



Keeyask Infrastructure Project

Terrestrial and Aquatic Monitoring Plan

Mammals Monitoring

Annual Report 2014-2015



KEYYASK INFRASTRUCTURE PROJECT

TERRESTRIAL AND AQUATIC MONITORING PLAN

Mammals Monitoring: Annual Report 2014 - 2015

Prepared for

Keeyask Hydropower Limited Partnership

By

Wildlife Resource Consulting Services MB Inc.

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EXECUTIVE SUMMARY

The Keeyask Hydropower Limited Partnership constructed the Keeyask Infrastructure Project (the Project or KIP) between 2012 to July 2014, after which construction of the Keeyask Generation Project began.

The KIP is located approximately 40 km southwest of Gillam, in the Split Lake Resource Management Area, extending between Provincial Road (PR) 280 and Gull Rapids on the Nelson River. The Project includes a start-up camp and associated infrastructure, a 25 km all-weather access road and the first phase of a main camp. The start-up camp is located near the intersection of PR 280 and the access road, while the first phase of the main camp is located at the east end of the access road on the north side of Gull Rapids.

As part of the KIP licensing conditions (*Environment Act* Licence No. 2952R), the Keeyask Hydropower Limited Partnership (KHLP) conducted terrestrial effects monitoring during the KIP construction. The monitoring approach focused on verifying construction-related effects on caribou (*Rangifer tarandus*) and other large mammals as predicted in the KIP Environmental Assessment (EA) Report (KHLP 2009). Mammals monitoring is described in detail in the *Keeyask Infrastructure Project Terrestrial and Aquatic Monitoring Plan* (TAMP). The program was primarily designed for caribou effects monitoring, and in particular, for the summer resident caribou population; however, other large mammal species and habitats were monitored opportunistically.

Caribou activity in potential calving and calf-rearing habitat was monitored during KIP construction in three survey areas from 2011, 2012, 2013 and 2014 (2014 is the final monitoring year). Sign surveys were conducted three times per year during the calving and calf-rearing seasons in the Project Effects Area, where caribou activity was predicted to be affected by KIP access road construction activities; in the Undisturbed Comparison Area, where calving habitat was likely far enough away to be undisturbed by construction (i.e., greater than 5 km); and in the Traffic Disturbance Comparison Area, where caribou activity is likely influenced by an existing road (Provincial Road [PR] 280). Caribou activity on habitat islands was compared before (2011) and during (2012 to 2014) construction and at increasing distances from the KIP access road and

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PR 280 with a Mann-Whitney U test ($\alpha = 0.05$). The same test was used to compare caribou activity on habitat islands before and after wildfires burned large portions of the Project Effects Area in 2013. Sign surveys for moose and other large mammals were also conducted on transects perpendicular to the KIP access road.

Although caribou activity was highly variable throughout the Project area, caribou activity declined significantly on habitat islands in the Project Effects Area during construction of the KIP access road as predicted. One effect that was different than predicted was that caribou activity declined on islands up to 4 km from the KIP access road during construction. This loss of effective habitat was greater than the 2 km predicted in the TAMP. Caribou activity increased in other parts of the Regional Study Area, possibly due, at least in part, to displaced caribou relocating to suitable alternative habitat.

There was little difference in caribou activity near or farther from PR 280 before or during construction, suggesting future caribou activity may increase in the Project Effects Area after the construction disturbance has ended. Data also suggested that caribou activity levels in calving islands could remain slightly depressed, and may not return to activity levels as high as undisturbed comparison habitats greater than 5 km from a completed road.

Natural forest fires in 2013 altered a substantial amount of potential calving and calf-rearing habitat near the KIP access road. Burned areas are likely to remain unsuitable for caribou use including calving for decades, and long after the construction period has ended.

A total of 48 trail cameras were deployed on heavy use game trails and/or near the edges of potential calving islands to document caribou activity in the Project Effects and Undisturbed Comparison areas. Caribou were photographed in both areas each year from 2011 to 2014. After 2011, caribou were photographed at fewer locations. Only one calf was photographed over the four-year survey period, in the Project Effects Area in 2011. Caribou were photographed at five locations on three transects in 2014. All photos were of lone males or single caribou whose sex could not be identified.

Moose activity did not appear to be substantially affected by construction activity in the Regional Study Area. While moose activity declined slightly when construction began, moose activity was

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widely distributed in the region during the four-year study period. Moose were likely less affected by construction disturbance than caribou.

Black bear den surveys were conducted in 2011, 2012 and 2013 before Project footprints were cleared. One gray wolf den survey also occurred in 2012. No black bear or gray wolf dens were discovered during these searches so, the implementation of protection measures such as buffering dens by 100 metres was not required for the KIP.

No caribou mortality was reported during the KIP construction monitoring period. Two moose-vehicle collisions occurred on the KIP access road (one in 2013 and one in 2014) that resulted in one moose fatality in 2014. Mitigation measures such as speed limits on the KIP access road appeared to have aided in minimizing wildlife-vehicle collisions.

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STUDY TEAM

The study team consisted of personnel from Wildlife Resource Consulting Services MB Inc. (WRCS) as well as field assistants from the Keeyask Cree Nations. WRCS personnel who have worked on this field project include Nicholas LaPorte, Peter Hettinga, Timothy Kroeker, Gordon Macdonald, Morgan Scharf, Mark Baschuk, Andrea Ambrose, Joseph Guay, Jason Kelly, Christopher Higgs, Scott Patrick, Scott MacKenzie, Krista Kenyon, Cole Moszynski, and Adam Cox.

