted bear foraging activities up to 4 km from industrial sites. The predicted effect is:

The maximum zone of influence from mining activities is predicted to be 10 km.

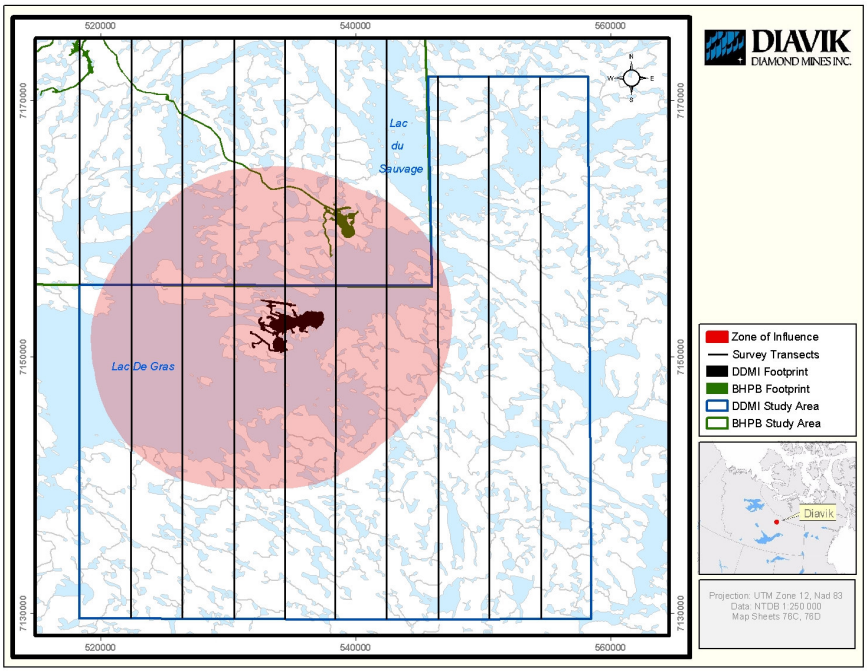
6.3.1 METHODS

The presence of grizzly bears surrounding the Diavik site was monitored at 36 plots, described above.

While conducting weekly caribou aerial surveys, all observations of grizzly bears within the predicted zone of influence (<10 km) and outside of the predicted zone of influence (>10 km) were documented. The number of bears per transect area surveyed were determined for the Diavik wildlife study area (Table 6.3.2-1). Density of grizzly bears within the zone of influence was calculated using the sum of length of transects multiplied by the area surveyed (1.2 kilometer observation width during aerial surveys) within the highlighted area in Figure 6.3.1-1, which extends into the BHPB wildlife study area. Determining the density of bears outside the zone of influence was calculated using survey transects present within the Diavik wildlife study area, without the addition of transects in the BHPB study area. The area surveyed within 10 kilometers is 166.2 km^2 where the area surveyed greater than 10 kilometers is 226.1 km^2. As bear observations were not categorized into season, the length of transects include all habitat types (i.e., including waters).

Golder (2005) provides a comprehensive analysis of plot data within the regional study area from 2000 through 2004 (Appendix A).

Figure 6.3.1-1 Predicted Maximum Zone of Influence for Grizzly Bears



6.3.2 RESULTS

Surveys did not detect any effect of distance from the mine on the chance of finding fresh grizzly bear sign within sedge wetland or riparian habitats (Appendix A). After pooling the data for both habitats, analysis suggested that there was a higher chance of finding bear sign in plots closer to the mine than further from the mine.

Weekly aerial surveys were conducted from April to September and observations of grizzly bears in the study area were recorded (Table 6.3.2-1 and Figure 6.3.2-1). Densities of bears within the zone

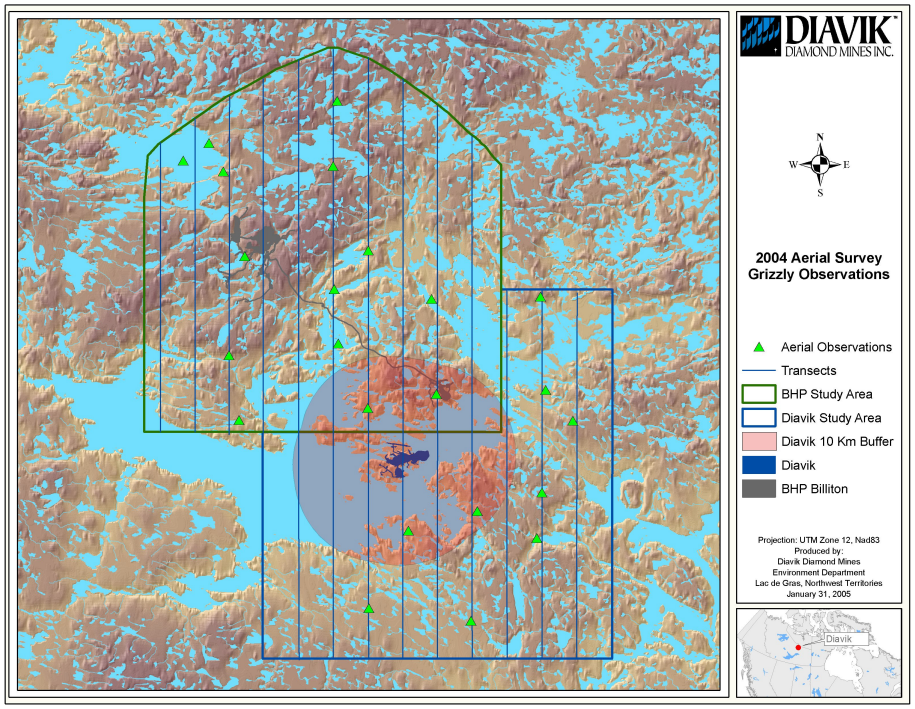
of influence and outside the ZOI, but within the Diavik study area were calculated as 0.024 and 0.031, respectively.

Table 6.3.2-1: Aerial Survey Observations of Grizzly Bears in the DDMI Wildlife Study Area

	2003		2004	
	Inside the ZOI (<10 km)	Outside the ZOI* (>10 km)	Inside the ZOI (<10 km)	Outside the ZOI* (>10 km)
Number of Observations	2	11	4	7
Transect area surveyed (km^2)	166.2	226.1	166.2	226.1
Number of Observations/ area surveyed	0.012	0.049	0.024	0.031

*Values represent only those observations within the DDMI study area.

Figure 6.3.2-1 Grizzly Bears Observed Within and Outside the Diavik Zone of Influence



6.4 MORTALITY

Despite mitigation measures, mine activities may lead to grizzly bear mortalities, injuries or relocations. The specific impact prediction in the Environmental Effects Report (DDMI, 1998b) is:

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

6.4.1 METHODS

Project related incidents and mortalities are reported to Environment staff for documentation.

6.4.2 RESULTS

One grizzly bear mortality occurred during 2004. This same bear had twice been relocated from the DDMI project site since 2001 (Table 6.4-1).

Table 6.4-1 Days of Grizzly Bear Visitations on East Island

	2000	2001	2002	2003	2004
Days with bear visitations on East Island	15	14	5	15	24
Days when deterrent actions were used	10	8	2	6	20
Relocations	0	1	0	1	0
Mine-related mortalities	0	0	0	0	1

A total of 24 sightings of grizzly bears were made on East Island between 15 May and 03 November 2004 (Appendix F), on 24 separate days. Eight of these sightings were of a family group of three bears, while one was of a pair of adults. On some (4) of these occasions, the bear(s) left the island before any deterrent action was necessary. On five of these occasions, it was necessary to deter the bear(s) off the island with a helicopter.

There was one grizzly bear mortality that occurred in 2004; the first since Diavik has been conducting activities at Lac de Gras. On 5 July, a large adult male grizzly bear (G758) was destroyed following an attempt to gain access to the accommodations complex. This male had twice been relocated from East Island, once in 2001 and again in 2003. During 2004, G758 first appeared in camp on 4 July and was deterred using a helicopter. The bear returned the morning of 5 July and managed to gain entry into the air terminal building. While there was no food present, it did receive a food reward from some garbage that had been left in the building. After this second deterrent event, RWED was contacted and decided that, given the bears history on site, the bear should be put down. An RWED employee was scheduled to come up to site on 6 July 2004. However, the bear returned to site the night of 5 July and attempted to gain access into the accommodation complex. DDMI Environment contacted RWED's wildlife emergency line and it was decided that the bear must be destroyed to prevent any harm to employees. A copy of the wildlife incident report submitted to RWED and EMAB on 23 November 2004 is included in Appendix G. This report contains a detailed description on the history of this bears activities at Diavik, as well as a chronological account of the incident that occurred on 5 July 2004.

Although there is some interaction between the Diavik Diamond Mine and surrounding grizzly bears, every effort is made to immediately report and deter any animals that arrive at the mine site. Several bears were successfully deterred from the property in 2004. In light of the one mortality that did occur, a concerted effort will be made to further increase employee awareness and the diligence with which preventive measures are followed at site.

Construction began at the Diavik Diamond Mine site in the year 2000. The calculated mine mortality rate over the past five years is 0.2, which falls within the range predicted during the environmental assessment.

6.5 RECOMMENDATIONS FOR THE 2005 PROGRAM

There are no recommendations for the 2005 program.

7.0 WOLVERINE MONITORING

Wolverines are year round residents in the Lac de Gras area (DDMI, 1998b) and the western population is listed as a species of 'Special Concern' in Schedule 3 of the Species at Risk Act (SARA; COSEWIC 2004).

Actions are currently being taken to revise the listing of wolverine under the federal SARA legislation from Schedule 3 to Schedule 1, thereby providing protection afforded by SARA. During consultations held by the Federal government, it was noted by the Nunavut Wildlife Management Board (NWMB) that the status report used for the assessment does not satisfy requirements to incorporate the best available community knowledge and aboriginal traditional knowledge, and that consultations had not been sufficient (Canada Gazette, Part II). Further consultations will take place with the NWMB, with completion planned for spring 2005. At this time, the species listing may be reconsidered.

The Government of the Northwest Territories (GNWT) is in the process of approving a SARA for the NWT that would specifically account for species within the territory. Should this be established, it would supersede the federal legislation. The GNWT lists the status of wolverines as secure (RWED, 2000), and it is believed that populations within the Slave Geological Province (SGP) are healthy (Mulders, 2000).

Wolverine home ranges were 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 (Penner, 1998). This potential has been demonstrated during baseline and construction monitoring years in the Diavik area.

7.1 PRESENCE

The objective for this program is to determine if mining activities are influencing the presence of wolverines in the study area, and the impact prediction is stated as:

> ***The mine is not predicted to cause a measurable shift in the presence of wolverines in the study area.***

7.1.1 METHODS

Wolverine presence around the Diavik Diamond Mine is monitored in three ways: snow track surveys, incidental observations at site, and sightings during caribou aerial surveys.

Wolverine snow track surveys are conducted by snowmobile along 23 transects, totalling 148 kilometres in length (see figure 7.1.2-1). Each route is driven once by snowmobile in both April and December of each year, and all wolverine tracks and other sign (digs and dens) are recorded. The snow track surveys began in 2003, and have been conducted with the assistance of community members from Kugluktuk. See Appendix B (Technical Procedure: Wolverine Snow Track Surveys) for a full description of the survey methodology.

DDMI representatives record all sightings of wolverine on East Island, and summarize observations of wolverine during caribou aerial surveys.

7.1.2 RESULTS

Wolverine snow track spring surveys were conducted from 16-22 April 2004. During these surveys, a total of 23 wolverine tracks were encountered along 12 of the routes, four of which were pairs of tracks. This resulted in a track index of 0.16 wolverine tracks per kilometre, along the 148 kilometres surveyed. No incidental observations of wolverine were made. The results for the spring survey were similar to those recorded for 2003 (Table 7.1.2-1). The winter survey, conducted from 2 - 8 December, resulted in 9 observed tracks along 8 routes, with a track index of 0.06. Four incidental observations of wolverine were made during the survey, including one pair. Unfortunately no direct comparison can be provided for the winter surveys, as data was not acquired in 2003. Mainland areas to the south and east of the Diavik mine site show the greatest concentration of observed tracks in 2004; this is similar to the 2003 spring results. Preliminary analysis of wolverine densities suggest that mine operations are not influencing the presence of wolverine in the study area (Golder 2005).

Additional analysis was performed to determine whether the likelihood of observing tracks in the study area was independent of distance from the mine. The results of this analysis are presented in Appendix A (Golder 2005).

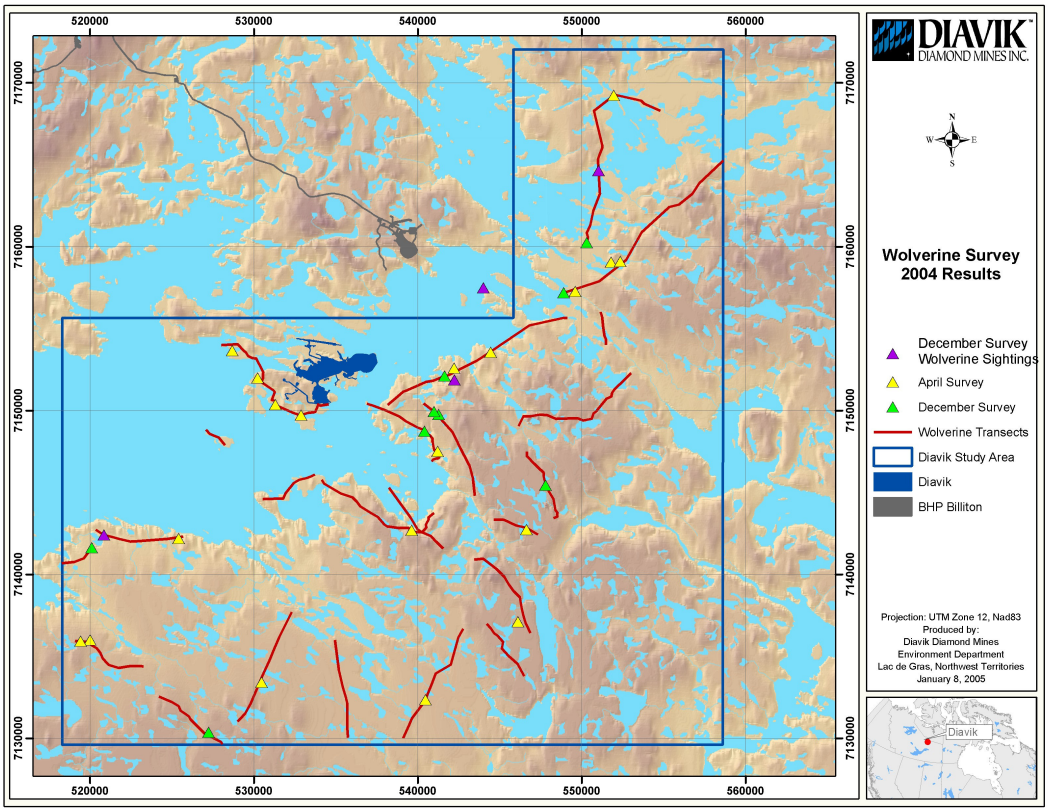
The mean number of days-since-snow was greater in 2004. This accounts for some of the difference between spring surveys in 2003 and 2004, as fresh snowfall can make it more difficult to observe tracks. Figure 7.1.2-1 illustrates the location of the wolverine tracks identified.

Bobby Algona of Kugluktuk, who led the winter wolverine survey, suggested that there are ten wolverine in the Diavik wildlife study area, including one pair. This is an increase from 2003, where eight animals were thought to be using the study area. Bobby also indicated that the areas to the east have the best habitat for wolverines, with a lot of boulder fields and cliffs. This is consistent with areas where the highest density of tracks were found.

Table 7.1.2-1. Wolverine Track Index, 2003 and 2004

	April 2003	April 2004	December 2004
Number of tracks observed	13	23	9
Tracks per km (148 km of survey route)	0.09	0.16	0.06
Mean days since last snow	2	4	4

Figure 7.1.1-1 Transects in the Diavik Study Area Investigated for the Presence of Wolverine During April & December 2004



*Only one symbol is shown on the map for locations where a pair of tracks occur (4 locations total)

Diavik staff recorded all incidental observations of wolverine on the East Island during 2004 (Appendix H). From 1 January to 31 December 2004, wolverine were observed on 18 separate occasions on East Island (Table 7.1.2-2).

Table 7.1.2-2 Wolverine Sightings on East Island

	Baseline*	2000	2001	2002	2003	2004
Number of days with wolverine visitations on East Island	27/year Total=82	25	36	4	38	18
Number of days deterrent actions were used	Unknown	9	10	0	1	1
Relocations	1	0	2	0	0	0
Mine-related mortalities	1	0	1	0	0	0

*Includes Wolverine occurrences recorded at three different camps (i.e. Diavik, Kennecott, and/or Echo Bay Road camps). Yearly numbers are not available for baseline investigations.

In addition to the incidental observations of wolverine at the Diavik site, lone wolverine were observed in the Diavik wildlife study area during three caribou aerial surveys in 2004; this is equal to the number observed during aerial surveys in 2003. Four incidental sightings also occurred during the December wolverine survey. One sighting consisted of a pair of wolverine.

7.2 MORTALITY

Mortalities can occur if wolverines become habituated to mining activities resulting from efforts to locate food (DDMI, 1998b). Diligent waste management (see Section 8.0), strictly enforced speed limits, and immediate reporting of wildlife sightings on East Island have limited mortalities of wolverine during the operational period of the Diavik mine. The prediction made during the environmental assessment was:

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

Unfortunately, testing of this prediction would require an intrusive study of the surrounding wolverine population, incurring more disturbance to the population than is reasonable. Rather, efforts have been focused on minimizing mining related mortalities, to prevent any changes to wolverine population parameters.

7.2.1 METHODS

Project related incidents that may occur are reported to Environment personnel through incident reports submitted by mine staff. The Environment department follows up on any incident and completes the necessary documentation. This information is tabulated and provided for annual comparisons.

7.2.2 RESULTS

No injuries, mortalities or relocations of wolverine occurred as a result of mining activities on East Island in 2004 (Table 7.1.2-2). Since 2000, two wolverines have been relocated and one mortality has occurred at the DDMI mine site.

7.3 RECOMMENDATIONS FOR THE 2005 PROGRAM

Wolverine snow track surveys will continue to include traditional knowledge on the movements and approximate numbers of wolverines within the study area, and provide data for statistically assessing the attraction or repulsion of mining activities on wolverine.

In addition to the track surveys described above, DDMI will also undertake DNA analysis of wolverine hair during 2005 to reliably index and quantify wolverine abundance in the Lac de Gras region. This study has been conducted by RWED at the Daring Lake Research Station for the past two years and analysis is able to determine individual wolverine based on DNA from hair samples.