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LIST OF ACRONYMS

EA	Environmental Assessment
GIS	Geographic Information System
GPS	Global Positioning System
KHLP	Keyask Hydropower Limited Partnership
KIP	Keyask Infrastructure Project
PR	Provincial Road
TAMP	Terrestrial and Aquatic Monitoring Plan

GLOSSARY

Habitat Islands in Peatland Complexes- Raised conifer-dominated islands surrounded by sparsely treed peatland.

Project Effects Area- Areas where caribou activity was predicted to be affected by KIP access road construction activities.

Traffic Disturbance Area- Areas where caribou activity is likely influenced by an existing road (Provincial Road [PR] 280).

Undisturbed Comparison Area- Areas where caribou calving habitat was likely far enough away from construction (i.e., greater than 5 km), to be undisturbed.

1.0 INTRODUCTION

The Keyask Hydropower Limited Partnership constructed the Keyask Infrastructure Project (the Project or KIP) between 2012 to July 2014, after which construction of the Keyask Generation Project began.

The KIP is located approximately 40 km southwest of Gillam, extending between Provincial Road (PR) 280 and Gull Rapids on the Nelson River. The Project includes a start-up camp and associated infrastructure, a 25 km all-weather access road and the first phase of a main camp. The start-up camp is located near the intersection of PR 280 and the access road, while the first phase of the main camp is located at the end of the access road on the north side of Gull Rapids. Construction activities included clearing trees, stripping, grubbing, stockpiling materials, burning slash, crushing, installation of culverts, installation of main camp buildings, and installation of the raw water lines.

Mammals monitoring addresses caribou (*Rangifer tarandus*) and other large mammals and is described in detail in the *Keyask Infrastructure Project Terrestrial and Aquatic Monitoring Plan* (TAMP). Monitoring has been undertaken to ascertain whether KIP access road construction activities affected caribou and other large mammals as predicted in the KIP Environmental Assessment Report (KHLP 2009). This report presents the data and results of caribou and other large mammal studies conducted during the period from April 1, 2011 to March 31, 2015. Wildlife observations are reported in the *Keyask Infrastructure Project Environmental Protection Plan Annual Report 2014–2015*.

Caribou is an important species in the region, having cultural, ecological, and economic value. As such, direct and indirect Project effects of the KIP access road and other infrastructure components must be considered. While some studies propose that single linear corridors have a negligible effect on caribou movement (Curatolo and Murphy 1986), potential effects of road construction include, but are not limited to, physical habitat loss, loss of effective habitat due to noise and other disturbances, and partial disruption of caribou movements due to barriers created by the road. The program was primarily designed for caribou effects monitoring, and in

particular, for the summer resident caribou population; however, other large mammal species and habitats were monitored opportunistically.

As described in the TAMP, mammal monitoring studies were developed to determine and document whether unexpected effects from the construction of the Project are occurring on large mammals and if so, to make recommendations for mitigation. These programs were also developed using an adaptive approach to support recommendations for changes to mitigation and protection measures where unexpected difficulties arise. Caribou calving monitoring focuses primarily on Project effects at the local level. Moose (*Alces alces*) and other large mammal monitoring studies were designed to consider other regionally significant mammal species: moose, black bear (*Ursus americanus*), gray wolf (*Canis lupus*), and also caribou. Depending on the species, the magnitude of Project effects will likely range from small to large, while the spatial extent of effects will likely be local.

In order to identify Project effects on summer resident caribou, their use of summer habitat in the study area was monitored. As such, the presence or absence of caribou in calving and calf-rearing habitat ("calving habitat" for simplicity) was determined, and evidence of calving activity was documented. Calving and calf-rearing typically occurs in areas with minimal anthropogenic disturbance and relatively few mammalian predators. In the Regional Study Area, habitat islands in peatland complexes or islands in lakes could be suitable for calving and calf-rearing. Peatland complexes consist of sparsely treed peatland surrounding raised conifer-dominated islands (Photo 1-1). Caribou become spatially isolated on these islands during the calving and calf-rearing season, allowing for the avoidance of the predator species that affect calf survival rates and population growth over the longer term.

2.0 METHODS

A number of monitoring programs were developed to monitor caribou, moose, and other large mammals prior to and during Project construction. Monitoring studies were completed in the Regional and Local Study Areas (Map 2-1). Studies included caribou calving island monitoring, which consisted of mammal sign surveys and trail camera surveys in potential calving habitat. Moose, black bear, and gray wolf occurrences were also considered because of their potential

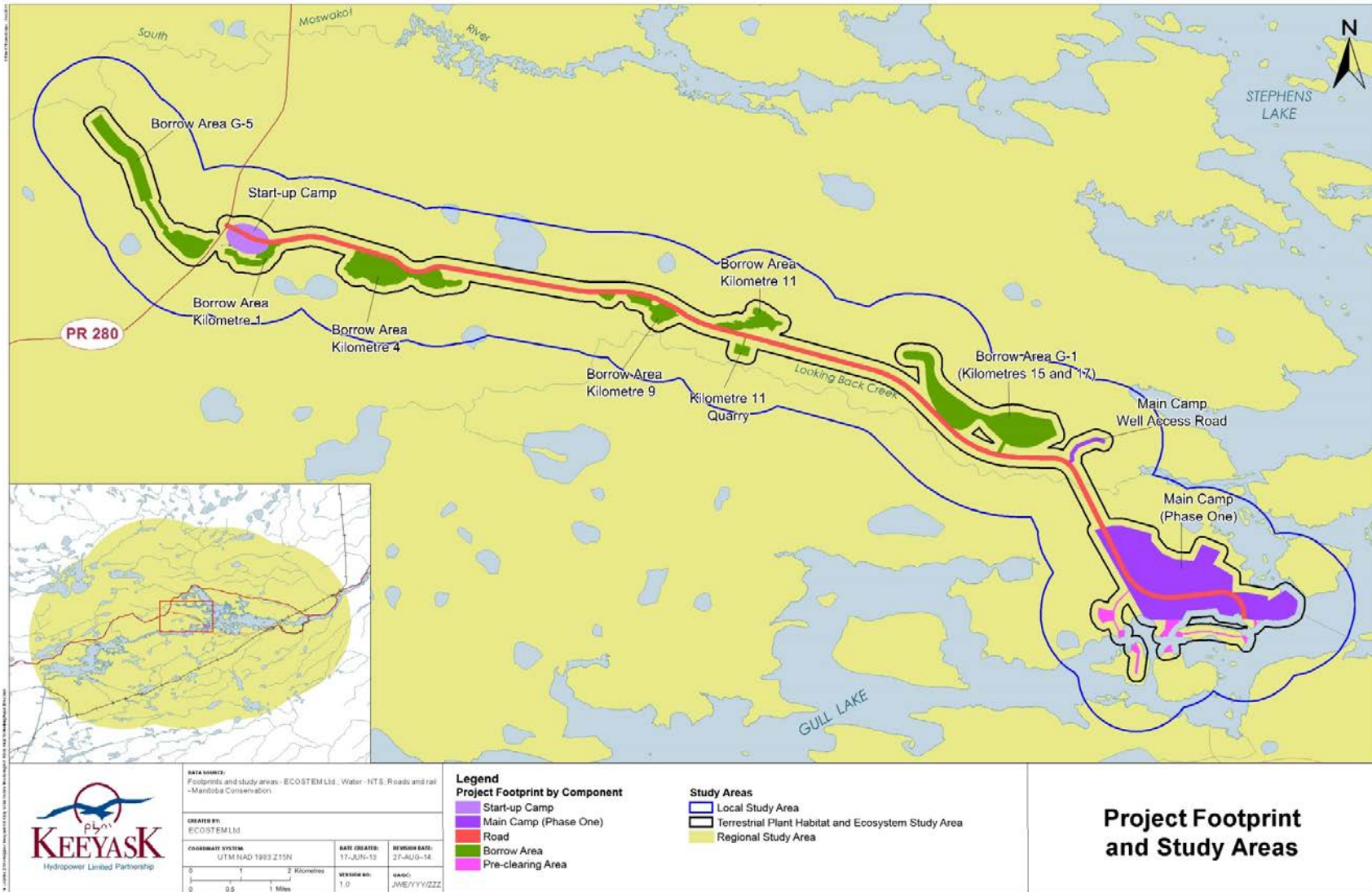
effect on the use of calving habitat by caribou. Sign surveys for moose and other large mammals were conducted near the KIP access road.

2.1 CARIBOU CALVING ISLAND MONITORING

Caribou calving habitat was selected through a desktop exercise using data from the KIP Environmental Assessment (KHLP 2009), orthophotos, maps, and other data obtained from caribou island studies conducted between 2001 and 2010. In the Regional Study Area, caribou calving habitat consists of relatively undisturbed islands in lakes or of raised conifer-dominated islands surrounded by sparsely treed peatland (*i.e.*, peatland complexes). The objectives of monitoring caribou activity in calving habitat included:

- Determining whether there is caribou calving activity on islands in peatland complexes near the KIP access road, start-up camp, main camp and borrow areas;
- Determining whether there are Project effects on caribou and/or caribou behaviour by quantifying their distribution and relative abundance, and by assessing the loss of effective habitat in peatland complexes;
- Providing baseline data and information for future use on this and other projects; and,
- Identifying unexpected impacts and effects, if any of the Project.

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Map 2-1: Keyask Infrastructure Project Regional Study Area, Local Study Area, and Project Footprint