8.0 WASTE MANAGEMENT

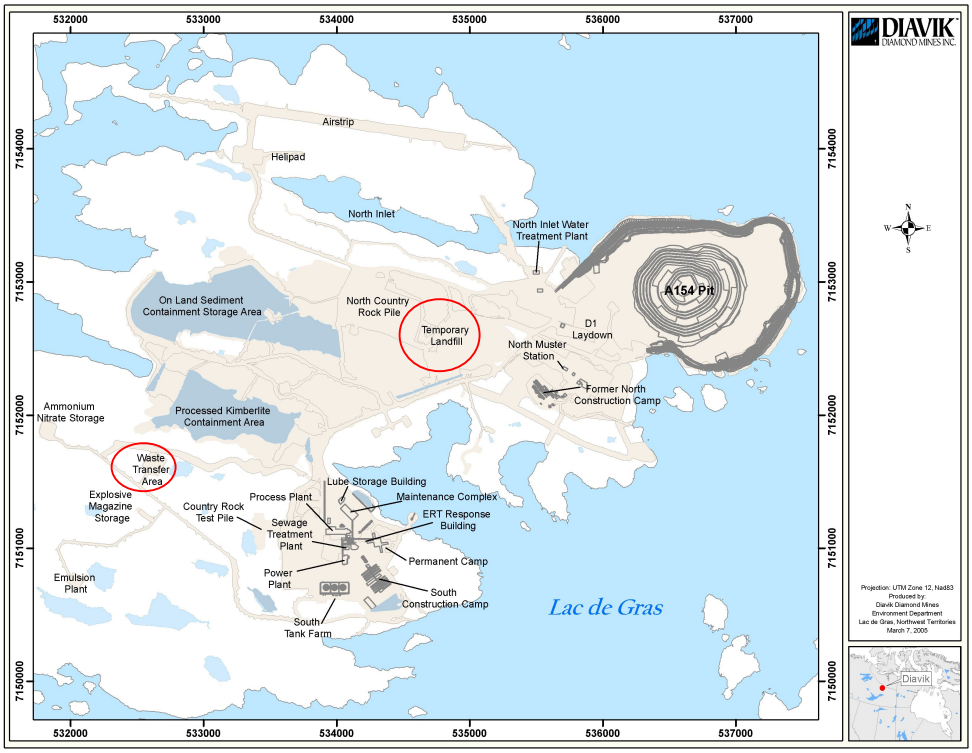
Waste management is the process used to ensure the proper disposal or recycling of waste. Waste, particularly food waste, can also act as an attractant and potential food source for wildlife. Waste management should therefore include measures to ensure that these attractants are not available to wildlife. This will minimize mine related effects on carnivores (specifically grizzly bears, wolverine and fox) and opportunistic species (such as gulls and ravens) (DDMI, 1998b).

Mitigation measures to reduce attractants include the burning of all food wastes, proper segregation of non-food wastes, quick disposal of waste, and the use of fences and other enclosures to isolate stored waste. Surveys of the waste transfer area and landfill are conducted to determine the effectiveness of this waste management and it's effect on wildlife.

The waste transfer area (WTA) and the inert landfill are used for waste segregation, storage and management (Figure 8.1). The waste transfer area is fenced, and contains three incinerators, a burn pit and a lined contaminated soils area. Food garbage is burned in incinerators within this area. Cardboard boxes, wood and paper are burned in a burn pit located on the north side of the waste transfer area. Waste segregation (i.e. used batteries, used oil filters, aerosol cans, etc.) for shipment to an approved facility in the south takes place here. During the summer of 2004, the northeast corner of the fence at the waste transfer area was raised in response to concerns noted by the Environmental Monitoring Advisory Board.

The inert landfill is located within the north quarry and wastes such as steel, plastics and glass are buried in this area.

Figure 8.1 Waste Facilities on East Island



8.1 METHODS

Surveys of the waste transfer area and landfill were conducted regularly from January to December. Environment personnel walked the area of the waste transfer and landfill, where safe to do so, and documented the type and number of attractants found. Also documented were wildlife species or signs of species that were present during the survey.

8.2 RESULTS

Potential wildlife attractants (such as food and oil) were found at the waste transfer area on 61% of the 163 visits during 2004 (Figure 8.2-1). Food packaging and food were the most commonly found attractants. Attractants were found on 59% of 158 visits to the inert waste landfill (Figure 8.2-2). Again, food packaging and food were the most commonly found attractants.

Figure 8.2-1 Percent of Visits Where Attractants Were Identified at the WTA - 2002 to 2004

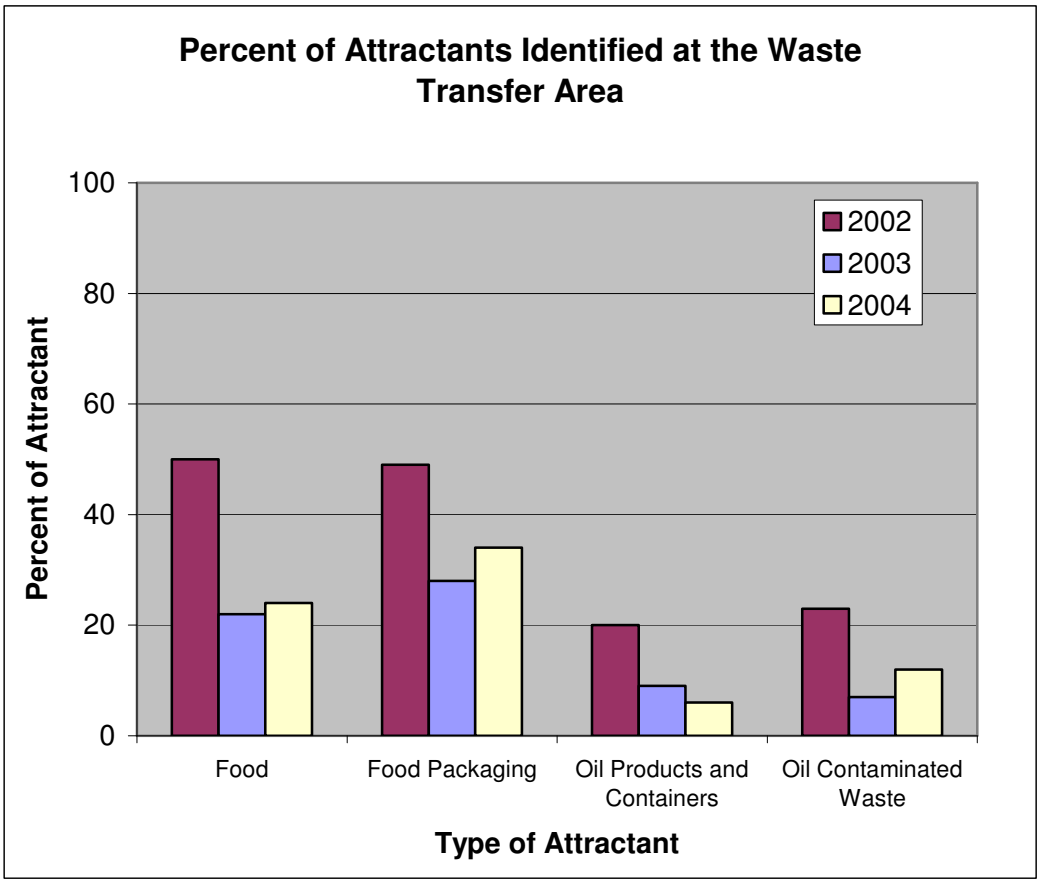
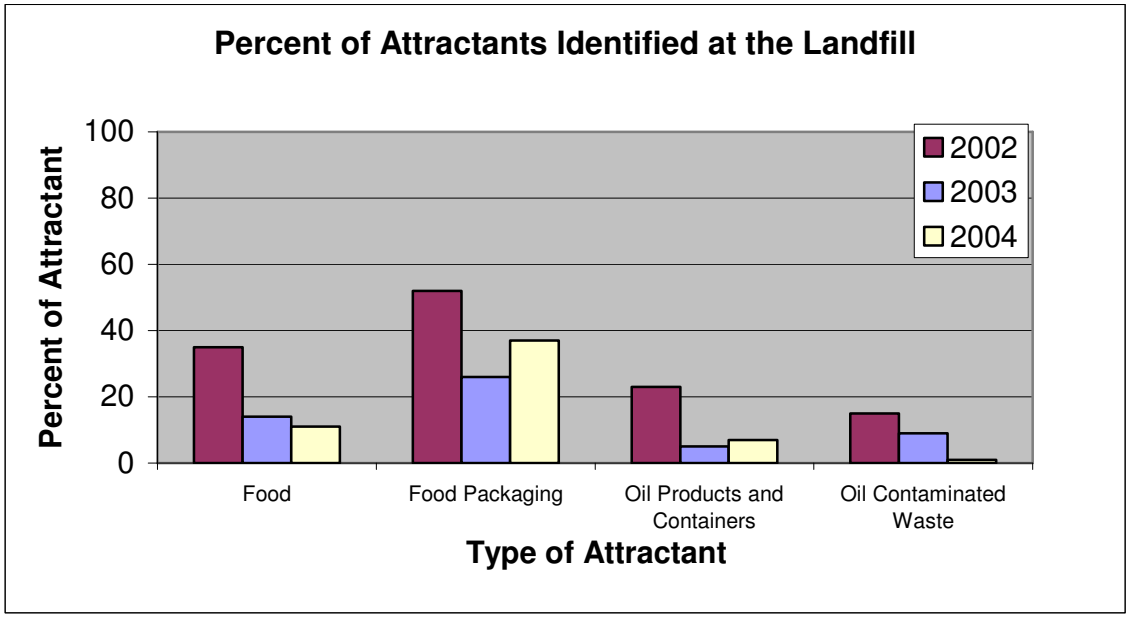


Figure 8.2-2 Percent of Visits Where Attractants Were Identified at the Landfill - 2002 to 2004



Wildlife was observed on 23% of 163 visits to the waste transfer area, and on 3% of 158 visits to the landfill. Fox were the most frequently observed wildlife in these two areas, followed by ravens, gulls, hare and one wolverine (Table 8.2-3).

Observations of wildlife sign is also presented in Table 8.2-3. Fox, raven, gull and hare sign were the most commonly observed. Wildlife sign was found on 34% of visits to the waste transfer area, and 28% of visits to the landfill. No grizzly bears were present, nor was sign observed at either of these areas.

Table 8.2-1 Number of Visits to the Waste Transfer Area and Landfill where Wildlife or Wildlife Sign were Observed

	WTA (163 visits)		Landfill (158 visits)	
	Wildlife	Wildlife Sign	Wildlife	Wildlife Sign
Gull	3	0	0	2
Raven	9	3	4	2
Fox	28	61	0	40
Hare	2	2	0	0
Ground Squirrel	0	0	0	0
Wolverine	1	2	0	2
Wolf	0	2	0	0
Grizzly Bear	0	0	0	0

Wastes which may act as wildlife attractants are routed towards the waste transfer area for incineration. Therefore, the presence of attractants at the waste transfer area should be considered normal and should not present a problem if incineration is prompt. The relatively low occurrence of wildlife and wildlife sign at the waste transfer area indicates that attractants are quickly incinerated

and not regularly available to wildlife. The further mitigation measure of fencing the entire waste transfer area has also made the attractants less accessible to wildlife.

The presence of attractants at the inert waste landfill indicates some mismanagement of waste. However, turnover appears to be frequent, and the location of the landfill in the waste rock pile further limits wildlife from accessing the area. Again, the low frequency of wildlife and wildlife sign observations indicate that current waste management is successful at minimizing wildlife visits to these areas.

It should be noted that while the number of wildlife sign recorded for both the WTA and landfill increased during 2004, this is likely the result of observations of the same sign during more than one inspection.

Overall, the procedures and mitigation currently in place appear to be successful at minimizing wildlife interactions, as only one wolverine (WTA) and no wolf or grizzly bears were observed at the landfill or waste transfer area. It appears that some gulls, ravens and fox visit the landfill and waste transfer area, but the low number of observations suggest that these individuals are not sustained by the food they may find there.

The attractiveness of oil contaminated waste at the waste transfer area or in the landfill is likely limited. Although these types of waste can be a wildlife attractant, removing them from the waste transfer area and landfill completely would do little to reduce the overall amount of hydrocarbon odour at the mine as there are well over 100 vehicles on site.

8.3 RECOMMENDATIONS FOR THE 2005 PROGRAM

With an increase in the number of staff anticipated to be on site during 2005, frequent environmental awareness sessions will continue to provide workers with information on ramifications due to improper waste management such as human safety issues related to carnivore problems.

Regular inspections (every second day) at the WTA and landfill will continue as this has proven successful in the prompt discovery and resolution of potential concerns.

9.0 FALCON MONITORING

The peregrine falcon and gyrfalcon were selected as key species because of their special management status, biological vulnerability to disturbance and that they are known to nest regularly in the Lac de Gras area (DDMI, 1998b). The peregrine falcon (*Falco peregrinus tundrius*) is listed as a "Species of Special Concern", as designated by the Committee of the Status of Endangered Wildlife in Canada (COSEWIC, 2004) under the Species at Risk Act. A Species of Special Concern is defined as a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

As the last date of assessment for the *tundrius* sub-species was April 1992, the species is currently under re-assessment, with a draft report in progress. The expected date of species assessment is May 2006 (COSEWIC, website).

9.1 PRESENCE AND DISTRIBUTION

Habitat loss, sensory disturbance, and impacts to prey populations may influence raptors nesting in the Lac de Gras area. The impact predictions for raptors are that:

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.

Other raptors present in the study area include rough-legged hawks, snowy owls, and short-eared owls. However, these species are uncommon in the study area, and their presence from year to year is unpredictable. Falcons are therefore used to monitor impacts to raptors.

9.1.2 METHODS

Falcon nesting sites were visited on 7 June and 23 July 2004, in cooperation with RWED and BHP Billiton Diamonds Inc., and included nest sites at the Daring Lake Tundra Research Station, the Ekati Diamond Mine, and Diavik Diamond Mine wildlife study areas. The falcon monitoring results from Daring Lake are presented here as control data from an undisturbed area. Previously identified potential nesting sites were visited by helicopter to determine if nesting sites were occupied, and to count any young in the nest (Figure 9.1.3-1). Minimal time was spent in the vicinity of the sites to reduce disturbance.

In 2004, a spring survey of falcon sites was added to the falcon monitoring program to include those nests which are occupied in spring but fail before the July chick count (see DDMI 2004). The reasoning for this is as follows. Following arrival at the breeding grounds, falcons must locate and defend a suitable cliff for nesting, attract a mate, contend with unpredictable weather and occasional storms, and assess the availability of prey in that year. Any one of these may influence the choice, or the option, of breeding in that year. As such, this is also the most vulnerable period for falcons, and the time when breeding attempts are most likely to fail. DDMI has therefore added a June survey to the falcon monitoring program to account for this sensitive time of year. Sites that were unoccupied in the spring survey, but were occupied in the July survey were designated as occupied (i.e., it was assumed that nest initiation occurred after the spring survey).

Sites 7 and 8 were identified during baseline studies as potential falcon nest sites, but had not yet been occupied by raptors since studies began in 1995. DDMI therefore proposed to remove these sites from the monitoring program in 2003 (DDMI 2004). However, as both were occupied during the new spring survey, it was decided to retain these sites in the monitoring program, even though site 8 was again unoccupied at the time of the July survey. Both sites have been included in the 2004 data, presented below.

9.1.3 RESULTS

Six known nesting sites in the Diavik wildlife study area were each surveyed twice during 2004. In the spring occupancy survey conducted on 7 June, five of the six sites were occupied (7, 8, 11, 14 and 20), and one site (Nest 20) contained three eggs. This same nest was the only site to produce two chicks, as observed during the 23 July productivity survey (Table 9.1.3-1). The other nest sites occupied but unproductive in July were 7, 11, 14 and 19 (Figure 9.1.3-1).

Productivity was within the range recorded in the Diavik wildlife study area since 2000, while occupancy was the highest yet recorded, which is partially due to the change in survey protocol. Historically, the number of occupied sites in the study area has ranged from one to four, and never more than two have been productive (Table 9.1.3-1). Chick production has ranged from zero to five. Occupancy and production in the Diavik wildlife study area were found to be similar to that found in the undisturbed area, Daring Lake (Table 9.1.3-1).

Figure 9.1.3-1 Falcon Site Locations

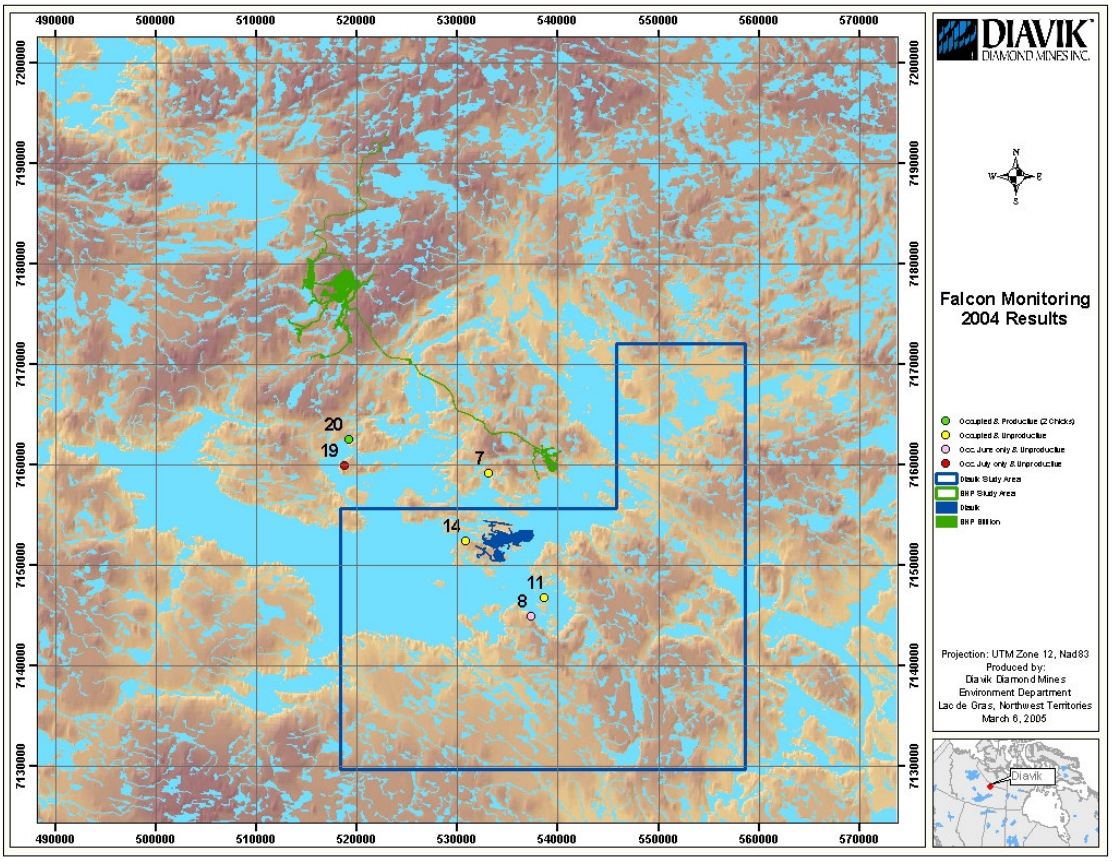


Table 9.1.3-1 Falcon Nest Occupancy and Production at Diavik and Daring Lake, 2000 to 2004

	2000		2001		2002		2003		2004*	
	Diavik	Daring	Diavik	Daring	Diavik	Daring	Diavik	Daring	Diavik	Daring
Total Sites	6	11	6	13	6	18	6	10	6	10
Occupied	3	6	2	3	2	10	2	5	6	5
Productive	2	4	0	1	1	9	0	3	1	1
Total Young	5	11	0	3	3	15	0	4	2	1

Daring Lake data originates from the Daring Lake research station (S. Matthews, personal communication, RWED).

*Diavik data includes spring and summer monitoring data.

The occupancy of falcon nest sites has changed little since studies began in 1995 (Table 9.1.3-2). Sites 11 and 20 have been the most commonly used sites since monitoring began in 1995; sites 7 and 8 have never been occupied until this spring. Sites 11, 14, 19, and 20 have all been used both before and following construction. Appendix A provides a comprehensive analysis of regional data for falcon nest occupancy, success, and production.

Table 9.1.3-2 History of Activity at Falcon Nests Surrounding Diavik, 1995 to 2004

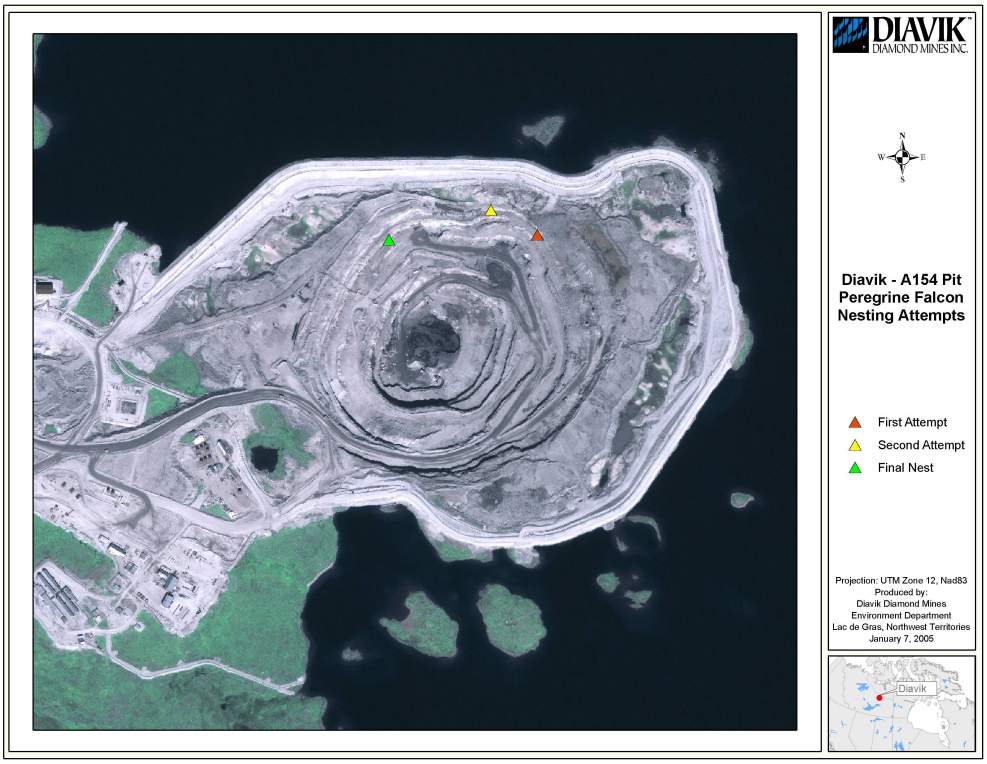
Nest Site	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
7	No	No	No	-	-	No	No	No	No	Yes
8	No	No	No	-	-	No	No	No	No	Yes (June)
11	Yes	Yes	Yes	-	-	Yes	Yes	Yes	Yes	Yes
14	No	No	Yes	-	-	Yes	No	No	No	Yes
19	Yes	No	No	-	-	No	No	No	No	Yes (July)
20	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Falcon production is known to be annually variable and highly dependent upon availability of suitable nesting habitat, weather events and small mammal and bird prey populations. As such, annual changes in falcon occupancy or productivity are unlikely to be sensitive indicators of human-related disturbance. Rather, impacts from mining would probably be manifest in gradual decline in falcon occupancy or productivity over several years or with proximity to the mine. An alternative scenario is that falcon productivity and occupancy are only affected by human disturbance in years when natural environmental factors are limiting the falcon's ability to breed (see Appendix A).

In 2004, environmental conditions appeared to favour the falcons, as all but one of the known sites were occupied, including sites 7 and 8, which were occupied for the first time since monitoring began in 1995. However, part of this increase in occupancy rate was due to the change in study protocol (i.e., 2004 was the first nests were surveyed for occupancy in the spring). It is normal for some falcon nests to be active in most years, while others are only used in unusually good years (Appendix A). The occupancy of sites 7 & 8 suggests that this was the case this year. Interestingly, this high occupancy rate did not translate into high production of chicks in 2004.

Not included in the monitoring data presented above is the presence of a nesting pair of peregrine falcons in the A154 pit. Falcons were first confirmed to be establishing a nest on the pit wall on 25 May 2004. Two attempts were made to discourage the pair from nesting in the pit, following discussions with representatives from the Canadian Wildlife Service and RWED. In the first instance on 26 May, a tarp was placed over the nest site. The falcons relocated to a different section of the pit wall, and continued nest-building activity at the new site. This second attempt at nesting was destroyed using a backhoe to remove the ledge on which they were building, and the falcons were not observed in this area of the pit again.

Figure 9.1.3-2 Locations of Peregrine Falcon Nests in the A154 Pit



On 11 June, a pair of peregrine falcons was observed on the west side of the A154 pit. At this point it was decided that, as the nest was in a relatively safe area of the pit wall, no attempts to discourage the pair should be made, particularly given the time of year and the likelihood that the pair could already have produced eggs. Additionally, further deterrent actions may possibly have increased the risk of the falcons moving to a more active area of the pit. Although it was difficult to see into the nest, at least two fledglings were observed on 27 July. On 26 October, one adult and one juvenile peregrine were observed near the nest site. The appearance of the juvenile (brown, without any visible down) and its distance from the nest indicated that it had fledged. The site continued to be monitored regularly, and adult and juvenile falcons were observed near the pit for the last time on 6 September.

Photo 9.1.3-1. Peregrine Falcon Nest in the A154 Pit, 10 June 2004

Although this is the first occurrence of falcons nesting in open pits at Diavik, similar events have occurred at two open pits and other structures at Ekati (BHPB 2003), and should be expected to continue at Diavik, particularly in years of high prey abundance.

9.2 MORTALITY

The objective for this program is to determine the number of raptors killed or injured due to DDMI mining-related activities. The following section summarizes methods used and results produced from incident reporting. The impact prediction in the Environmental Effects Report (DDMI, 1998b) is:

> ***The mine is not predicted to cause a measurable change in raptor presence in the study area.***

9.2.1 METHODS

Project related incidents that may occur are reported to Environment personnel through incident reports submitted by mine staff. The Environment department follows up on any incident and completes necessary documentation. This information is tabulated and provided for annual comparisons.

9.2.2 RESULTS

On 22 September, the carcass of a juvenile peregrine falcon was found on the A154 dike, below the transformer and power lines on the south side of the dike (Photo 9.2.2-1). Although electrocution is possible, the fact that the carcass was found freshly consumed suggests predation by another bird (such as a jeager, owl or another peregrine). The transformer, mounted on a raised wooden platform, may have been used by the predatory bird as a perch for eating, the remains discarded onto the ground below. The location of the carcass, near the A154 pit, suggests that this individual was one of the chicks fledged from the peregrine nest within the A154 pit, described in Section 9.1.3.

This is the first recorded mortality for a raptor at the Diavik mine site.

Photo 9.2.2-1. Carcass of Juvenile Peregrine, 22 September 2004

9.3 RECOMMENDATIONS FOR THE 2005 PROGRAM

Recommendations for 2005 are to continue the spring occupancy survey, and be diligent for falcons nesting in the A154 pit or other areas that may present a hazard to falcons.

10.0 WATERFOWL MONITORING

The Lac de Gras area is in the central flyway (migration route in the western arctic) and the arctic feeding grounds for migrating birds (Penner, 1998). Migratory birds often stop or "stage" to feed in the Lac de Gras area before moving on to their nesting grounds in the high arctic. In the East Island area, shallow bays, melt-water ponds and shoreline leads were identified as important areas for migrant waterfowl (DDMI, 1998b) as they provided habitat requisites such as open water. The shallow bays consist of a combination of mudflats and sedge bands, which are close to open water and upland vegetation, ideal habitat for shorebirds (Van Egmond *et al*. 1997a).

Mining activities may artificially produce early open water due to dust deposition and the associated increased rate of snowmelt. This, in turn, may attract migrating waterfowl. DDMI monitors the shallow bays of East Island to determine if there is a change in the number and species of waterfowl present. Artificially created water habitat is also monitored to ascertain the level of use by waterfowl in those created habitats. Habitat loss (shallow and deep water) due to mining activities is also monitored to determine if more or less habitat is lost than predicted.

10.1 HABITAT LOSS

The objective is to determine if direct habitat loss is greater than predicted. The following section summarizes the methods used and results obtained from satellite imagery. As a result of mining activities, habitat loss will occur and it has been predicted that:

> ***At full development, direct aquatic habitat loss from the project is predicted to be 3.94 km^2.***

10.1.1 METHODS

The vegetation classification map used in the vegetation/land cover section of the Environmental Effects Report (DDMI, 1998b) was used to determine the loss of waterfowl habitat (see Section 2.1).

10.1.2 RESULTS

Habitat loss is defined as the loss of habitat utilized by waterfowl in the East Island area. In 2004, a total of 0.04 km^2 of shallow and deep water was lost as a result of mining activities. It was predicted that 3.94 km^2 would be lost as a result of the mine (DDMI, 1998b). In total, 2.10 km^2 has been lost up to December 2004 (Table 10.1.2-1).

Table 10.1.2-1 Predicted Versus Actual Direct Waterfowl Habitat Loss on East Island - 2004

Wetland Type	Predicted Area lost (km^2)	Actual Area lost (km^2)- up to 2001	Actual Area lost (km^2) - 2002	Actual Area lost (km^2) - 2003	Actual Area lost (km^2) - 2004	Total Area lost (km^2)
Shallow water: <2 m	0.48	0.11	0.12	0.01	0.03	**0.27**
Deep water: >2 m	3.46	0.15	1.66	0.01	0.01	**1.83**
Total area	**3.94**	**0.26**	**1.78**	**0.02**	**0.04**	**2.10**

10.2 PRESENCE

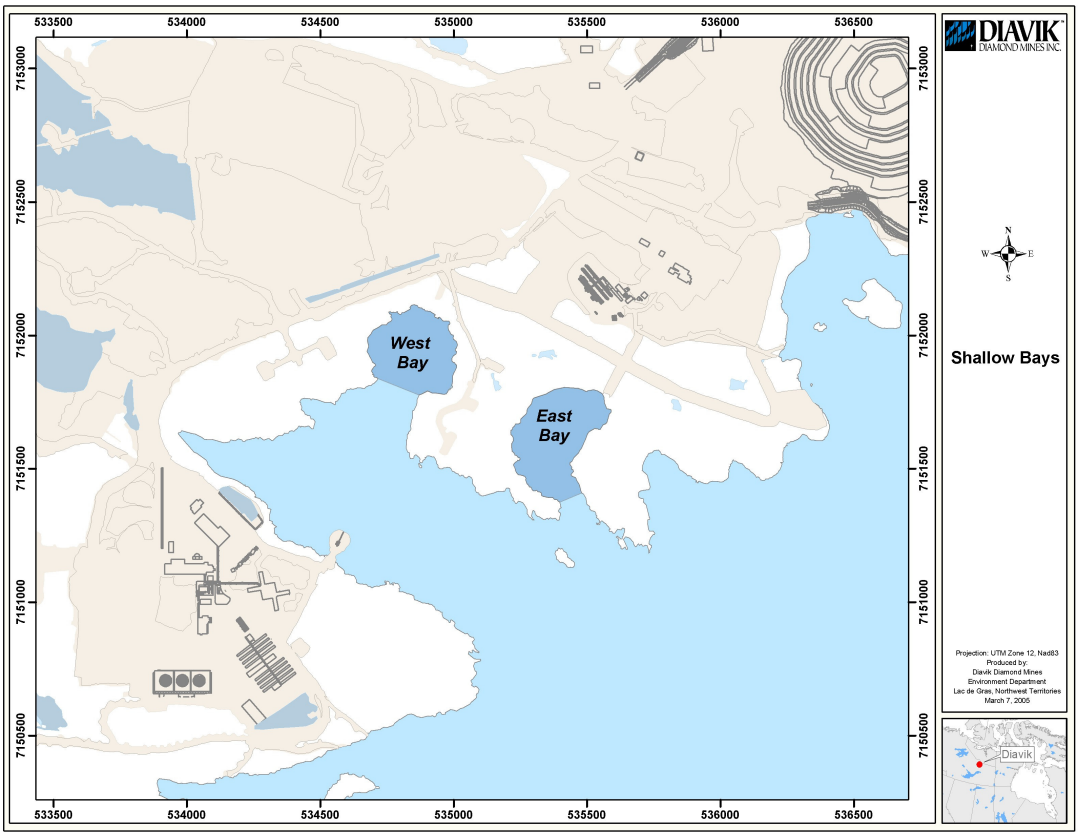
The objective for this component is to determine if disturbance from the mine is impacting the presence of waterfowl species. Disturbance may result from habitat loss, altered drainage patterns, dust fall, noise from mining activities and human presence (DDMI, 1998b). The following section summarizes the methods used and results obtained from yearly spring migration surveys of East Island shallow bays. This monitoring program will determine if conditions are different than the predicted impact:

The mine is not predicted to cause a measurable change in waterfowl presence in the study area.

10.2.1 METHODS

Waterfowl surveys of the shallow bays (Figure 10.2.1-1) were conducted from 25 May to 20 June and procedures used can be found in Appendix B – Technical Procedure: Waterfowl, Shorebirds and other Aquatic Birds Monitoring. Surveys were conducted every second day during the morning (0700 to 1000) for the shallow bays and all applicable staging birds were identified and recorded. The surveys consist of personnel walking the shores of the shallow bays and identifying all birds sighted with the use of binoculars and a field guidebook. Birds that were unidentifiable during surveys were categorized as unknown species within each group (i.e., shorebirds, ducks or geese).

Figure 10.2.1-1 East Island Shallow Bay Monitoring Locations



10.2.2 RESULTS

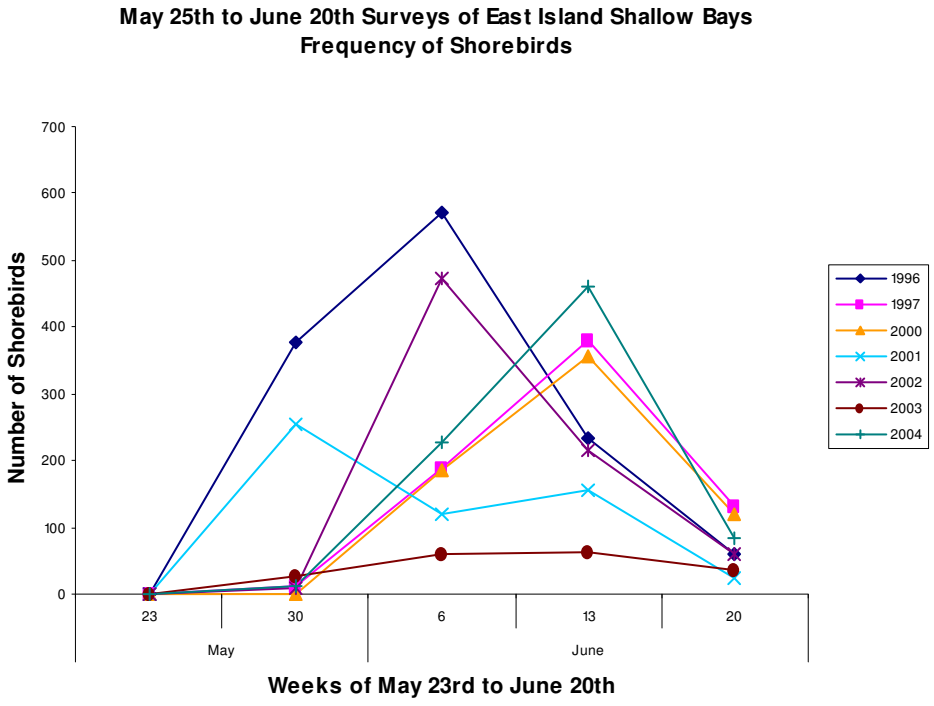
In 2004, seven species of shorebirds (Table 10.2.2-1) were recorded. The seven species were comprised of 783 shorebirds, counted over 14 survey days. Fifty percent of species observed during baseline but not identified in the shallow bays during 2004 were the sanderling, common snipe, lesser golden plover, pectoral sandpiper, stilt sandpiper and red-necked phalarope. Two species not observed in 2003, the white-rumped sandpiper and the dunlin, were identified during 2004. The black-bellied plover was first observed in 2004, as was the sandhill crane.

The semipalmated sandpiper was determined to be the most commonly occurring species in the study area (n=136 observations). During 2004, a large number of shorebirds (n=493) were categorized as unidentified shorebirds. Shorebird migration peak abundance occurred during the week of 13 June (Figure 10.2.2-1) with 59% of the movement occurring at this time.