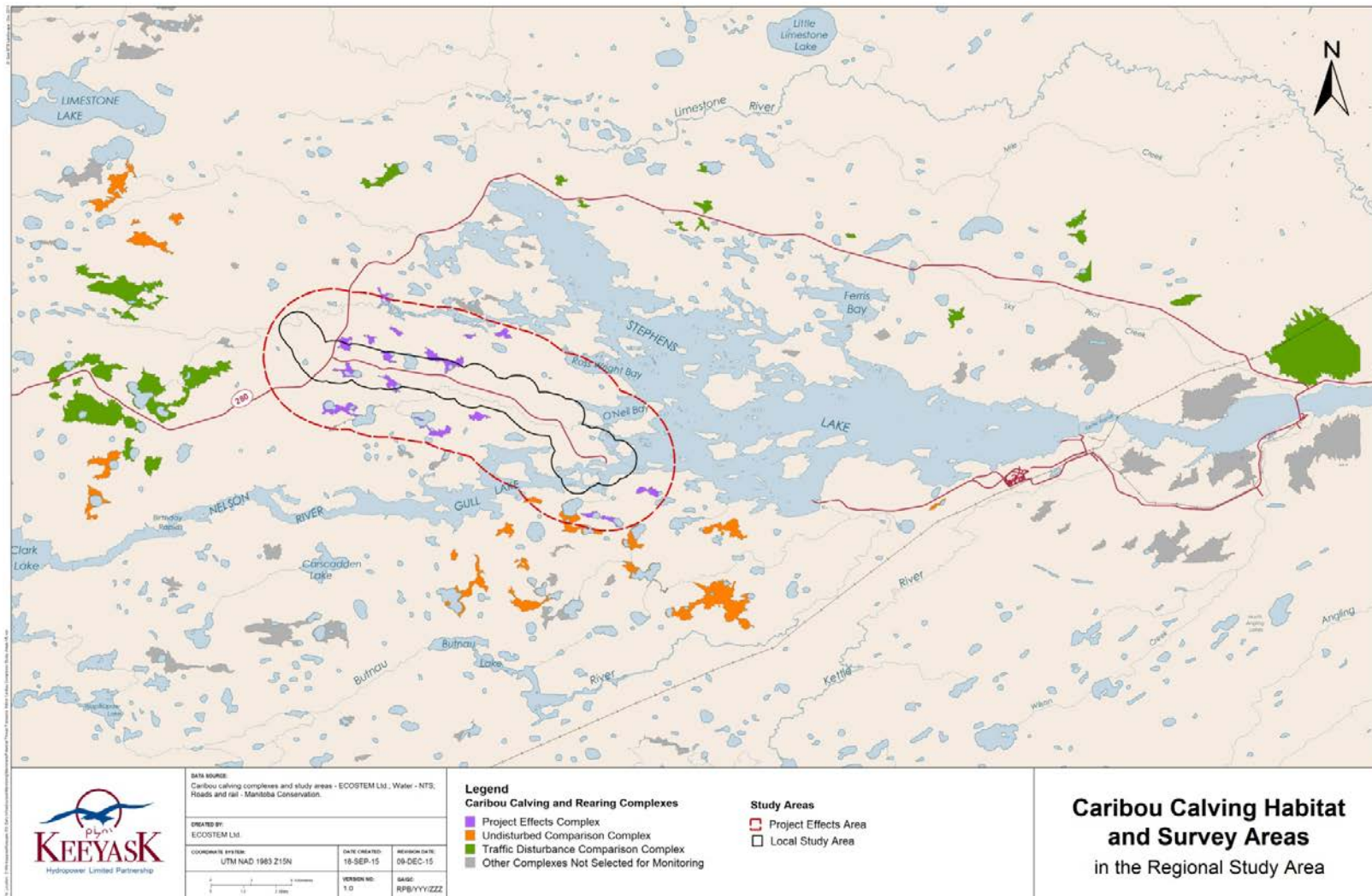
2.1.1 Mammal Sign Surveys

2.1.1.1 Survey Methods

Caribou calving island transects were surveyed in three areas (Map 2-2). The Project Effects Area (known as the Experimental Area in previous KIP annual reports) was within 5 km of the KIP access road, where disturbance from construction activity was expected to result in caribou avoiding the area. Transects in the Undisturbed Comparison Area (the Control Area in previous annual reports) were 5 km or more from the KIP access road, where no effects of construction activity were anticipated. Transects in the Traffic Disturbance Comparison Area (the Road Control Area in previous annual reports) were established near Provincial Road (PR) 280 to compare the effects of construction activity on caribou with those of existing traffic disturbance, and to predict the effects of traffic on the KIP access road when it is in operation. These terms were updated for the final report to better reflect the purpose of surveying the three areas and to avoid the implication that the survey involved a treatment ("experiment" vs. "control") of some sort.

Peatland complexes were assigned to each of the three survey areas by measuring the distance of the complex centroid to the nearest point on the KIP access road or on PR 280 with a geographic information system (GIS). Some complexes that appeared to be partially or largely within the Project Effects Area were assigned to that survey area in previous years, but were classified based on actual distance of the centroid from the KIP access road for the final report.

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Map 2-2: Caribou Calving Habitat and Survey Areas in the Regional Study Area

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In 2014, 18 transects (Table 2-1) were surveyed in 15 peatland complexes in the Project Effects Area. Twenty transects were surveyed in 18 peatland complexes in the Undisturbed Comparison Area, and 223 transects were surveyed in 23 peatland complexes in the Traffic Disturbance Comparison Area. Most transects were established in 2011 and re-visited in 2012, 2013, and 2014, where possible.

Table 2-1: Survey Effort on Caribou Calving Habitat Transects 2014

Survey Area	Number of Transects	Length of Transects (km)	Total Length Surveyed (km)
Project Effects	18	59.8	179.6
Undisturbed Comparison	23	96.5	289.5
Traffic Disturbance Comparison	223	202.9	584.8
Total	264	359.3	1,053.9

Transects were generally surveyed three times in 2014 (Appendix A, Table A-1). Each was divided into 50 m segments and oriented to best detect caribou movements with biodegradable thread strung along the length of the transect. Transects traversed each peatland complex, crossing habitat islands (Map 2-3) and the surrounding peatland. During the initial placement of thread in spring, all animal signs visible up to 1 m on either side of the thread were recorded, including tracks, trails, droppings, shelters, browse or feeding sites, and visual observations. See Appendix A, Table A-2 for survey effort from 2011 to 2013. Not all transects were surveyed three times each year due to issues with accessibility. The locations of all animal signs were recorded using Global Positioning System (GPS) units.