Table 10.2.2-1 Shorebird Species Present (√) or Absent (χ) on East Island for All Monitoring Years

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004
Semipalmated Plover	✓	✓	✓	✓	✓	✓
Black-bellied Plover	×	×	×	×	×	✓
Lesser Golden Plover	✓	✓	✓	✓	×	×
Semipalmated Sandpiper	✓	✓	✓	✓	✓	✓
Least Sandpiper	✓	✓	✓	✓	✓	✓
White-rumped Sandpiper	✓	✓	✓	✓	×	✓
Baird's Sandpiper	✓	✓	✓	✓	✓	✓
Pectoral Sandpiper	✓	✓	×	✓	×	×
Stilt Sandpiper	✓	✓	✓	✓	×	×
Dunlin	✓	✓	×	✓	×	✓
Sandhill Crane	×	×	×	×	×	✓
Sanderling	✓	✓	✓	×	×	×
Red-necked Phalarope	✓	✓	✓	✓	✓	×
Common Snipe	✓	✓	×	×	×	×
Ruddy Turnstone	×	✓	×	✓	×	×
Long billed Dowitcher	×	×	✓	×	×	×

Figure 10.2.2-1 Frequency of Shorebirds Observed Within the Study Area from Baseline through 2004

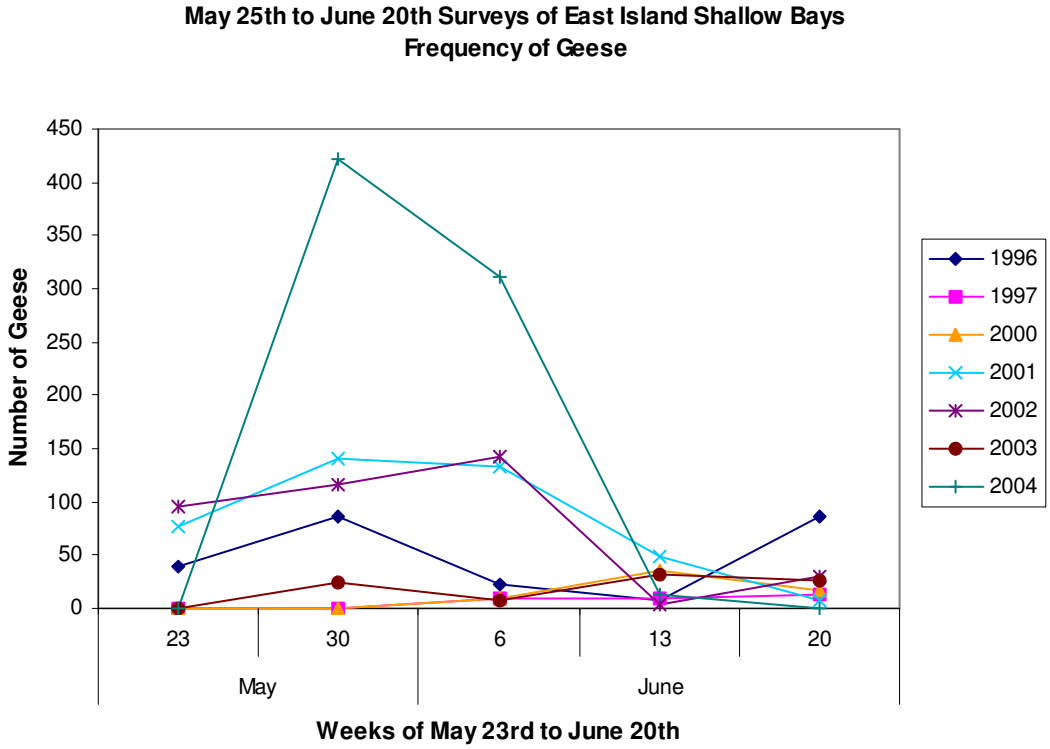


In 2004, 3 species of geese were confirmed in the Diavik area (Table 10.2.2-2). Peak migratory movement through the area occurred during the weeks of 30 May and 6 June, with 98% of geese moving through the area. Overall goose observations were higher than all previous years. Migratory peaks during baseline and 2000 to 2004 monitoring years are illustrated in Figure 10.2.2-2.

Table 10.2.2-2 Geese Species Present (√) or Absent (χ) on East Island for All Monitoring Years

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004
Canada Geese	✓	✓	✓	✓	✓	✓
Greater White-fronted Geese	✓	✓	✓	✓	✓	✓
Snow geese	✓	×	✓	✓	×	✓

Figure 10.2.2-2 Frequency of Geese Observed Within the Study Area from Baseline through 2004



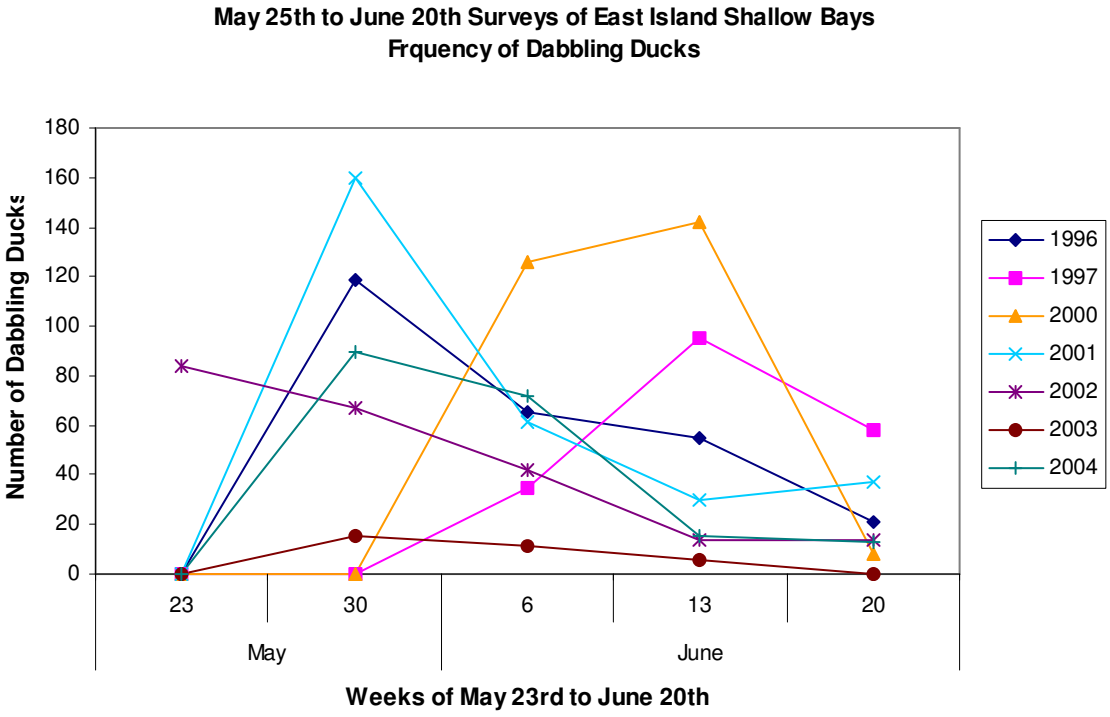
Peak migratory movements for dabbling ducks also occurred during the weeks of 30 May and 6 June, with 85% of birds moving through the area at this time (Figure 10.2.2-3). The northern pintail was the only dabbler identified at the shallow bays during 2003 and 2004. Similarly, from 2000 - 2002, northern pintails accounted for 90%, 94%, and 97%, respectively, of all dabbling duck observations on the shallow bays. Baseline studies also showed northern pintails to be the most commonly occurring dabbling duck species, accounting for 74% and 92% of species during the 1996 and 1997 baseline

years, respectively. Unidentified ducks accounted for 32% of all duck observations and these have been grouped under the diving duck table.

Table 10.2.2-3 Dabbling Duck Species Present (√) or Absent (χ) on East Island for All Monitoring Years

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004
Northern Pintail	✓	✓	✓	✓	✓	✓
Mallard	✓	×	×	✓	×	×
American Wigeon	✓	×	✓	×	×	×
Green-winged Teal	✓	✓	✓	×	×	×

Figure 10.2.2-3 Frequency of Dabbling Ducks Observed Within the Study Area from Baseline through 2004

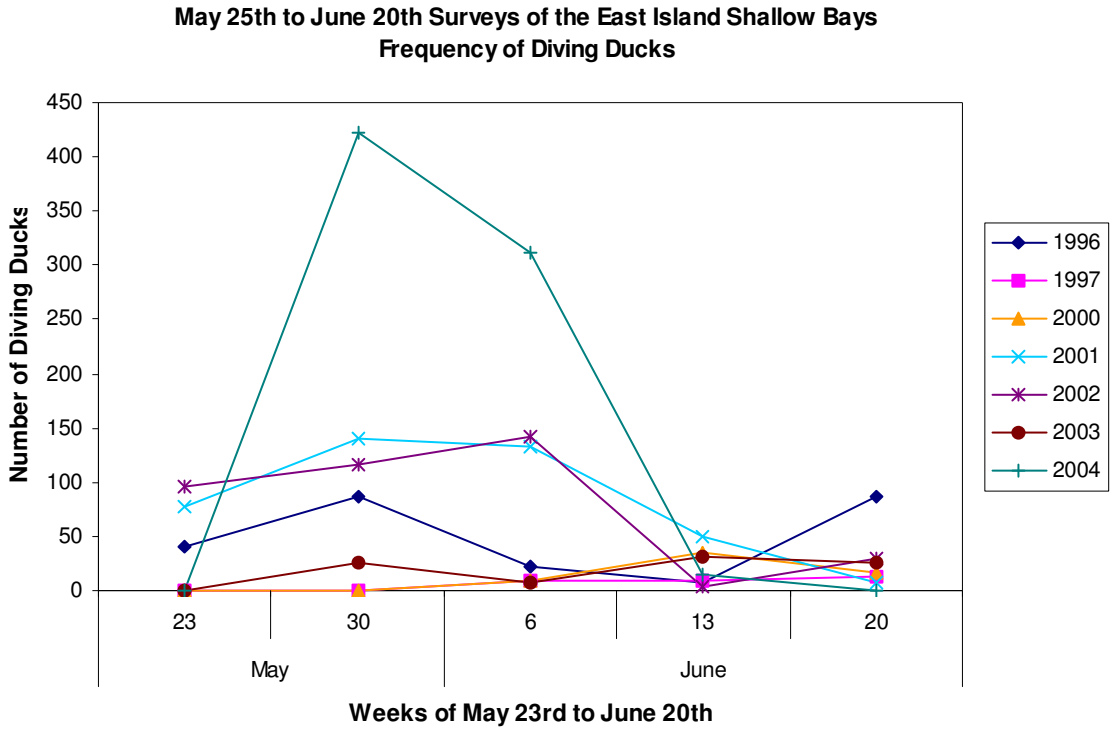


In 2004, peak migratory movements (Figure 10.2.2-4) for diving ducks (oldsquaw, greater scaup and red-breasted merganser) occurred during the weeks of 30 May (56%) and 6 June (42%), which was slightly earlier than most monitoring years (1996, 1997 and 2000 to 2003). The most common diving duck recorded during all monitoring years up to 2003 was the oldsquaw. The surf scoter dominated 2004 sightings at 21% while oldsquaw sightings were 16%. Unidentified ducks accounted for 32% of all duck observations and have been grouped under the diving duck table (Table 10.2.2-4). A comprehensive analysis of waterfowl and shorebird data is provided in Appendix A.

Table 10.2.2-4 Diving Duck Species Present (√) or Absent (χ) on East Island for All Monitoring Years

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004
Oldsquaw	✓	✓	✓	✓	✓	✓
Greater Scaup	✓	✓	✓	×	✓	×
Black Scoter	✓	×	×	×	×	×
Surf Scoter	×	×	×	×	×	✓
Red-breasted Merganser	✓	✓	✓	×	✓	×

Figure 10.2.2-4 Frequency of Diving/Unidentified Ducks Observed Within the Study Area from Baseline through 2004



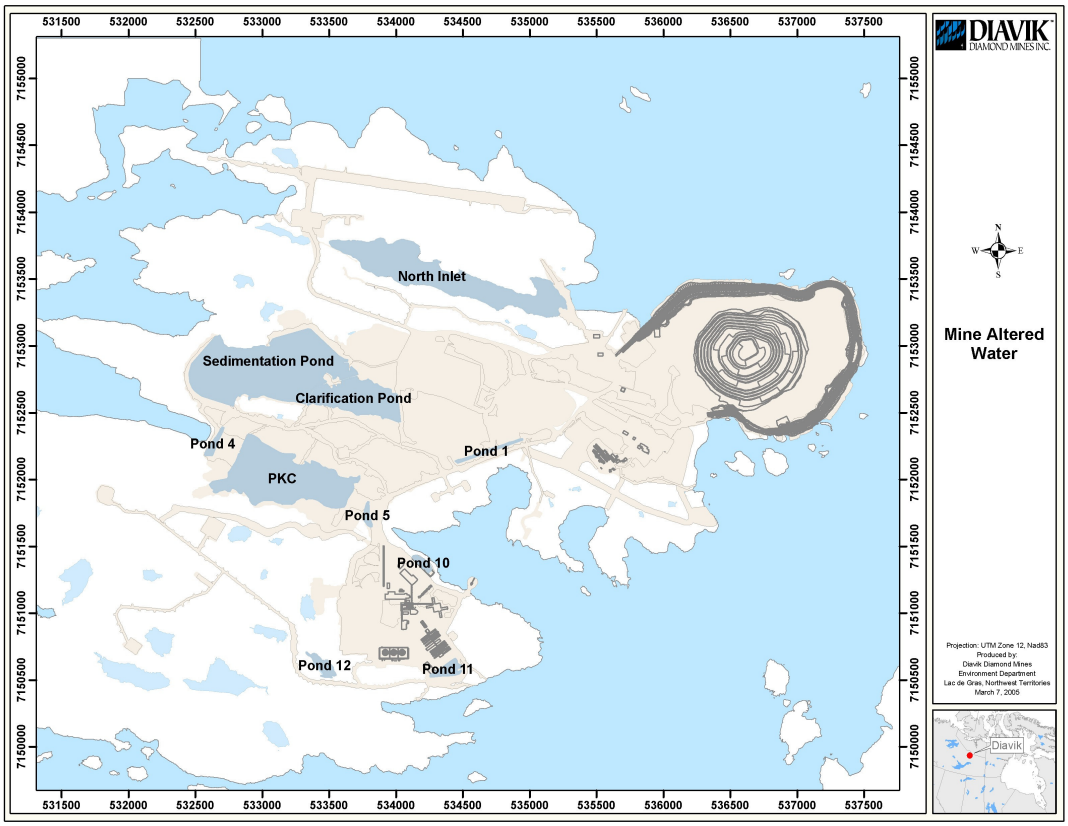
10.3 MINE-ALTERED HABITAT UTILIZATION

With ongoing development of the mine, new water areas have been constructed as part of DDMI's water management system. These areas may provide new waterfowl habitat. As part of the water management system, the water within the north inlet was lowered and thus exposed "new" shoreline habitat that may potentially be used by waterfowl and shorebirds. The processed kimberlite containment (PKC) area was constructed in 2002, and waters that could potentially be used by waterfowl are stored in this area for use within the diamond process plant. Engineered, lined ponds created to collect site run off waters may provide suitable water habitat for migrating birds. A temporary water and sediment storage facility was also created in 2002. These areas will be monitored by DDMI to determine the extent of use by migrating birds (Figure 10.3-1).

The objective is to determine if waterfowl are using mine-altered waters to determine if:

Early open water or early vegetation growth might attract waterfowl during spring migration.

Figure 10.3-1 Mine-altered Waters due to Diavik Activities on East Island



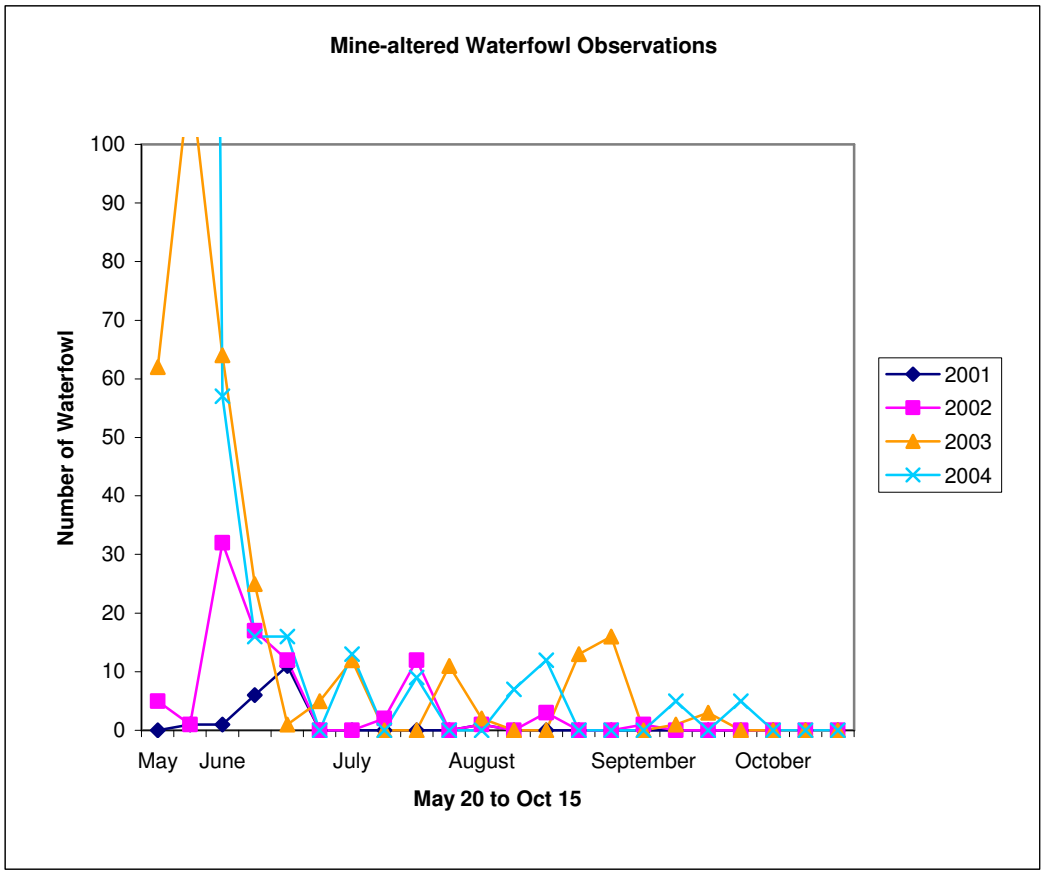
10.3.1 METHODS

Waterfowl surveys of the mine-altered water bodies (Figure 10.3-1) were conducted daily from 20 May to 20 June, and weekly from 20 June to 15 October (Appendix B – Technical Procedure: Waterfowl, Shorebirds and other Aquatic Birds Monitoring). Surveys were conducted during the morning for the mine-altered water bodies (North Inlet, PKC, collection and sedimentation ponds, Ponds 1,4, 5 and 10-12) and all applicable staging birds were identified and recorded. Environment personnel walked the periphery of the identified areas and documented observations.

10.3.2 RESULTS

While overall observations of waterfowl and shorebirds increased at mine-altered water bodies during 2004, few shorebirds or waterfowl were observed at most ponds. Exceptions to this were the North Inlet and PKC area, which accounted for 71% and 15% of all observations, respectively. In total, 1042 birds were sighted during 24 weeks of monitoring (Figure 10.3.2-1). This total was higher than that of all other monitoring years, all of which have been increasing steadily from year to year (Appendix I). Of the 1042 birds observed, northern pintail, Canada geese and gull species were most common accounting for 47%, 26% and 13% of all observations, respectively. (Appendix I).

Figure 10.3.2-1 Mine-altered Frequency Diagram (All Species of Waterfowl and Shorebirds)



*During the week of 20 May 2003 and 2004, over 100 birds were observed within the mine altered areas. To better represent the number of observations for previous years, the scale illustrates a maximum of 100 birds.

10.4 MORTALITY

The objective is to determine the number of mine-related mortalities, should they occur. The following section summarizes methods used and results obtained from incident reporting. The specific impact prediction in the Environmental Effects Report (DDMI, 1998b) is:

Mining related mortality, if they occur, is expected to be low.

10.4.1 METHODS

Project related incidents' (deaths caused by mining activities such as collisions with vehicles or power lines, or blasts) are reported to Environment personnel for follow up, and all necessary documentation completed. This information is tabulated and provided for annual comparisons should future mortalities occur.

10.4.2 RESULTS

No project related mortalities occurred in 2004.

10.5 RECOMMENDATIONS FOR THE 2005 PROGRAM

Increase the number of spring surveys on the east and west bays to similar efforts used during baseline studies (Appendix A).

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Appendix A

Analysis of Environmental Effects from the Diavik Diamond Mine on Wildlife in the Lac de Gras Region

Appendix B

Technical Procedures for the Collection of Wildlife Monitoring Data

TECHNICAL PROCEDURES – AERIAL SURVEYS FOR CARIBOU

Purpose

The purpose of aerial surveys for caribou includes the determination of;

- Relative abundance of caribou with respect to the mine site;
- Directional movement of caribou with respect to the mine site;
- Composition of caribou groups with respect to the mine site;
- Activity of caribou with respect to mine site; and
- Incidental observations of wildlife.

Applicability

Surveys will be flown at least once per week during the field season.

References and Suggested Readings

Wildlife Monitoring Program
BHPB's Wildlife Monitoring Program

Field Procedures

Systematic surveys with a transect width of 1.2 km (600m on each side of helicopter) will be used to estimate the number of animals in the study area. The distance between transects will be 4km. Throughout the field season a survey will be flown once per week.

The first survey should occur prior to caribou moving through the study area (mid to late April). The last survey should occur during the post-migration period (late September). Initial dates for northern migration and final dates for the post-southern migration surveys will remain flexible in response to current data from satellite-collared caribou delivered by RWED and local observations of caribou in the area.

A helicopter will be used for all surveys. In addition to the pilot, a navigator in the front seat will use a 1:250,000 scale map to plot and follow a predetermined flight path, and record all observations of wildlife by observation number. The navigator will also record the GPS location, group size and composition, dominant behaviour, and habitat type (see descriptor codes on page 3).

Surveys will be conducted from 120-180 meters above ground level (agl), at a speed of 145-160 kilometers per hour. The same line transects will be followed during consecutive surveys with the aid of the 1:250,000 scale map and GPS units. Transect routes are provided on the attached map. Observers will not record wildlife observations outside the study area during turns at the end of transects.

Local weather conditions resulting in poor visibility during surveys may result in temporary deviation from these protocols.

The following information will be recorded for caribou observations:

- GPS location, using hand held GPS or helicopter GPS;
- Habitat type;
- Number of caribou;
- Dominant composition of caribou (nursery or non-nursery)
- Dominant behaviour (activity) of group
- Direction caribou movement if moving;
- Locations of tracks/trails, direction of travel or orientation tracks/trails; and
- Observation of any other wildlife, den locations or raptor nest sties.

Incidental observations of other species will be made, but there will be no excessive deviation from the flight path in connection with such observations. Incidental observations of grizzly bears (and bear dens), wolves (and wolf dens), wolverines, raptors or raptor nest sites, and musk ox will be recorded on aerial survey data sheets. These observations will later be recorded in the "incidental observation" database and not in the caribou aerial survey database.

If surveys detected no caribou, then a "0" should be entered on the data sheet and in the database for that date.

A running tally of helicopter hours spent of surveys will be kept and reported on the field sheet.

QA/QC

Data sheets will be checked for omissions and/or errors on the same day as the survey.

Analyses will take into consideration the relative value of habitat and topography to caribou in addition to distance to mine elements.

Reporting

For each migration period, a field report of total numbers of caribou and other wildlife seen will be prepared.

Equipment and Materials

Binoculars
GPS units
Maps
Data sheets

Descriptor Codes

Habitat Codes	
BE	Bedrock (>80%)
BO	Boulders (>80%)
EC	Esker Complex
HT	Heath Tundra
RB	Riparian Birch
RS	Riparian Shrub
SW	Sedge Wetland
SF	Spruce Forest
SF/BE	Spruce Forest/Bed Rock
SW/HT	Wetland/Heath Tundra
HT/BE	Heath Tundra/Bedrock
HT/BO	Heath Tundra/Boulders
LA	Lake
IC	Ice

Composition Codes	
F	females
M	males
C	calf
Y	yearling
F/C	females and calves
F/M	females and males
F/M/C	females, males, calves

Activity Codes	
A	Alert
B	Bedded
F	Feeding
R	Running
S	Standing
SW	Swimming
T	Trotting
W	Walking

TECHNICAL PROCEDURES – Caribou Scanning Observations

Purpose

Information regarding the activity budgets (i.e. time spent feeding, resting, walking, running) of caribou exposed to the mine site and on control sites can be used to assess the potential impact of the mine on nutritional condition of caribou.

The objective of this component of the monitoring program is to:

- Determine the effect of the mine on caribou activity budgets.

Applicability

Applicable for all caribou in the vicinity of the mine and those away from the mine (controls).

References and Suggested Readings

Wildlife Monitoring Program
BHP Wildlife Monitoring Program
Altman 1974; Curatolo and Murphy 1983.

Field Procedures

Task 1. Scan Sampling of Caribou Groups

Scan sampling of caribou groups or individuals will be used to monitor caribou behaviour as function of distance from the mine. The method to be used is adapted from Curatolo and Murphy (1983), and will involve two observers. Individual caribou activities will be recorded as either feeding, bedded, standing, alert, walking, trotting, or running. Individuals will be classified as feeding when they are actually foraging or searching for food (i.e., walking with head down). GPS location will be recorded, and observations will be conducted during the spring, summer, and autumn. Group composition will be classified (see descriptor codes on page 3), and the number of animals in the group will be recorded. Thus, the response variable is caribou behaviour, while the treatment variables include distance from mine, season, and group composition. In order to control for the effects of habitat and insect harassment, all observations will be performed within one habitat type (tundra with < 30% bedrock or boulders) and the level of insect harassment will be recorded.

The group will be scanned every 8 minutes for a minimum of 4 observations and a maximum of 8. For each scan, the number of animals exhibiting each behaviour will be recorded. Here, the unit of replication is the individual group. We anticipate obtaining 10 - 15 replicates for each level within the treatment effects. Given that there is a total of 12 levels within treatments (2 sites, 3 seasons, and 2 group composition categories), the maximum number of hours required to obtain 15 full replicates (i.e., 64 minutes for each

group) is 192 hrs. However, we believe that the replicates can be obtained in less time. A strong attempt should be made to distribute the number of observations evenly over distances of less than 2 km from the mine to distances up to 20 km from the mine.

Task 2. Response to Specific Stressors

For all caribou groups, instantaneous observations will be used to assess the response of caribou to different potential stressors as a function of distance. These observations will occur during scan sampling, and consequently, no increase in observation time will be required. In the event that a stressor is introduced during scan sampling, the observers will note the time (in the comments box) and record the response of caribou to stressors will as "no reaction" or "exhibiting a reaction" (i.e., alert posture, walking or running away from disturbance; see data sheet). The reaction of the majority of the group will be used in selecting the category. Estimated distance (m) from the stressor will also be recorded. Stressors include type of aircraft, type of vehicle, and blasts from pits.

The observers will then wait until the animals resume previous behaviour (1 – 2 minutes), and begin scanning observations again.

For the scan observations, weather conditions such as wind speed and direction, temperature, and type of precipitation will be documented. Level of insect harassment will be recorded separately for mosquitoes/black flies and for bot/warble flies. The former will be subjectively judged on a level from 0 (none) to 4 (severe) based on actual harassment to observers and/or observed reaction of caribou such as shaking and scratching. Bot and warble flies will be recorded simply as being present or absent during the observation period, based on observed reaction of caribou (sudden bolting, aberrant running, rigid standing).

QA/QC

Data sheets will be checked for omissions and/or errors on the same day as the survey.

Reporting

A report will provide a summary of the number of replicates for each of the treatments (season, site, group composition) for each of the 2 tasks obtained for each migration period.

Equipment and Materials

- Binoculars
- Watches, stopwatches;
- Field notebook, data sheets and pencils

Descriptor Codes

Habitat Codes	
BE	Bedrock (>80%)
BO	Boulders (>80%)
EC	Esker Complex
HT	Heath Tundra
RB	Riparian Birch
RS	Riparian Shrub
SW	Sedge Wetland
SF	Spruce Forest
SF/BE	Spruce Forest/Bed Rock
SW/HT	Wetland/Heath Tundra
HT/BE	Heath Tundra/Bedrock
HT/BO	Heath Tundra/Boulders
LA	Lake
IC	Ice

Composition Codes	
F	females
M	males
C	calf
Y	yearling
F/C	females and calves
F/M	females and males
F/M/C	females, males, calves

Activity Codes	
A	Alert
B	Bedded
F	Feeding
R	Running
S	Standing
T	Trotting
W	Walking

TECHNICAL PROCEDURES – Caribou Road Observations

Purpose

Concerns have been raised about the impact of dust on caribou. Environmental staff will keep a tally of the number of times individual caribou or groups of caribou are encountered during weekly monitoring of the waste transfer area/landfill sites.

The objective of this component of the monitoring program is to:

- Determine if caribou are attracted to dust deposition sites.

Applicability

April 15 through October 15 or until caribou are no longer within the area after October 15th.

References and Suggested Readings

Wildlife Monitoring Program

Field Procedures

Caribou road observation data sheets should accompany personnel during monitoring of the waste transfer area (WTA) and landfill sites. Each time the WTA or landfill sites are monitored, field staff will record the number times caribou were encountered within different distance categories (i.e., on the road, within 50 m of edge of road, and 50 – 200 m of edge of the 3 observation roads (north, mid and south haul roads – see map). The total distance travelled to and from the monitoring area must also be recorded (using the truck odometer). Other information recorded will include: dominant behaviour of the group, group size and group composition (see legend on page 2).
If no caribou are encountered during the trip, then enter a "0" (or no caribou) under the heading "group size" with the distance travelled and date. The survey will be conducted on one leg of the trip only, i.e. caribou will only be counted once while driving the haul roads.

QA/QC

Data sheets will be checked for omissions and/or errors on the same day as the survey.

Reporting

A report on the number of caribou encountered per distance traveled will be provided.

Equipment and Materials

Binoculars
Data sheets

Descriptor Codes

Composition Codes	
F	females
M	males
C	calf
Y	yearling
F/C	females and calves
F/M	females and males
F/M/C	females, males, calves

Activity Codes	
A	Alert
B	Bedded
F	Feeding
R	Running
S	Standing
T	Trotting
W	Walking

TECHNICAL PROCEDURES – Caribou in the PKC/Quarry Monitoring

Purpose

Kimberlite containment areas and quarry locations have the potential to kill or injure caribou. The purpose of this technical procedure is to determine if caribou drink from or get trapped in the PKC and the quarry area. The objectives of this component of the monitoring program are to:

- Determine if caribou utilize the PKC and quarry areas.

Applicability

Monitoring will be conducted 2-3 times per week during the entire year.

References and Suggested Readings

Diavik Wildlife Monitoring Program

Field Procedures

A truck with one Diavik environmental personnel will travel a route weekly with fixed observations points (to be determined when construction is completed) that provide a clear view of the PKC area and quarry area. Observations of caribou behaviour will be recorded such as routes travelled, and caribou drinking in the PKC area.

If surveys detected no caribou, then a “0” should be entered on the data sheet and in the database for that date

QA/QC

Data sheets will be checked for omissions and/or errors on the same day as each survey. Data sheets will be transferred to a database each week.

Observations will be summarized in the annual report and if it discovered that the PKC and quarry area pose a risk for caribou, possible mitigation strategies will be presented and discussed.

Reporting

A report will provide a summary of the information collected.

Equipment and Materials

Data sheets
binoculars

TECHNICAL PROCEDURES – Spring/Summer Bear Activity Surveys

Purpose

To determine the potential long-term influence of the mine on habitat use by grizzly bears within the study area.

Applicability

High quality bear habitat during spring and summer.

References and Suggested Readings

Diavik Wildlife Monitoring Program

Field Procedures

The presence of bear sign within and adjacent to seasonal high quality (i.e., preferred) habitats will be used as an index of habitat utilization by grizzly bears within the wildlife study area. Sample polygons (i.e., habitat complexes) will include wetland habitats during green-up in the spring (June) and willow-riparian / birch-seep habitats in the summer (August). Twenty polygons will be sampled during the spring and summer. Sample sites will be uniquely identified, located on a map and GPS co-ordinates will be recorded. This will insure that the same polygons can be sampled during subsequent years.

Each polygon will encompass of a 500 m x 500 m area and comprise a minimum of 25% of the preferred habitat type(s). Observers will initiate the search for bear sign from the centre (provided by pre-determined UTM co-ordinates) of each polygon. If the centre point falls within open water, then begin searching from the nearest shoreline. Thus, the polygon represents the initial point of the survey, but searching should not be restricted to the area of the polygon and should include an approximate 1-km buffer from the initial starting point. The idea is to obtain coarse-scaled information on the presence/absence of grizzly bear activity within and adjacent to each polygon. For example, if an esker is located within 1 km of the polygon, observers should include the esker in their search area. The duration of each search within and adjacent to the polygon will be standardized to one hour.
Sign includes attributes such as dens, diggings, tracks, scat, hair and feeding evidence. If sign is detected, the number of independent sign is to be recorded. A narrative description of the type of sign will be recorded on the data sheet. One data sheet will be used for each sample polygon.

The field crew will consist of 2 observers with land-based and sign recognition experience, and an additional person will serve as a “look-out” and must remain vigilant towards potential bear encounters at all times (see Bear Safety Procedures).

Bear Safety Procedures

Safety is first. Before surveying a polygon, especially riparian shrub habitat, fly over the area closely to check for bears in the area. If a bear is within 5 km of the polygon or a fresh kill is observed in the area, move on to survey another site, and return to the previous site at a later time (i.e., do not entirely abandon the site).

QA/QC

Data sheets will be checked for omissions and/or errors on the same day as the survey.

Reporting

A report will provide a summary of the information collected.

Equipment and Materials

Maps with identified sample polygon locations during spring and summer
Data sheets
GPS
Bear spray, bangers, and flares
Paper envelopes for hair samples

TECHNICAL PROCEDURES – Wolverine Snow Track Surveys

Purpose

To monitor for continued presence of wolverines over time as the mine develops.

Applicability

Monitoring will be conducted twice per year.

References and Suggested Readings

Diavik Wildlife Monitoring Program

Field Procedures

Surveys will be conducted two times, once in the early spring (mid- April) and once in early winter (late November to early December) by snowmobile. Surveys would best be conducted 2 – 6 days after a snowfall. Personnel will follow the route provided in a clockwise direction. The snowmobile will be driven slowly to ensure that all wolverine tracks are recorded.

The observer will record the start time, the times at each corner and the end time of the circuit. In addition, the distance travelled will be recorded from the odometer on the snow machine.

For each wolverine track observation, record:

observation number
number of wolverines (sex, if possible)
direction of travel (N, S, E, W)
UTM coordinates

QA/QC

Upon return from the field, technicians will check their data sheets and maps for completeness and accuracy and will submit them for data entry.

Reporting

A report will provide a summary of the information collected.

Equipment and Materials

Binoculars, GPS (and spare batteries)
Field notebook, pencil, compass

TECHNICAL PROCEDURES – Waste Transfer Area/Landfill Monitoring

Purpose

Wildlife attracted to the landfill site can potentially be very dangerous by becoming habituated to human activity. This situation can pose a threat to the safety of both the personnel on site and to the animal itself.

The objectives of this component of the monitoring program are to:

Determine if the landfill site contains potential attractants for wildlife (i.e. edible items, oil products)
Determine if the landfill site is being visited by wildlife.

Applicability

Monitoring will be conducted 2-3 times per week during the entire year.

References and Suggested Readings

Diavik Wildlife Monitoring Program

Field Procedures

Surveys to monitor the landfill site will include a systematic survey on foot of the entire landfill site and waste transfer area. Consecutive surveys should be alternated between morning and afternoon. The following information will be recorded on the Waste Transfer Area/Landfill Monitoring Data Sheet:

time of starting, finishing and duration of survey
the presence of any possible attractants to the site (i.e. edible items, oil products)
observations of wildlife at the site (all species including bears, wolves, wolverines, foxes, caribou, hares, and birds)
any sign of wildlife use of the site (i.e. tracks, scats, etc.)

If surveys detected no sign of wildlife, then a “0” should be entered on the data sheet and in the database for that date

QA/QC

Constant analysis of the data obtained will be performed to ensure early detection of any problems that may develop with respect to wildlife use of the landfill site.

Data sheets will be checked for omissions and/or errors on the same day as each survey.

Data sheets will be transferred to a data base each week.

Reporting

A report will provide a summary of the information collected.

Equipment and Materials

Data sheets; binoculars

TECHNICAL PROCEDURES – Raptor Surveys

Purpose

The purpose of the raptor survey is to monitor the nesting success of peregrine falcons and other raptors, and to monitor if mining activity is disturbing nesting raptors.

Applicability

Peregrine Falcons and other raptors.

References and Suggested Readings

Diavik Wildlife Monitoring Program
BHP's Wildlife Monitoring Program
Peterson's Field Guide to Western Birds

Field Procedures

The raptor survey will be conducted once during the summer (July 20 – 21) to detect success rates of each nest.

The methodology for this type of raptor survey involves a "Look-See" method where observers fly adjacent to the nest site to determine whether or not birds are occupying the area and count young if present.

The location of nest sites will be documented using a GPS. Proof of nest success would include finding a nest containing eggs or young.

For each nest site, one data sheet will be used to record information from each survey.

QA/QC

Upon returning to camp, field data will be transcribed onto the computer in the appropriate databases. The data will be summarized upon return from the field.

Reporting

A report will provide a summary of the information collected.

Equipment and Materials

Binoculars
GPS
Raptor data sheets and pencil
Bird Identification book

TECHNICAL PROCEDURES – Waterfowl, Shorebirds and other Aquatic Birds Monitoring

Purpose

To document general observations/occurrence of the East Island shallow bays of waterfowl, loons and shorebirds during spring migration to determine any changes in use.

To document any use by waterfowl, loons and shorebirds of mine process waters (i.e. PKC, north inlet and drainage ponds) during spring migration and breeding season.