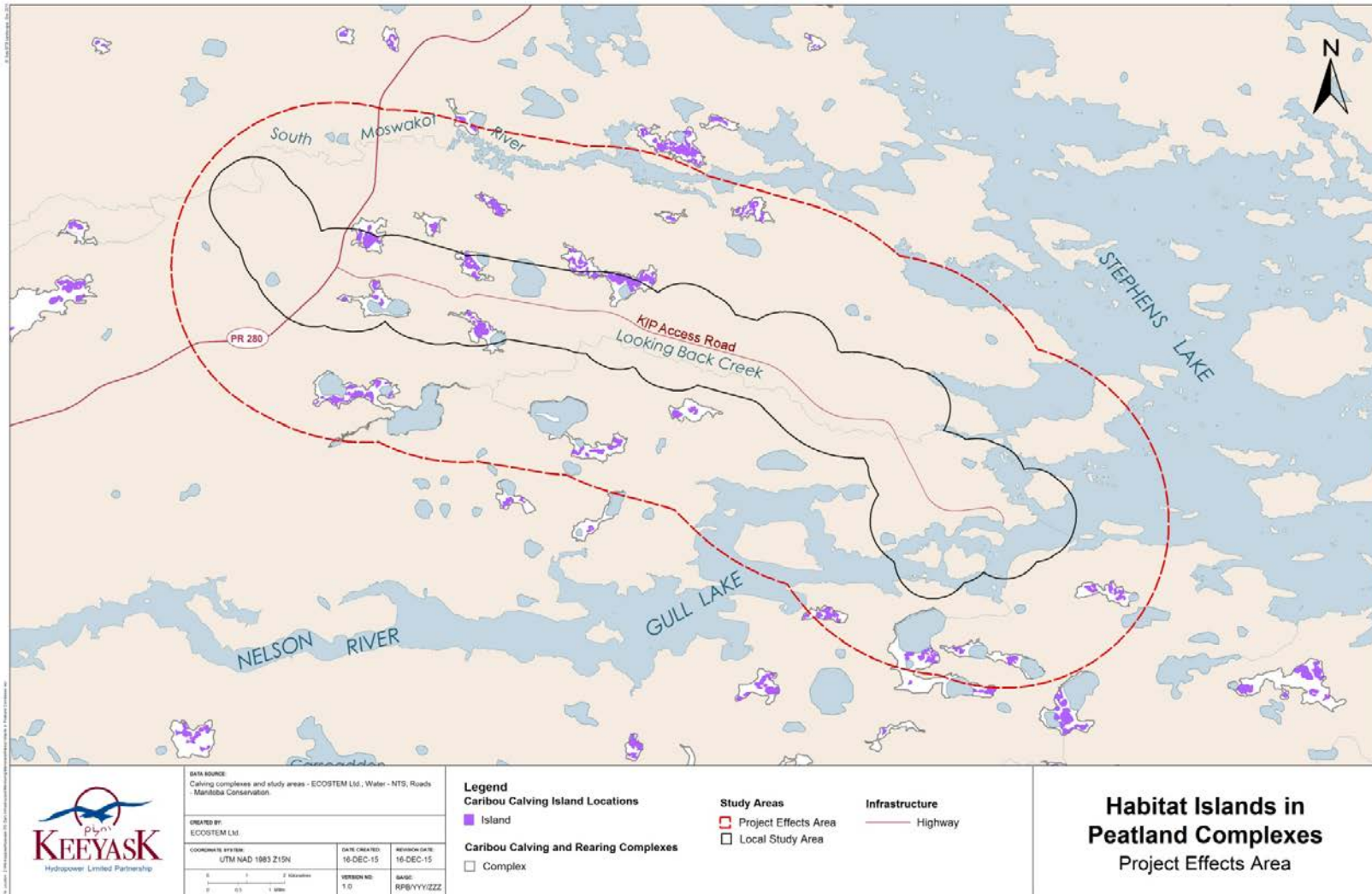
Two subsequent site visits occurred in July and September 2014. Caribou distribution and activity were recorded at thread breaks on each transect. When a break in the thread was encountered, the area was searched for sign (*e.g.*, tracks or droppings) to identify the species responsible where possible. Locations of all signs were recorded with a GPS unit. All thread breaks were repaired during the second visit to re-form a continuous line and the thread was removed during the third visit.

Several fires occurred in the KIP study area and broader region beginning in early June 2013 (Map 2-4). In total, Manitoba Conservation and Water Stewardship recorded 38 fires