Applicability

Shallow Bays – May 20th to October 15th – every 2nd day in the morning.
Mine altered wetlands – daily during early spring and late fall migration; and weekly from May 20th to October 15th.

References and Suggested Readings

Diavik Wildlife Monitoring Program
Peterson's Field Guide to Western Birds

Field Procedures

Waterfowl monitoring will begin on May 20th for mine altered wetlands and May 25th for shallow bays. Surveys are to be completed in the morning and at approximately the same time every day.

Data to be recorded is as follows:
Dates and times of surveys;
Survey personnel
Survey site (i.e. east and west bays, North Inlet, PKC or drainage ponds)
All bird species and numbers
Percent open water

Incidental observations such as nests or habitat use may be collected at sites.

QA/QC

Upon return from the field, technicians will check their data sheets for accuracy and will submit them for data entry.

Reporting

A report will provide a summary of the information collected.

Equipment and Materials

Binoculars, Peterson's Field Guide to Western Birds, Data sheets

STANDARD OPERATING PROCEDURE – Permanent Vegetation Plot Analysis

Purpose

The objective of this Standard Operating Procedure (SOP) is to provide Environment staff and other team members with a method for conducting habitat assessments on the Permanent Vegetation Plots (PVP).

The purpose of the habitat assessments is to summarize the amount of vegetation in a given plot and habitat type. This information is used to determine accumulation rates and the potential effects of dust on vegetation within the project area.

Responsibilities

It is the Senior Environmental Coordinator's responsibility to ensure that all members of the Environment Team are trained in, and understand, this Standard Operating Procedure (SOP).

It is the responsibility of the Environmental Coordinators, Environmental Technicians, contractors, researchers and students, and any other members of the Environment Team to follow this Standard Operating Procedure.

Procedure

Method
Habitat Analysis is conducted every three years using a plot sampling method (Figure 1). Analysis was completed in 2001 and 2005 to date. The next scheduled sampling year is 2008.

The plots are designed in a 2m x 2m configuration with four quadrants inside, each measuring $1m^2$ and segregated by a string. Quadrants each have a directional coordinate associated with them (i.e. NW, SW, SE, NE). This directional coordinate is recorded with the quadrant number on the field sheet.

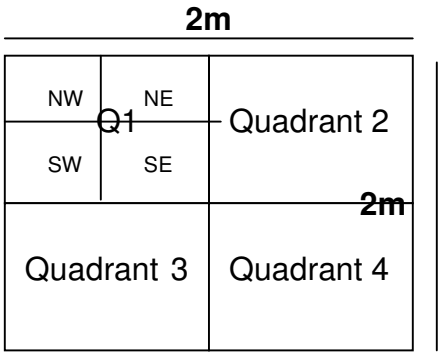

Figure 1: Diagram of a permanent vegetation plot

Plants within the string boundaries are identified and counted so that an estimate of their percent cover can be determined. Plant species that are located directly on the string will be considered within the plot. All unknown plants will be collected in the field, pressed and identified in the laboratory. Photos will be taken of all plots, along with a GPS (Global Positioning System) location.

Each plant is counted as one (1) count according to its stem. For example, cranberry is counted per stem and birch trees per trunk, while sedges and grasses are counted by flower, seed head or stem/root.

Results

Once the species in the plot are completely counted, the total percent of each plant is added up and divided by the number of species observed within the quadrant. The formula for calculating total percent cover is:

$$\text{Total Percent Cover} = \frac{(Q1\ \%number + Q2\ \%number + Q3\ \%number + Q4\ \%number)}{4}$$

Equipment

- Boat and associated equipment and safety gear
- Radio and spare, charged batteries
- 50metres (m) tape
- Flagging tape
- Stakes
- White rope
- Compass
- Plant press
- Camera
- GPS

Appendix C

Comparison of Plant Species Cover in Permanent Vegetation Plots

Table 1: A Comparison of Total Percent Species Cover Within Each PVP - Segregated by Habitat Type 2001 & 2004

Scientific Plant Species Name	PVP1-Heath Tundra		PVP2-Heath Tundra		PVP4-Heath Tundra		PVP5-Heath Tundra		PVP6-Heath Tundra		PVP10-Heath Tundra		PVP3-Sedge Wetland		PVP7-Sedge Wetland		PVP9-Sedge Wetland		PVP8-Esker Complex	
	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004
Agrostis borealis	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Andromeda polifolia	0	0	0	0	0	0	3	2	3	6	0	0	0	0	14	8	3	3	0	0
Animal Pellets	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Arctostaphylos rubra	9	7	2	2	9	12	7	9	2	1	12	18	2	1	0	0	0	0	0	0
Astragalus alpinus	3	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bare ground	15	0	13	0	15	3	10	2	6	3	3	2	0	0	0	1	0	0	58	15
Betula glandulosa	6	13	33	19	22	16	2	1	20	18	7	5	12	14	1	1	5	6	5	7
Betula occidentalis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Betula spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Carex #1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0
Carex #2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0
Carex aqualtilis	0	1	0	1	0	0	0	1	0	2	0	0	0	0	0	0	0	20	0	0
Carex aquatilis var. aquatilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0
Carex aquatilis var. stans	2	0	1	0	0	0	1	0	0	0	0	0	0	0	10	0	0	0	0	0
Carex rotundata	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	4	0	0	0
Carex saxatilis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Empetrum nigrum	5	9	5	4	6	11	7	8	3	3	0	0	1	1	0	0	1	2	26	33
Eriophorum angustifolium	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0	0	5	6	0	0
Eriophorum vaginatum	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0	0	0	5	0	0
Kalmia polifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Ledum decumbens	6	7	7	14	10	7	26	16	15	11	24	12	9	20	1	1	2	1	0	0
Lichen	8	5	7	7	9	5	14	11	7	3	31	60	0	1	1	1	0	0	2	10
Loiseleuria procumbens	22	29	3	2	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moss	2	34	8	30	0	1	5	8	19	26	1	1	20	48	69	83	62	68	3	3
Mushroom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxycoccus microcarpus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Pedicularis lapponica	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Poaceae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rock	2	0	3	0	6	2	1	1	0	0	6	14	0	0	0	0	0	0	1	2
Rubus chameamorus	0	0	0	0	0	0	2	1	4	2	0	0	0	0	0	0	8	5	0	0
Salix fuscescens	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	11	0	0
Salix glauca	0	6	0	5	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salix herbacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Salix planifolia	2	1	6	3	0	0	0	0	2	0	0	0	0	0	1	0	2	0	0	0

Scientific Plant Species Name	PVP1-Heath Tundra		PVP2-Heath Tundra		PVP4-Heath Tundra		PVP5-Heath Tundra		PVP6-Heath Tundra		PVP10-Heath Tundra		PVP3-Sedge Wetland		PVP7-Sedge Wetland		PVP9-Sedge Wetland		PVP8-Esker Complex	
	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004	2001	2004
Salix spp.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tolfieldia pusilla	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vacccinium uliginosum	1	1	1	1	4	1	5	3	2	1	7	1	0	0	2	2	1	1	2	2
Vaccinium vitis-idaea	18	6	11	10	16	15	18	18	11	7	11	16	12	14	0	0	3	4	3	1

Appendix D

Caribou Mortality Report

CARIBOU MORTALITY REPORT

SUPPORTING INFORMATION

Location: Traditional knowledge (TK) camp, south coast of Lac de Gras.
UTM Easting 541155
Northing 7152216

Species involved: Caribou, unknown age and sex.
Grizzly Bear, unknown age and sex.

Date found: The carcass was found on 16 August 2004.

Date occurred: The incident occurred between 6-15 August 2004, after the TK water quality workshop and prior to the TK caribou workshop. The exact date is unknown as the camp was not in use.

Reported by: Ed Jones, TK Camp Manager, Discovery Mining Services.

OCCURRENCE DESCRIPTION

Observed: The day Ed arrived at the TK camp (approximately 1000 hours), Ed noted that the electric fence around the camp had collapsed in many places. At 1800 hours, Ed reported a grizzly bear on a caribou carcass approximately 10 metres outside the electric fence. The caribou carcass had been stripped of most flesh (Photos 1 to 4).

PHOTO 1: CARIBOU REMAINS AT DIAVIK TK CAMP

PHOTO 2: SPINE AND RIB CAGE OF CARIBOU CARCASS

PHOTO 3: JAW AND LEG BONES OF CARIBOU CARCASS

PHOTO 4: CARIBOU ENTRAILS

One strand of the fence had been snapped, was pulled near the carcass, and was tangled around the caribou antler (Photos 5 and 6). The electric fence was active at the time of the occurrence.

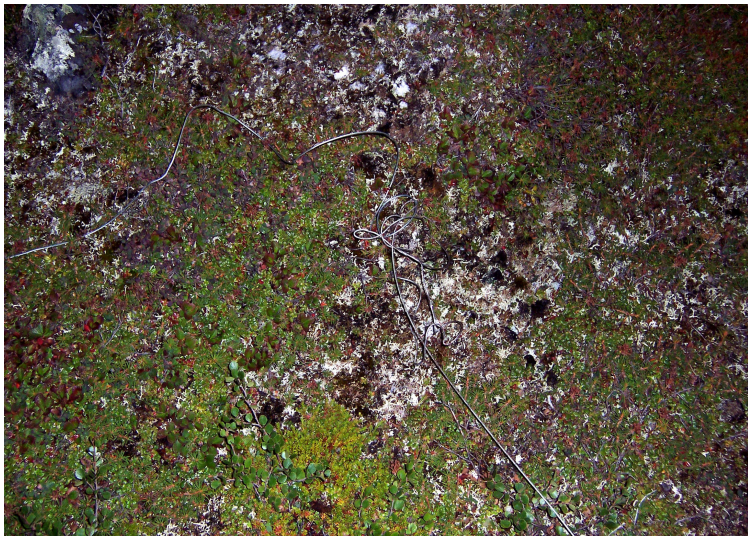

Photo 5: Wire tangled around caribou antler

Photo 6: Close-up of tangled wire from around antler

Actions taken: The remains of the carcass were collected at 2000 hours and returned to Diavik for incineration.

Possible scenario: It appears that the caribou became entangled by the antler in the electric fence. The caribou likely broke this strand, preventing further electric shocks, but remained entangled in the fence. However, being caught up made the caribou easy prey for a grizzly bear. It is likely that the caribou was killed by the bear and was largely unhurt, if stressed, by the electric fence.

Follow up required: None.

Appendix E

Caribou Road Observation Data for 2004

Caribou Road Observations - 2004

Date	Road	Herd Size	Herd Composition	Encounter Distance	Behaviour
04-May-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
04-May-04	South Obs. Road	No Observations	N/A	N/A	N/A
04-May-04	North Obs. Road	No Observations	N/A	N/A	N/A
07-May-04	South Obs. Road	No Observations	N/A	N/A	N/A
07-May-04	North Obs. Road	No Observations	N/A	N/A	N/A
07-May-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
11-May-04	North Obs. Road	No Observations	N/A	N/A	N/A
11-May-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
11-May-04	South Obs. Road	No Observations	N/A	N/A	N/A
12-May-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
12-May-04	North Obs. Road	No Observations	N/A	N/A	N/A
12-May-04	South Obs. Road	No Observations	N/A	N/A	N/A
13-May-04	South Obs. Road	No Observations	N/A	N/A	N/A
13-May-04	North Obs. Road	No Observations	N/A	N/A	N/A
13-May-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
18-May-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
18-May-04	South Obs. Road	No Observations	N/A	N/A	N/A
18-May-04	North Obs. Road	No Observations	N/A	N/A	N/A
24-May-04	North Obs. Road	No Observations	N/A	N/A	N/A
24-May-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
24-May-04	South Obs. Road	No Observations	N/A	N/A	N/A
25-May-04	North Obs. Road	No Observations	N/A	N/A	N/A
25-May-04	South Obs. Road	No Observations	N/A	N/A	N/A
25-May-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
27-May-04	South Obs. Road	No Observations	N/A	N/A	N/A
27-May-04	North Obs. Road	No Observations	N/A	N/A	N/A
27-May-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
01-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
01-Jun-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
01-Jun-04	North Obs. Road	8	M/F	<50m	Feed
03-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
03-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
03-Jun-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
07-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
07-Jun-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
07-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
10-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
10-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
10-Jun-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
15-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
15-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
15-Jun-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
17-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
17-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
19-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
19-Jun-04	Mid Obs. Road	No Observations	N/A	N/A	N/A

19-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
22-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
22-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
22-Jun-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
24-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
24-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
24-Jun-04	Mid Obs. Road	2	M	50-200m	Feed
26-Jun-04	Mid Obs. Road	2	M	50-200m	Feed
26-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
26-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
28-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
28-Jun-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
28-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
29-Jun-04	South Obs. Road	No Observations	N/A	N/A	N/A
29-Jun-04	North Obs. Road	No Observations	N/A	N/A	N/A
29-Jun-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
01-Jul-04	North Obs. Road	No Observations	N/A	N/A	N/A
01-Jul-04	South Obs. Road	No Observations	N/A	N/A	N/A
01-Jul-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
06-Jul-04	North Obs. Road	No Observations	N/A	N/A	N/A
06-Jul-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
06-Jul-04	South Obs. Road	No Observations	N/A	N/A	N/A
13-Jul-04	South Obs. Road	No Observations	N/A	N/A	N/A
13-Jul-04	North Obs. Road	No Observations	N/A	N/A	N/A
13-Jul-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
15-Jul-04	North Obs. Road	No Observations	N/A	N/A	N/A
15-Jul-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
15-Jul-04	South Obs. Road	No Observations	N/A	N/A	N/A
20-Jul-04	North Obs. Road	No Observations	N/A	N/A	N/A
20-Jul-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
20-Jul-04	South Obs. Road	No Observations	N/A	N/A	N/A
22-Jul-04	North Obs. Road	No Observations	N/A	N/A	N/A
22-Jul-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
22-Jul-04	South Obs. Road	No Observations	N/A	N/A	N/A
27-Jul-04	South Obs. Road	No Observations	N/A	N/A	N/A
27-Jul-04	North Obs. Road	No Observations	N/A	N/A	N/A
27-Jul-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
29-Jul-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
29-Jul-04	North Obs. Road	No Observations	N/A	N/A	N/A
29-Jul-04	South Obs. Road	No Observations	N/A	N/A	N/A
02-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
02-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A
02-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
03-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A
03-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
03-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
05-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A
05-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
05-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
10-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A

10-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
10-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
12-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
12-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A
12-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
17-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A
17-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
17-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
19-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
19-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
19-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A
24-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
24-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A
24-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
26-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A
26-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
26-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
31-Aug-04	North Obs. Road	No Observations	N/A	N/A	N/A
31-Aug-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
31-Aug-04	South Obs. Road	No Observations	N/A	N/A	N/A
09-Sep-04	North Obs. Road	No Observations	N/A	N/A	N/A
09-Sep-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
09-Sep-04	South Obs. Road	No Observations	N/A	N/A	N/A
14-Sep-04	South Obs. Road	No Observations	N/A	N/A	N/A
14-Sep-04	North Obs. Road	No Observations	N/A	N/A	N/A
14-Sep-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
16-Sep-04	South Obs. Road	3	F	50-200m	Feed
16-Sep-04	North Obs. Road	No Observations	N/A	N/A	N/A
16-Sep-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
22-Sep-04	North Obs. Road	No Observations	N/A	N/A	N/A
22-Sep-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
22-Sep-04	South Obs. Road	No Observations	N/A	N/A	N/A
23-Sep-04	Mid Obs. Road	No Observations	N/A	N/A	N/A
23-Sep-04	South Obs. Road	47	M/F/C	50-200m	Walk
23-Sep-04	North Obs. Road	No Observations	N/A	N/A	N/A
28-Sep-04	North Obs. Road	No Observations	N/A	N/A	N/A
28-Sep-04	South Obs. Road	3	M/F	<50m	Feed
28-Sep-04	Mid Obs. Road	No Observations	N/A	N/A	N/A

Appendix F

Grizzly Bear Sightings

Incidental Grizzly Bear Sightings on East Island, 2004

Date (2004)	Number Of Animals	Location	Attractant Present	Deterrent Action Taken	Corrective Measures Taken	Comments	Colour, Size, Markings Of Animal	Advisory Issued
23 Apr	1	SE of site, near Exploration camp	None	None	None	N/A	N/A	N/A
15 May	1	North side of A154 Dike	None	Snow machines, bear bangers	None	Moved off to the north on the ice	Blonde with dark rump	All workers notified
18 May	3	5 miles NW of site (Exploration)	None	None	None	N/A	Sow and 2 cubs on a kill	N/A
29 May	3	Near PKC	None	Bear bangers	None	Moved west past the AN Storage Building	Sow and 2 yearling cubs, each blonde with dark rumps	All workers notified
7 June	3	On ice near water intake	None	Bear bangers & screamers	None	Not overly responsive to bangers. Moved off west of Emulsion Plant	Sow and 2 yearling cubs, each blonde with dark rumps	All workers notified
8 June	3	North Inlet/Airstrip	None	Bear bangers	None	Moved off to the SW	Sow and 2 yearling cubs, each blonde with dark rumps	All workers notified
10 June	2	West of the Sedimentation Pond – at North Inlet when Environment arrived	None	Bear bangers	None	Moved off to the north	2 bears of equal size – 1 blonde on top, darker toward ground; other dark with traces of blonde	All workers notified
11 June	1	North Inlet	None	None	None	Moved off along shore	N/A	All workers notified
18 June	1	Emulsion Plant	None	None	None	Moved off to the south	N/A	All workers notified

22 June	1	North Inlet	None	Bangers/ horn	None	Slow but continual movement to the west	Female, blonde with dark rump, appeared to have collar	All workers notified
4 July	1	North Inlet	None	Helicopter	None	Moved off to west island	Male, 14 yrs	All workers notified
4 July	3	North camp	None	Bangers, horn	None	Moved off to east mainland via Shallow bays	Sow and 2 yearling cubs, each blonde with dark rumps	All workers notified
5 July	1	Air terminal building	Garbage & coffee supplies	Hit building with wooden paddle, bear bangers	Window repaired & closed at night	Previous food reward obtained at this location (2003). Moved west toward AN storage building	Male, 14 yrs, same bear as 4 July	All workers notified
5 July	1	Accommodation complex	None	Pushed with truck, rifle	None	Bear destroyed after discussions with RWED personnel	G758, male, 14 years, previously relocated in 2003 (x2)	All workers notified
23 July	1	Between north inlet and airstrip	None	Bear bangers & screamers, horn	None	Swam north to mainland	Small (~2 yrs), even brown colouring	All workers notified
2 Aug	1	Between E dorm & south camp	None	None	None	Moved off on its own	N/A	All workers notified
5 Aug	1	Near Exploration crews – 557000/7169300 557400/7173300	None	Helicopter	None	Same bear spotted twice in one day	Large, bold & aggressive	N/A
17 Aug	1	North inlet	None	Bear bangers, rubber bullets, horn, helicopter	None	Not overly responsive to bear bangers	Blonde with dark rump & face, light tail	All workers notified
18 Aug	1	North inlet	None	Bear bangers, horn, helicopter	None	Moved off to West Island	Blonde with dark rump & face, light tail	All workers notified

26 Aug	1	North side of A154 dike	None	None	None	Moved off on it's own, swimming south to mainland	N/A	All workers notified
28 Sept	5	Morning: Airstrip (1), west dam(1), near air terminal building (3) Afternoon: East of emulsion plant (1)	1 Caribou carcass near air terminal, 1 carcass near emulsion plant	Bear bangers, helicopter	None	Bears feeding on two caribou kills. Difficult to deter.	Sow and cubs all dark – one cub easily exhausted. Lone bear blonde	All workers notified
29 Sept	3	South side near Emulsion plant	Caribou carcass	Helicopter	None - carcass was nearly clean	One cub was tired and reluctant to move	Sow and cubs all dark	All workers notified
30 Sept	3	On tundra north of truck shop	None	Truck, bear bangers and rubber bullets	None	N/A	Sow and 2 cubs	All workers notified
1 Oct	3	North inlet	None	Bear bangers	None	N/A	Sow and 2 cubs – one cub favoured left hind paw	All workers notified
1 Oct	1	South haul road	None	Bear bangers, rubber bullets	None	Did not appear disturbed by activity	Male, fat, light brown at shoulders	All workers notified
16 Oct	1	Near winter road access	None	Bear banger – ineffective, likely due to distance	None	Moved off on its own toward the west	Very dark brown in colour	All workers notified
3 Nov	1	MetCon laydown	None	Bear bangers, truck	None	Moved off toward the west	Very dark brown, injury on right side of snout, not very fat	All workers notified

27 sightings total
24 sightings on East Island
3 sightings at DDMI Exploration camp

Appendix G

Grizzly Bear Mortality Report

DIAVIK
DIAMOND MINES INC.