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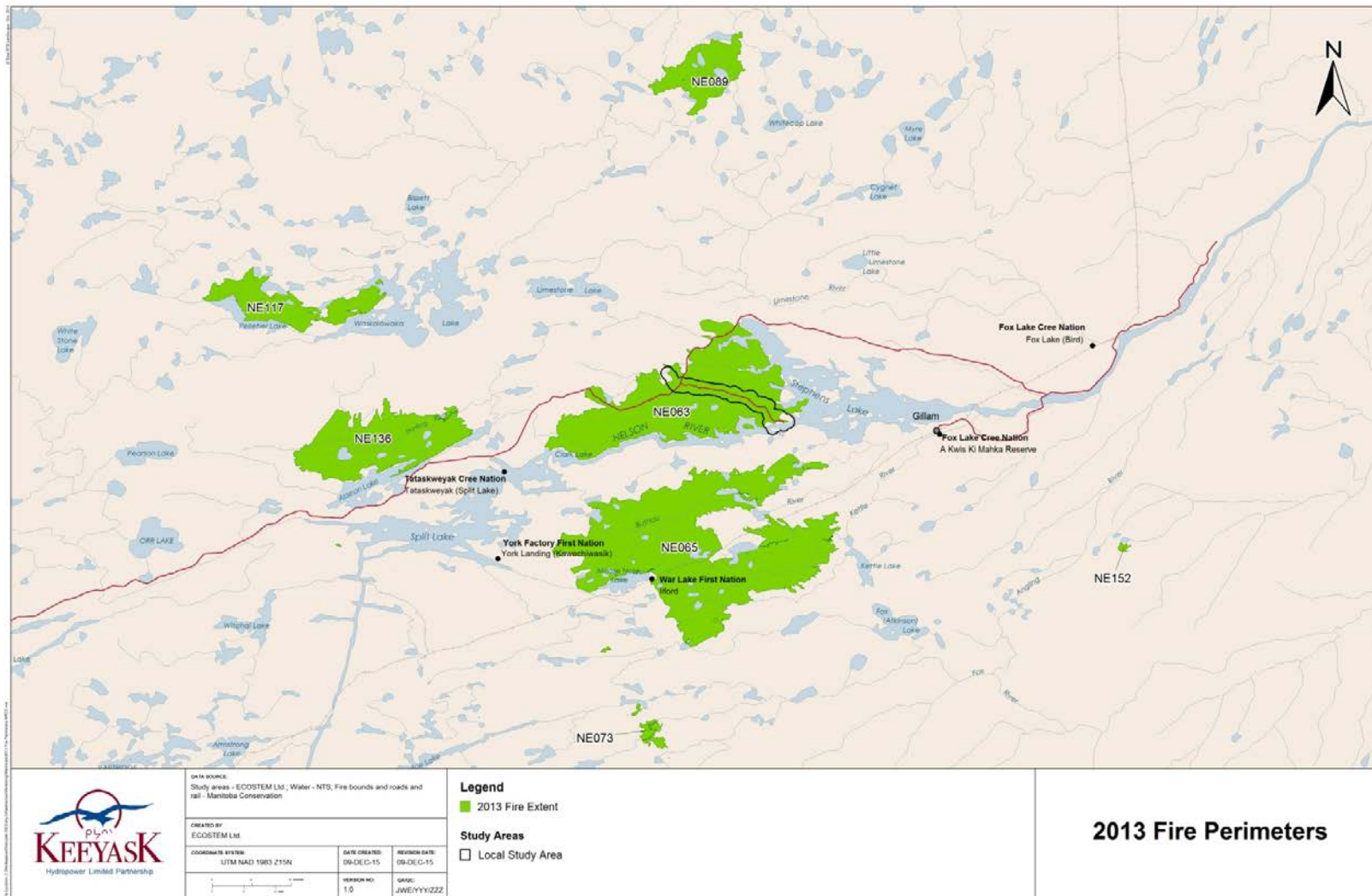
encompassing 219,256 ha. The 2013 fire boundaries are fire perimeters which include burned areas, most waterbodies, and areas skipped over by the fire. After removing waterbodies and fire skips, an estimated 151,714 ha burned in the broader region (ECOSTEM Ltd. unpublished data). Many transects that were affected by the fires were not surveyed a second or third time in 2013 (Appendix A, Table A-3). Fifteen transects in the Project Effects Area were burned; most were only surveyed once. Four transects in the Undisturbed Comparison Area and 16 transects in the Traffic Disturbance Comparison Area were also burned. In all survey areas, portions of some transects were surveyed during the second and third visits where possible.

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Map 2-3: Habitat Islands in Peatland Complexes in the Project Effects Area

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Map 2-4: 2013 Fire Perimeters

2.1.1.2 Data Summary and Analysis Methods

Data from all three visits were explored separately and were combined to generate an index of caribou (and other large mammal) abundance in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison areas. If caribou signs were observed during any of the three visits, caribou were considered present on a habitat island or in a peatland complex. If no signs were observed over the three visits, caribou were considered absent. It should be noted that the absence of caribou signs does not confirm the absence of caribou; it signifies that no caribou activity was detected.

The shortest distance from the centre of Project Effects Area peatland complexes to the KIP access road centreline was measured using a Geographic Information System (GIS). Peatland complexes were grouped into five 1-km intervals (0 to 1 km, 1 to 2 km, 2 to 3 km, 3 to 4 km, and 4 to 5 km) from the KIP access road. Mammal activity was reported for each survey year (Table 2-2). Undisturbed Comparison Area peatland complexes were all more than 5 km from the KIP access road and were assigned a 5+ km distance class. The distance from the centre of habitat islands within peatland complexes was also measured and islands were assigned the same distance classes as peatland complexes. Therefore, some islands fell into different distance classes than the complexes in which they were located. The nearest distance from PR 280 to the centre of peatland complexes and islands in the Traffic Disturbance Comparison Area was measured, and complexes and islands were assigned the same six distance classes as in the Project Effects and Undisturbed Comparison areas. While there were no peatland complexes whose centre was located 2 to 3 km from PR 280, the centres of 42 islands fell within this range. The relative abundance of caribou and other large mammal signs (signs/km) was reported for each survey year. Survey effort in each distance class for previous survey years is listed in Appendix A, Table A-4 to Table A-7.