23 NOVEMBER 2004

ERNIE CAMPBELL
Manager, Wildlife & Environment
North Slave Region
Resources, Wildlife and Economic Development
600, 5102-50th Ave.
Yellowknife, NT
X1A 3S8

Dear Ernie,

SUBJECT: WILDLIFE INCIDENT REPORT – DIAVIK MINE SITE

SUMMARY

The purpose of this report is to outline events that lead to a wildlife incident that occurred at Diavik Diamond Mines Inc. (DDMI) on July 5, 2004, which resulted in the loss of one adult male grizzly bear (G758). A chronological account of the incident that occurred on July 5th is provided below, followed by an overview of the history of this bears activities at the Diavik site.

CHRONOLOGICAL ACCOUNT – JULY 5, 2004

- At approximately 21:30, Ray Eskelson of the DDMI Environment Department received a call from the security control room regarding a bear, which was observed on the mine site. The bear was near the south tank farm and heading toward the main accommodations.

- At approximately 21:35, while en route to the environment office, Ray received another call from security control. The bear had reached accommodations and was attempting to enter the building at several locations. Security personnel called all supervisors with crews working in the area and alerted them that a bear was in the area and to ensure that all outside doors and windows were closed.

- Cheryl Wray (DDMI Environment) reached the cafeteria and observed the bear charging at the windows of the cafeteria, toward the people inside. At this time the

bear was recognized as the same bear that had entered camp on several previous occasions.

- Ray met Cheryl at the front doors of accommodations and drove around to the east side, where the bear was observed walking back and fourth, swinging it's head side to side. Karl Cox (DDMI Environment) arrived in another truck. Ray then passed a twelve-gauge shotgun with deterrents and lethal shells on to Karl while they discussed the options with Cheryl.

- Ray, Cheryl and Karl positioned the trucks in an attempt to coerce the bear northwest, but the bear was reluctant to move.

- Cheryl then drove around to the front doors and dropped Ray off at the accommodations building. He walked through the building toward the cafeteria carrying a rifle. As Ray entered the cafeteria he observed the bear clawing at the edges of the door and pushing on the glass.

- The bear finally backed away from the door and moved west along the building where Karl was able to push it along with the truck. The bear ran down the road near the maintenance building and down the hill to the North, where it slowly walked along the shore next to the shallow bays and toward North camp.

- Ray and Karl continued to observe the bear while Cheryl returned to the environment office to call the 24-hour wildlife emergency line for Resources, Wildlife and Economic Development (RWED). At this time, Cheryl was told by RWED personnel to kill the bear, as safety of personnel was obviously at risk.

- Cheryl drove back to the north camp and instructed Ray to kill the bear when it was safe to do so.

- Ray and Karl met with Cheryl and observed the bear until it crossed the A154 dike and began to enter the pit. The bear quickly doubled back and crossed the dike, again moving south.

- At 02:30, with the bear located on the south approach to the A154 dike and a safe distance from personnel and infrastructure, Ray fired two shots. The second shot entered the chest cavity, killing the bear. The bear fell in the water at the south edge of the dike and sunk to the bottom. An inspection of the carcass identified the bear as G758, from ear tags and tattoos.

- Ray, Cheryl and Karl decided to leave the bear in the water overnight to avoid attracting other wildlife to site. Ray and Karl returned to their rooms and Cheryl returned to the office to send out an email regarding the incident.

- The next morning, DDMI employees received instruction from RWED to take photos, skin the bear with the head and claws intact and ship the hide to RWED in Yellowknife. The meat was to be incinerated. The bear was moved to the waste transfer area before being skinned.

- On July 6th the carcass was cut into small pieces and incinerated. The hide was wrapped in a tarp, placed in a barrel with ice packs and dropped off at the Diavik warehouse for shipment to G&G Expediting in Yellowknife. The barrel was shipped the following morning, July 7th.

- Ray called the RWED North Slave regional office and left a message for Ernie Campbell, Manager, Wildlife & Environment to pick up the hide.

Post-mortality Photos of Bear G758

Photo 1: Place of rest

Photo 2: Skinning the bear.

Photo 3: Tattoo #1 and #2

Photo 4: Ear tag (G758)

Photo 5: Teeth – note the missing incisor

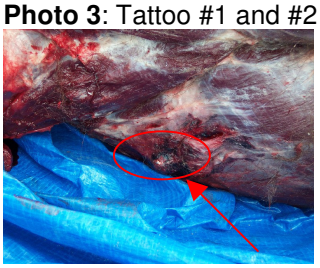

Photo 6: Protruding bullet (exit point)

Photo 7: Liver

Photo 8: Heart

Photo 9: Intestines

HISTORY OF G758 AT THE DIAVIK MINE SITE

JULY 3-5, 2001

An adult male grizzly bear was present in the project area from July 3rd to July 5th 2001. This animal became bold and was lingering near camp infrastructure during the day, when the number of workers on East Island was estimated at 1200 people. After various attempts to deter the animal using approved methods such as bear bangers, rubber bullets and hazing with a vehicle, it was decided that the bear was endangering human safety. Wildlife officers were notified on the second day of the occurrence (July 4th) and continuing attempts were made to deter the animal. Despite these efforts, the bear was still near camp infrastructure and wildlife officers were again notified on July 5th. After thorough

discussions with wildlife officers, the decision was made to relocate the animal, as it continued to visit areas near the project infrastructure. DDMI Environmental Personnel constantly monitored the bear until RWED Wildlife Officers arrived. The bear was immobilized and relocated approximately 20km south of Lac de Gras on July 5, and an initial assessment was performed. The bear was a mature male weighing approximately 130 kilograms, with moderate tooth wear. A distinctive scar was observed along the length of the bear's snout. Wildlife officers tattooed and ear tagged (G758) the bear, and numerous measurements were taken. The animal was known to be 8 years old.

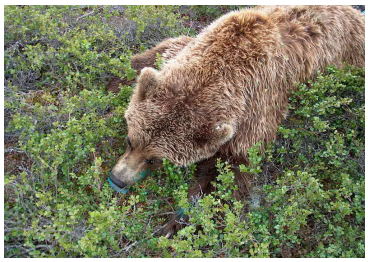

Photo 10: G758 from front – tranquilized July 5, 2003

Photo 11: G758 from rear

June 5, 2003

Following reports from the Lac De Gras winter road camp and DDMI regarding a persistent grizzly bear, Raymond Bourget and Robert Mulders flew in to Diavik. Cheryl Wray accompanied Raymond and Robert and helped them locate the bear using a B206 helicopter borrowed from Ekati mine. The bear was found approximately 8 km southwest of Diavik. The bear was immobilized at this location and identified as G758 from previous ear tagging. The bear was moved 74 km to the east of Diavik.

Later that evening Robert and Raymond visited the Lac De Gras road camp and spoke with the camp attendant regarding the bear, which had been observed on several recent occasions. The description given by the camp attendant and tracks observed surrounding the camp indicated that the bear was the same bear previously identified as G758.

June 22, 2003

An adult male grizzly broke into the airport terminal building between 05:30 and 06:00. The bear ripped through a window screen and entered through the opening. The bear found food in a small refrigerator and exited using the same window. Bear bangers were initially used but were proven unsuccessful. The bear was then hazed by helicopter although it was reluctant to move. Photographs taken were later used to identify grizzly bear G758 by colour and the distinctive scar on its snout.

		
Photo 12: Window at airport where bear gained entry on June 22, 2003	**Photo 13:** Destruction caused by bear in airport terminal	**Photo 14:** Photograph of the bear taken during the deterrent event

July 4, 2004

At approximately 09:00 on July 4th, 2004, Environment received notification from Security that one grizzly bear was seen near the North Inlet Water Treatment Plant. Environment monitored the bear from the road near the North Inlet barge and the helipad for a short period. Environment then used the helicopter to persuade the bear across the airstrip and west on to West Island.

JULY 5, 2004

At approximately 02:30 July 5th, 2004, Environment received notification from Security that one grizzly had broken in to the airport terminal. When Environment arrived, the bear was still inside. One window had been left open and the bear had ripped the screen to enter the building. Environment drove to the opposite side of the building and, while remaining in the truck, used a paddle to pound on the siding, flushing the bear out the window that it had entered. The bear quickly ran up the hill west of the airport terminal and south toward the PKC and ammonium nitrate storage building. Environment monitored the bear and attempted to move it toward the West Island using bear bangers. The bear had moved out of sight near the ammonium nitrate building at approximately 06:00.

It was on this day at approximately 21:30 when Environment received the next notification from Security that resulted in the incident described earlier in this report.

We trust that this report provides the details required for the termination of this animal. Should you require further clarification, please do not hesitate to contact the undersigned at (867) 766-5407.

Sincerely,

ORIGINAL SIGNED BY

Scott Wytrychowski
Manager, Environment
Diavik Diamond Mines Inc.

Appendix H

Wolverine Sightings

Incidental Wolverine Sightings on East Island, 2004

Date (2004)	Number Of Animals	Location	Attractant Present	Deterrent Action Taken	Corrective Measures Taken	Comments	Colour, Size, Markings Of Animal	Advisory Issued
February 4	1	Waste Transfer Area	Food waste in burn pit	Banger	Food waste removed	None	N/A	All Workers Notified
February 12	1	Near warehouse sprung	None	None	None	None	N/A	All Workers Notified
February 19	1	Main accommodations	None	None	None	None	N/A	All Workers Notified
February 25	1	Near sprung/Winter Road dispatch	None	None	None	None	N/A	All Workers Notified
February 26	1	10m from dyke	Built Temporary Den	None	None	None	N/A	All Workers Notified
March 16	1	Near A154 pit	None	Chased away with snow machine	None	None	N/A	All Workers Notified
March 18	1	Main accommodations	None	None	None	None	N/A	All Workers Notified
April 18	1	Under north camp	None	None	None	None	N/A	All Workers Notified
April 21	1	Lac de Gras, south of Diavik	Kill Site	None	None	Feeding on a kill	N/A	All Workers Notified
April 30	1	533350E, 7147925N (Exploration Camp)	Survival Gear	None	None	Took apart survival bag, opened & ate food, ran away	N/A	Workers in area notified
May 3	1	531721E, 7147950N (Peak Drilling site off A154 dike)	None	None	None	Approached drill within 5m, then left the area	N/A	All Workers Notified
May 7	1	Near Travco genset on north side of accommodations	None	None	None	None	N/A	All Workers Notified
May 13	1	556679E, 7148458N (Exploration Camp)	None	None	None	Ran off after spotting group of people	N/A	N/A

Date (2004)	Number Of Animals	Location	Attractant Present	Deterrent Action Taken	Corrective Measures Taken	Comments	Colour, Size, Markings Of Animal	Advisory Issued
May 18	1	Lac de Gras road camp (544210, 7142830)	None	None	None	Under building – ripped off skirting	N/A	N/A
May 19	1	559650E, 7165950N (Exploration Camp)	None	None	None	Running from helicopter	N/A	N/A
August 1	1	Swimming in Lac de Gras	None	None	None	Went Ashore Near East Island	N/A	All Workers Notified
August 28	1	North haul road near airport	None	None	None	None	N/A	All workers notified
9 October	1	On tundra near AN storage building	None	None	None	None	N/A	All workers notified
16 October	1	Near North Inlet	None	None	None	Moved off onto the ice on its own	N/A	All workers notified
17 November	1	North Camp	None	None	None	None	N/A	All workers notified
8 December	1	Near door 15 of Process Plant	None	None	None	None	N/A	All workers notified
15 December	1	Near road to Emulsion Plant	None	None	None	Headed south toward Lac de Gras	N/A	All workers notified

22 sightings total
18 sightings on/around East Island
3 sightings at DDMI Exploration camp
1 sighting at LDG Winter Road camp

Appendix I

Waterfowl Data for all Monitoring Years (1995-2004)

Shorebird Migratory Movement Frequencies 1996-2004

	May-96							Jun-96																		
Species	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	17	18	19	20	**Total**
Semipalmated Sandpiper	0	2	0	4	0	2	6	4	4	3	1	1	1	1	0	1	3	1	0	0	1	0	0	0	3	38
Lesser Golden Plover	0	5	0	1	2	1	1	1	1	5	1	0	2	0	1	0	1	0	0	0	0	0	0	0	0	22
Least Sandpiper	0	2	0	3	0	1	8	1	5	1	6	4	6	1	4	4	6	5	3	0	3	0	0	0	0	63
Semipalmated Sandpiper	0	0	1	5	35	24	40	13	41	26	30	44	55	37	29	16	11	12	10	15	9	0	0	0	2	455
White-Rumped Sandpiper	0	2	0	10	3	10	26	13	2	4	3	15	17	3	3	1	1	0	1	0	0	0	0	0	0	114
Baird's Sandpiper	0	0	0	2	1	1	0	3	1	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	14
Pectoral Sandpiper	1	0	0	0	7	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Stilt Sandpiper	7	13	4	10	20	55	36	14	14	3	2	7	17	4	2	2	2	1	1	1	2	0	0	0	2	219
Dunlin	0	0	0	0	0	0	0	0	0	0	0	1	1	3	2	0	0	1	0	0	0	0	0	0	0	8
Sanderling	0	0	0	0	2	2	3	4	2	0	0	1	4	0	0	8	2	0	0	0	0	0	0	0	0	28
Red-necked Phalarope	1	1	0	0	0	0	0	1	1	1	2	8	2	2	3	4	11	2	0	0	3	3	0	0	3	48
Common Snipe	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Unidentified Peeps	23	23	27	9	31	25	0	18	5	2	8	0	8	3	2	0	1	4	3	0	0	11	9	6	2	220
Daily Total	32	48	32	44	101	121	121	74	77	45	55	81	119	54	46	36	38	26	18	16	18	14	9	6	12	1243

	May-97							Jun-97																		
Species	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	**Total**
Semipalmated Sandpiper	0	0	0	0	0	0	0	0	0	0	0	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	5
Lesser Golden Plover	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	3	1	1	2	0	0	2	0	0	2	1	15
Least Sandpiper	0	0	0	0	0	0	0	0	2	13	3	2	5	1	1	2	0	1	3	1	1	3	1	2	4	1	46
Semipalmated Sandpiper	0	0	2	0	0	3	3	3	7	9	14	18	30	13	6	18	9	12	10	11	9	9	10	10	7	6	219
White-rumped Sandpiper	0	0	0	0	0	0	0	0	1	0	1	25	27	8	15	16	7	2	3	0	2	0	0	0	0	0	107
Pectoral Sandpiper	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Stilt Sandpiper	0	0	0	0	4	3	0	2	4	4	5	9	33	15	12	19	12	5	6	6	3	3	5	3	6	1	160
Sanderling	0	0	0	0	0	0	0	0	0	0	0	29	2	8	5	10	13	12	0	0	0	0	0	0	0	0	79
Red-necked Phalarope	0	0	0	0	0	0	0	0	0	0	0	0	5	0	2	2	0	0	1	2	2	1	2	0	1	0	18
Unidentified Peeps	0	0	1	2	2	0	0	0	3	2	5	12	6	4	2	2	3	2	0	2	2	5	2	3	0	0	60
Daily Total	0	0	5	2	6	8	3	5	17	29	28	98	109	49	44	72	45	35	25	22	19	23	20	18	20	9	711

	Jun-00													
Species	3	5	7	9	11	13	15	17	19	21	23	25	27	**Total**
Semipalmated Plover	0	2	0	6	0	0	13	2	1	7	4	1	1	37
Lesser Golden Plover	0	0	1	0	0	2	0	0	0	2	0	1	0	6
Least Sandpiper	28	7	10	5	10	14	2	9	5	8	9	4	5	116
Semipalmated Sandpiper	15	0	0	1	0	14	11	12	18	1	1	0	2	75
White-Rumped Sandpiper	0	0	0	3	0	0	0	0	0	0	0	0	0	3
Baird's Sandpiper	0	0	0	4	0	2	0	0	4	0	0	0	4	14
Stilt Sandpiper	0	12	15	8	12	6	8	2	8	2	1	0	1	75
Dunlin	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Red-necked Phalarope	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Ruddy Turnstone	5	0	0	2	0	0	0	0	0	0	0	0	0	7
Unidentified Shorebirds	65	50	166	59	15	1	1	19	4	22	8	2	6	418
Daily Total	115	71	192	88	37	39	35	45	40	42	23	8	19	754

	May-01										Jun-01																	
Species	20	22	24	25	26	27	28	29	30	31	2	4	6	7	8	10	12	14	16	18	20	22	24	26	28	30	**Total**
Baird's Sandpiper	0	0	0	0	0	2	0	0	0	0	0	0	0	0	24	9	0	0	0	0	0	0	0	0	0	0	35
Least Sandpiper	0	0	0	2	0	0	0	0	0	0	0	12	0	1	22	12	6	4	4	1	2	0	0	0	0	0	66
Semipalmated Plover	0	0	1	1	0	0	0	14	0	0	0	0	0	1	2	1	1	5	0	0	0	0	0	0	0	0	26
Semipalmated Sandpiper	0	0	0	0	0	1	0	10	0	0	0	0	4	2	12	12	5	1	1	2	1	0	0	0	0	0	51
Stilt Sandpiper	0	0	0	1	0	0	0	0	0	0	6	0	1	0	18	0	0	0	0	0	0	0	0	0	0	0	26
White-Rumped Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	8
Lesser Golden Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Long Billed Dowitcher	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
Sanderling	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	4
Unidentified Sandpipers	0	0	0	0	0	0	0	72	0	0	0	25	4	3	6	5	2	2	0	0	0	0	0	0	0	0	119
Unidentified Shorebirds	0	0	0	0	0	0	0	150	0	10	22	25	8	0	0	0	0	0	0	0	0	0	0	0	0	0	215
Daily Total	0	0	1	4	0	3	0	246	0	10	28	62	20	9	85	48	14	12	5	3	3	0	0	0	0	0	553

	May-02						Jun-02													
Species	17	19	22	24	27	29	1	2	4	5	6	7	8	10	12	14	16	18	20	**Total**
Baird's Sandpiper	0	0	0	0	0	0	0	0	24	26	38	16	14	6	1	2	0	0	0	127
Least Sandpiper	0	0	0	0	0	0	0	4	30	58	51	20	26	3	7	1	0	8	5	213
Semipalmated Plover	0	0	0	0	0	0	0	0	10	24	12	6	8	8	5	6	8	4	8	99
Semipalmated Sandpiper	0	0	0	0	0	0	0	2	25	40	57	20	26	9	2	7	0	0	5	193
Stilt Sandpiper	0	0	0	0	0	0	0	0	8	17	16	10	10	0	1	0	0	1	0	63
White-Rumped Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Lesser Golden Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Dunlin	0	0	0	0	0	0	0	0	24	0	0	10	0	0	0	0	0	0	0	34
Red-necked Phalarope	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	4
Ruddy Turnstone	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Pectoral Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Unidentified Shorebirds	0	0	0	0	0	8	2	5	20	0	0	0	0	1	0	0	0	0	5	41
Daily Total	0	0	0	0	0	8	2	11	141	166	174	82	84	29	16	19	9	13	24	778

	May-03							June-03												
Species	21	23	25	27	28	29	31	1	3	5	6	7	9	11	13	15	17	19	**Total**
Baird's Sandpiper	0	0	0	0	9	0	0	0	0	0	0	1	1	0	0	0	0	0	11
Least Sandpiper	0	0	0	0	0	0	0	0	0	0	0	13	3	0	3	2	4	1	26
Semipalmated Plover	0	0	0	0	4	0	1	1	0	0	3	11	1	0	3	3	6	3	36
Semipalmated Sandpiper	0	0	0	0	0	0	2	0	0	0	0	3	0	8	7	6	2	0	28
Stilt Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White Rumped Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lesser Golden Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dunlin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-necked Phalarope	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
Ruddy Turnstone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pectoral Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black-bellied Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Unidentified Shorebirds	0	0	0	0	0	15	30	16	1	0	6	0	0	0	9	0	5	1	83
Daily Total	0	0	0	0	13	15	33	17	1	0	9	28	5	8	22	12	19	5	187

	May-04						June-04								
Species	25	27	28	29	31	2	6	8	10	12	14	16	18	20	**Total**
Baird's Sandpiper	0	0	0	0	0	0	0	26	2	4	17	0	0	0	49
Least Sandpiper	0	0	0	0	0	0	0	0	0	0	13	0	3	3	19
Semipalmated Plover	0	2	0	0	4	1	2	0	3	3	2	31	9	2	59
Semipalmated Sandpiper	0	0	0	0	0	0	120	9	3	3	1	0	0	0	136
Stilt Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White Rumped Sandpiper	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2
Lesser Golden Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dunlin	0	0	0	0	0	0	0	0	0	7	0	0	0	0	7
Red-necked Phalarope	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sandhill Crane	0	10	0	0	5	3	0	0	0	0	0	0	0	0	18
Pectoral Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black-bellied Plover	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Unidentified Shorebirds	0	0	0	0	0	41	50	298	104	0	0	0	0	0	493
Daily Total	0	12	0	0	9	45	172	333	112	17	35	31	12	5	783

Goose Migratory Movement Frequencies 1996-2004

	May-96									Jun-96																					
Species	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	**Total**
Canada Geese	1	3	2	0	2	0	2	2	2	1	2	2	2	5	1	0	2	0	2	0	0	34	0	0	19	24	0	0	108
White-fronted Geese	3	4	2	4	10	9	4	2	3	0	2	0	0	0	0	0	2	0	0	0	0	6	0	0	0	2	0	2	55
Daily Total	4	7	4	4	12	9	6	4	5	1	4	2	2	5	1	0	4	0	2	0	0	40	0	0	19	26	0	2	163

	May-97								Jun-97																				
Species	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	**Total**
Canada Geese	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	8	0	0	0	10
White-fronted Geese	0	0	0	0	0	0	0	0	0	0	2	4	2	2	2	2	4	0	0	0	0	4	0	1	0	0	0	0	23
Daily Total	0	0	0	0	0	0	0	0	0	0	2	4	2	2	4	2	4	0	0	0	0	4	0	1	8	0	0	0	33

	Jun-00													
Species	3	5	7	9	11	13	15	17	19	21	23	25	27	**Total**
Canada Geese	2	0	16	0	0	2	15	0	0	6	0	0	0	41
White-fronted Geese	7	4	5	0	10	0	0	0	5	2	2	0	0	35
Snow Geese	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Total	9	4	21	0	10	2	15	0	5	8	2	0	0	76

	May-01											Jun-01																	
Species	20	21	22	23	24	25	27	29	30	31	2	4	6	7	8	10	12	14	16	18	20	22	24	26	28	30	**Total**
Canada Geese	14	11	0	0	4	29	36	17	8	12	12	1	2	14	0	10	4	2	0	0	0	0	0	0	0	0	176
White-fronted Geese	25	27	0	0	15	6	13	10	0	30	4	0	2	8	10	3	0	5	0	0	0	0	0	0	0	0	158
Snow Geese	0	0	0	0	2	0	0	0	0	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72
Daily Total	39	38	0	0	21	35	49	27	8	112	16	1	4	22	10	13	4	7	0	0	0	0	0	0	0	0	406

	May-02							Jun-02													
Species	17	19	22	24	27	29	31	2	4	5	6	7	8	10	12	14	16	18	19	20	**Total**
Canada Geese	0	0	12	35	0	31	32	0	0	0	4	0	0	0	0	0	0	0	40	22	176
White-fronted Geese	5	0	4	31	0	15	69	25	4	6	0	0	0	0	3	0	0	6	34	2	204
Snow Geese	0	0	0	4	0	2	6	0	0	0	0	0	0	0	0	0	0	0	0	0	12
Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Total	5	0	16	70	0	48	107	25	4	6	4	0	0	0	3	0	0	6	74	24	392

	May-03								Jun-03								
Species	25	27	28	29	31	1	3	5	6	7	9	11	13	15	17	19	**Total**
Canada Geese	2	0	0	3	0	0	0	0	0	0	0	2	30	24	2	0	63
Greater White-fronted Geese	2	0	0	15	0	3	0	0	3	0	0	0	0	0	0	0	23
Snow Geese	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown Geese	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	5
Daily Total	4	0	3	18	2	3	0	0	3	0	0	2	30	24	2	0	91

	May-04					Jun-04									
Species	25	27	29	31	2	4	6	8	10	12	14	16	18	20	**Total**
Canada Geese	6	104	64	82	3	6	4	0	0	0	0	0	0	0	269
Greater White-fronted Geese	23	38	64	25	19	2	7	1	1	1	0	0	0	0	181
Lesser Snow Geese (white)	0	71	50	59	85	0	0	0	0	0	0	0	0	0	265
Lesser Snow Geese (blue)	0	2	0	20	0	0	0	0	0	0	0	0	0	0	22
Unknown Geese	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Total	29	215	178	186	107	8	11	1	1	1	0	0	0	0	737

Dabbling Duck Migratory Movement Frequencies 1996-2004

	May-96									Jun-96																				
Species	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	**Total**
Northern Pintail	0	22	20	6	11	10	12	10	5	3	7	2	8	7	8	13	12	2	11	2	0	0	0	6	4	7	4	0	192
Mallard	0	2	0	0	4	0	0	2	0	0	0	0	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0	0	14
American Wigeon	0	0	0	0	1	0	0	0	0	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Green-Winged Teal	0	0	3	6	5	11	6	6	1	5	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	45
Daily Total	0	24	23	12	21	21	18	18	6	10	9	5	10	7	8	17	14	2	11	2	1	0	0	6	4	7	4	0	260

	May-97								Jun-97																				
Species	24	25	26	27	28	29	30	31	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	**Total**
Northern Pintail	0	0	0	0	0	0	0	0	5	11	5	4	8	15	13	10	16	11	9	9	14	8	5	11	7	7	4	172
Mallard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Wigeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green-Winged Teal	0	0	0	0	0	0	0	0	0	0	0	0	2	7	3	0	1	0	0	1	2	0	0	0	0	0	0	16
Daily Total	0	0	0	0	0	0	0	0	5	11	5	4	10	22	16	10	17	11	9	10	16	8	5	11	7	7	4	188

	Jun-00											
Species	3	5	7	9	11	13	15	17	19	21	23	**Total**
Northern Pintail	52	68	64	41	11	7	2	2	0	2	2	251
Mallard	0	0	0	0	0	0	0	0	0	0	0	0
American Wigeon	0	0	0	0	0	0	0	0	0	0	0	0
Green-winged Teal	0	6	2	12	2	3	2	2	0	0	0	29
Daily Total	52	74	66	53	13	10	4	4	0	2	2	280

	May-01							Jun-01														
Species	24	25	27	29	30	31	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	**Total**
Northern Pintail	15	4	20	58	60	10	22	12	2	11	6	11	4	6	23	4	0	0	0	0	0	268
Mallard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Wigeon	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	6
Green-winged Teal	0	3	0	0	0	0	4	5	0	0	0	2	0	0	0	0	0	0	0	0	0	14
Daily Total	15	7	20	58	60	10	26	17	8	11	6	13	4	6	23	4	0	0	0	0	0	288

	May-02							Jun-02											
Species	17	19	22	24	27	29	31	2	4	5	6	7	8	10	12	14	16	18	20	**Total**
Northern Pintail	0	7	84	67	0	0	4	17	4	9	8	8	0	3	3	4	2	2	6	228
Mallard	0	0	0	0	0	0	0	2	0	0	6	2	0	0	0	0	4	0	0	14
American Wigeon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Green-winged Teal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Daily Total	0	7	84	67	0	0	4	19	4	9	14	10	0	3	3	4	6	2	6	242

Diving Duck Migratory Movement Frequencies 1996-2004

	May-96								Jun-96																					
Species	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	**Total**
Oldsquaw	0	0	0	0	0	1	3	3	4	6	21	15	28	30	27	36	16	16	12	14	20	13	0	0	13	4	2	17	301
Greater Scaup	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Black Scoter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Scoter sp.	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Unidentified Divers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	6
Red-b Mergansers	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	0	2	0	0	0	0	0	0	0	0	0	8
Common Mergansers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Merganser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	3
Total Divers	0	0	0	0	0	1	5	3	4	8	23	17	28	32	29	36	20	16	15	14	21	13	0	6	13	4	2	18	328

	May-97										Jun-97																			
Species	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	**Total**
Oldsquaw	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	2	9	5	15	23	24	10	11	6	12	20	20	6	173
Greater Scaup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	5	0	2	13
Black Scoter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scoter sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Divers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-b Mergansers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
Common Mergansers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	4
Merganser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
Total Divers	0	0	0	0	0	0	0	0	0	0	0	0	0	5	5	2	9	5	15	24	32	10	11	6	12	29	20	8	193

	Jun-00													
Species	3	5	7	9	11	13	15	17	19	21	23	25	27	**Total**
Oldsquaw	0	0	25	62	73	50	39	18	7	5	2	0	0	281
Greater Scaup	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Black Scoter	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Divers	0	0	0	0	0	0	0	0	0	0	0	1	0	1
Red-breasted Merganser	2	3	2	2	0	0	0	0	0	0	0	2	0	11
Total Divers	2	3	27	66	73	50	39	18	7	5	2	3	0	295

	May-01						Jun-01															
Species	24	25	27	29	30	31	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	**Total**
Greater Scaup	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	12
Oldsquaw	0	0	0	0	0	0	0	0	5	2	36	0	0	2	0	4	0	0	0	0	0	47
Red breasted Merganser	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2
Black Scoter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Diver	0	0	0	0	0	0	33	0	10	0	0	0	0	0	0	0	0	0	0	0	0	43
Total Divers	0	0	0	0	0	0	33	0	15	14	38	0	0	2	0	4	0	0	0	0	0	104

	May-02							Jun-02												
Species	17	19	22	24	27	29	31	2	4	5	6	7	8	10	12	14	16	18	20	**Total**
Greater Scaup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oldsquaw	0	0	0	0	0	0	0	0	0	0	2	0	3	10	16	4	18	0	0	53
Red breasted Merganser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black Scoter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Diver	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Divers	0	0	0	0	0	0	0	0	0	0	2	0	3	10	16	4	18	0	0	53

	Jun-03															
Species	25	27	29	31	1	3	5	6	7	9	11	13	15	17	19	**Total**
Greater Scaup	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	7
Oldsquaw	0	0	0	7	2	4	0	25	22	21	0	34	27	30	0	172
Red breasted Merganser	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
Black Scoter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentified Diver	0	0	0	0	2	1	0	0	0	0	2	0	0	0	0	5
Common Merganser	0	0	0	0	0	0	0	0	1	0	0	0	4	2	0	7
Daily Total	0	0	0	7	9	7	0	25	25	21	2	34	31	32	0	193

	May-04				Jun-04										
Species	25	27	29	31	2	4	6	8	10	12	14	16	18	20	**Total**
Oldsquaw	0	0	0	0	0	0	0	3	0	12	10	0	6	0	31
Surf Scoter	0	0	0	15	0	0	20	2	4	0	0	0	0	0	41
Unidentified Diver	0	0	0	0	110	0	0	0	1	10	0	4	0	1	126
Daily Total	0	0	0	15	110	0	20	5	5	22	10	4	6	1	198

Mine-altered Habitat Movement Frequencies 2001-2004

North Inlet - 2001

Species	30-May	5-Jun	9-Jun	13-Jun	14-Jun	15-Jun	16-Jun	20-Jun	1-Aug	8-Aug	15-Aug	23-Aug	5-Sep	12-Sep	19-Sep	28-Sep	4-Oct	10-Oct	17-Oct	Total
Canada Goose	1																			1
Loon Species-Unknown			2				4													6
Red Throated Loon								1	1											2
Sandpiper Species-Unknown					1															1
Shorebird Species-Unknown		1																		1
Yellow Billed Loon				4	3	2														9
Daily totals	1	1	2	4	4	2	4	1	1	0	0	0	0	0	0	0	0	0	0	20

	May-02													Jun-02																				Jul-02							Aug-02			Sep-02	
Species	17	19	20	21	22	23	24	25	27	29	30	31	1	2	4	5	6	7	8	9	11	13	15	17	22	6	13	21	28	3	10	18	1	**Total**
Canada Goose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	10
Greater White Fronted Goose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	6
Goose Species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	0	0	0	0	0	0	0	0	0	0	0	1	27
Northern Pintail	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	13
Oldsquaw	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Mallard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Duck Species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Loon Species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Red Throated Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	3
Common Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	1	0	0	0	0	0	2	7
Shorebird Species	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Daily totals	1	0	0	0	0	0	0	0	0	0	0	0	1	5	1	8	9	2	10	5	29	7	2	0	0	0	1	0	1	0	1	0	3	86

	May-03												June-03											Jul-03				Aug-03					Sep-03				Oct-03	
Species	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	14	21	28	3	12	20	26	2	9	16	23	30	6	13	20	26	4	**Total**
Canada Goose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Greater White Fronted Goose	0	0	0	0	3	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Goose Species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Northern Pintail	5	0	2	0	3	8	11	0	0	2	0	2	2	0	0	0	0	1	0	5	0	0	0	0	0	0	0	0	0	8	2	0	0	0	0	0	0	51
Oldsquaw	0	0	0	0	0	0	0	0	2	1	2	4	4	4	14	0	0	4	5	2	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	54
Greater Scaup	0	0	0	0	0	8	3	0	2	0	0	0	2	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
Mallard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Green Winged Teal	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	3	0	0	0	14
Duck Species	0	0	2	0	27	0	0	0	3	7	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43
Red Throated Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	2	0	0	0	9	0	0	0	0	0	0	1	0	0	0	0	16
Yellow Billed Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pacific Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Loon Species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Common Merganser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Least Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Semipalmated Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Semipalmated sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-necked phalarope	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Shorebird Species	0	0	0	0	0	0	0	0	1	3	0	0	2	2	3	0	0	6	0	1	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	20
Herring gull	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Unidentified Gulls	5	45	3	0	0	0	1	0	14	1	2	5	1	0	1	0	0	0	0	1	1	0	1	0	0	2	0	0	0	5	2	0	0	0	0	0	0	90
Daily totals	10	45	7	0	33	16	17	0	28	14	4	11	13	8	18	0	0	14	7	17	1	5	6	6	0	11	2	0	0	13	16	0	1	3	0	0	0	326

	May-04																	Jun-04								Jul-04					Aug-04				Sep-04				
Species	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	10	17	24	1	8	15	22	29	5	12	19	26	10	17	22	**Total**
Canada Goose	1	0	0	0	0	0	0	0	0	0	0	0	29	0	0	100	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	131
Greater White Fronted Goose	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Lesser Snow Goose (blue)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27
Goose Species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Northern Pintail	0	0	0	0	0	0	0	0	0	0	82	0	0	300	80	1	0	0	0	11	0	2	0	0	0	3	0	0	0	0	0	0	5	0	5	489
Oldsquaw	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	1	1	0	0	0	0	0	12
Greater Scaup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mallard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
American Green Winged Teal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Surf Scoter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28
Duck Species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	2	0	13	0	2	0	0	3	4	0	0	0	0	0	35
Red Throated Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow Billed Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pacific Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Loon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Loon Species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common Merganser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Least Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Semipalmated Plover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	5
Semipalmated Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Bairds Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Red-necked Phalarope	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	2	0	0	2	1	0	0	0	0	0	10
Shorebird Species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	0	0	0	0	0	0	1	6	0	0	0	0	0	14
Herring Gull	0	0	0	0	0	15	51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	66
Glaucous Gull	0	0	0	0	15	0	36	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	107
Unidentified Gull	8	16	0	0	0	0	0	0	0	0	20	6	0	0	0	39	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96
Daily totals	10	16	0	7	15	15	87	55	0	0	102	6	29	300	80	176	25	0	0	32	16	16	0	13	0	9	0	0	7	12	0	0	5	0	5	1042