Table 2-2: Number of Peatland Complexes and Habitat Islands Surveyed in the Regional Study Area 2014

Distance from Road (km)	KIP Access Road		Provincial Road 280	
	Number of Complexes	Number of Islands	Number of Complexes ¹	Number of Islands
0 to 1	4	10	5	49
1 to 2	3	12	8	66
2 to 3	1	3	0	42
3 to 4	4	14	5	13
4 to 5	3	18	2	12
5+	18	94	3	21

1. There were no peatland complexes whose centre was located 2 to 3 km from PR 280.

Following the initial data summary, caribou activity on habitat islands was considered only for the second and third visits. Data from the habitat islands were selected because there is a larger sample size for islands than for peatland complexes, there are islands in all distances classes, the distance from the island centroid to the nearest point on the KIP access road or PR 280 was more accurate because the islands are smaller than the peatland complexes in which they are located, and the sparsely treed peatland surrounding the habitat islands was not surveyed for all transects. Data from the first visit were not included in the analysis because transects were generally surveyed before caribou activity was anticipated in calving habitat.

Caribou activity on each habitat island was initially measured as the mean number of thread breaks per 200 m, to standardize for survey effort which, due to the distribution of habitat islands in the Regional Study Area, differed among survey areas (Appendix A, Table A-8). Consecutive 50 m segments of the portions of transects on habitat islands were grouped by four and the average number of breaks for each group was calculated (*i.e.*, the average number of breaks per 200 m). This average was then averaged for each habitat island (*i.e.*, the average number of breaks per island). Where the number of segments on a habitat island was not divisible by four, up to three adjacent 50 m segments from the surrounding peatland were added. In some instances there were no segments surveyed in the surrounding peatland, and islands were excluded if fewer than four 50 m segments were surveyed. Caribou activity on habitat islands in the Project Effects and Undisturbed Comparison areas was compared during the pre-construction (2011), and

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construction (2012–2014) phases with a Mann-Whitney U test ($\alpha = 0.05$) to determine whether caribou activity declined near the KIP access road relative to undisturbed areas and to aid in distinguishing whether a decrease in caribou activity could be attributed to the Project or whether activity decreased throughout the Regional Study Area.

Caribou activity on habitat islands was examined at increasing distances from the KIP access road with a Mann-Whitney U test ($\alpha = 0.05$). The distance of islands to the nearest point on the KIP access road centreline was measured using GIS and islands were grouped into 1-km intervals (0-1 km, 0-2 km, 0-3 km, 0-4 km, 0-5 km, and 5+ km), which were compared for each survey year and visit to identify the spatial extent of sensory disturbance, if any, on caribou (Table 2-3). The nearest distance to PR 280 was similarly measured for Traffic Disturbance Comparison Area habitat islands, which were assigned the same distance classes, for an indication of the effect of an existing road on caribou in the Regional Study Area (Table 2-4). The effects of the 2013 forest fires were also evaluated by comparing caribou activity on habitat islands before (2011–2012) and after (2014) the fires in all three survey areas.

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Table 2-3: Number of Habitat Islands Surveyed at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas 2011–2014

Distance from KIP Access Road (km)	2011		2012		2013 ¹		2014	
	Visit 2	Visit 3	Visit 2	Visit 3	Visit 2	Visit 3	Visit 2	Visit 3
0-1	10	10	10	10	0	0	10	10
1+	129	128	135	140 ²	79	69	141	141
0-2	22	22	22	22	0	0	22	22
2+	117	116	123	128	79	69	129	129
0-3	25	25	25	25	0	0	25	25
3+	114	113	120	125	79	69	126	126
0-4	38	39	39	38	3	2	39	39
4+	101	99	106	112	76	67	112	112
0-5	56	57	51	56	11	9	57	57
5+	83	81	94	94	68	60	94	94

1. Few transects were surveyed a second or third time in 2013 due to forest fires.

2. Five islands were not surveyed in July; the September visit was considered the third visit for seasonal consistency.

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Table 2-4: Number of Habitat Islands Surveyed at Increasing Distances from Provincial Road 280 in the Traffic Disturbance Comparison Area 2011–2014

Distance from PR 280 (km)	2011		2012		2013		2014	
	Visit 2	Visit 3	Visit 2	Visit 3	Visit 2	Visit 3	Visit 2	Visit 3
0-1	35	35	32	32	24	22	34	24
1+	128	128	109	106	122	107	129	123
0-2	85	85	78	80	75	69	85	70
2+	78	78	63	58	71	60	78	77
0-3	125	125	111	110	109	95	125	109
3+	38	38	30	28	37	34	38	38
0-4	136	136	121	118	119	104	136	120
4+	27	27	20	20	27	25	27	27
0-5	144	144	125	122	127	112	144	128
5+	19	19	16	16	19	17	19	19

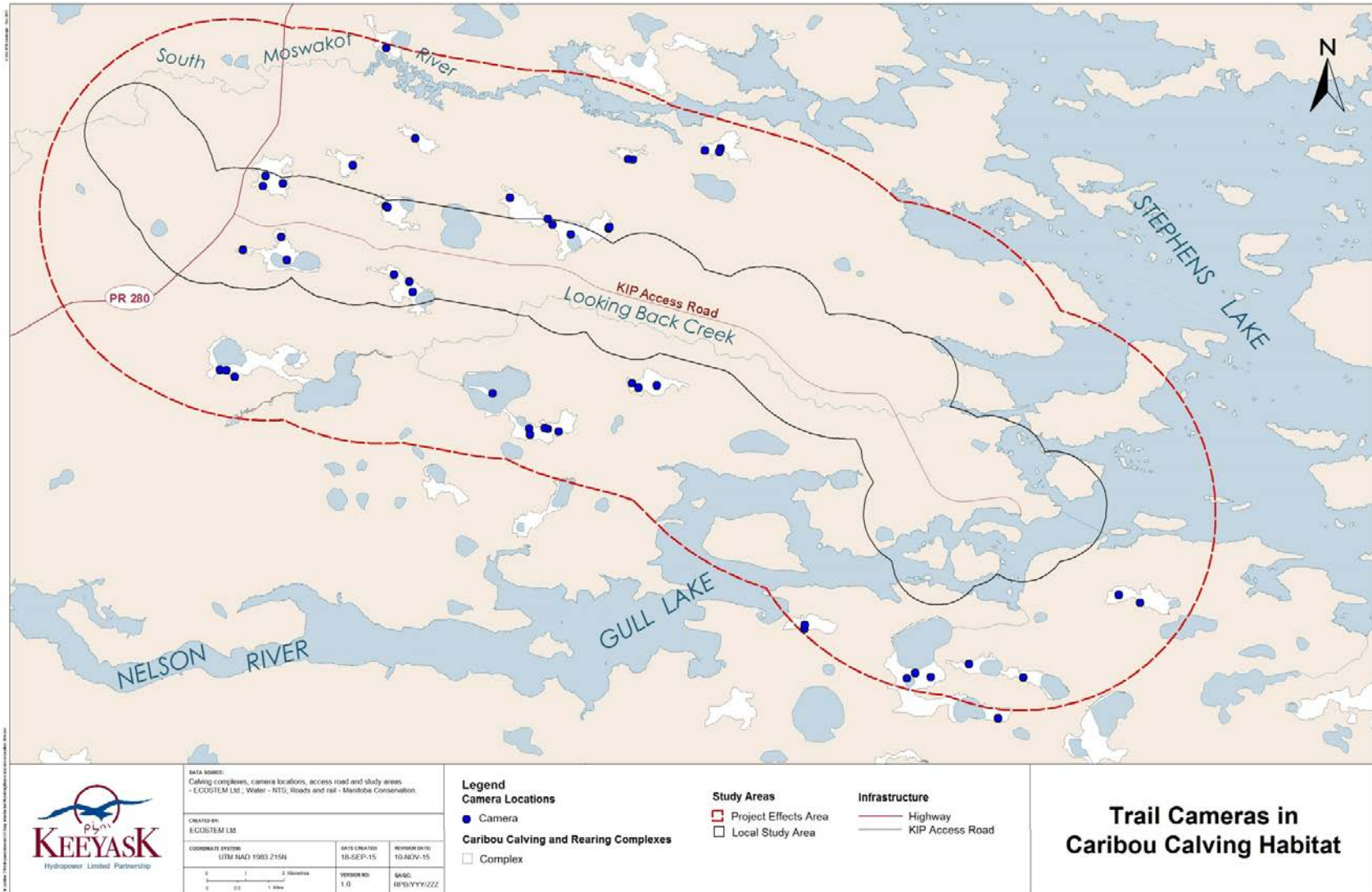
2.1.2 Trail Camera Monitoring

A total of 48 Reconyx™ PM35C31 trail cameras were deployed on heavy use game trails and/or near the edges of potential calving islands to document caribou activity in the Project Effects and Undisturbed Comparison areas (Map 2-5; Appendix A, Table A-9). Forty-two cameras were distributed among all 18 Project Effects Area sign survey transects and six cameras were placed on three transects in the Undisturbed Comparison Area. Cameras were deployed on heavy use game trails and/or near the edges of potential caribou calving islands and left in place for a five-month period from mid-April to mid-September. Cameras were placed at the same locations in 2014 as in previous survey years, or nearby. Cameras were set on rapid-fire to take five-picture bursts and to continue taking photographs one second after the first series as long as movement was still detected. The setup for each trail camera varied slightly but, efforts were made to affix each camera approximately 1.5 to 2 m above the ground on a large stable tree. Brush and other vegetation that was likely to trigger the camera were removed from the immediate area of the camera line-of-sight.

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Camera cards were retrieved twice annually, photographs were reviewed and caribou activity was documented. The age (adult or calf) and number of individuals were recorded and the sex of adults was identified (*e.g.*, presence or absence of large antlers or a vulva patch) where possible. Because multiple photos of one or more caribou were taken at one time, the number of events was recorded rather than the number of photos. As it can be difficult to distinguish individuals of the same sex and therefore to determine whether a new series of photographs was of the same or different individuals or groups, a new event was recorded if an hour elapsed between the end of one series of photos and the beginning of the next, unless a different individual (*e.g.*, different sex or species) was identifiable. Observations of other mammals, particularly moose, black bear, and gray wolf, were also recorded.

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Map 2-5: Trail Cameras in Caribou Calving Habitat 2014

2.2 MOOSE AND OTHER LARGE MAMMAL MONITORING

Monitoring for moose and other large mammals (caribou, black bear, and gray wolf) was completed via sign surveys north and south of the KIP access road in order to:

- Determine whether there are Project effects on large mammal behaviours by quantifying distribution and abundance and measuring the loss of effective habitat resulting from construction disturbance;
- Collect data that could attribute differences in mammal activity to Project effects; and
- Provide baseline data and information for future use on this and other projects.

Eleven transects were surveyed north and south of the KIP access road in 2014 (Table 2-5), in the same way as described for mammal sign surveys in caribou calving habitat (see Section 2.1.1.1). The transects, which were established in 2011, were 4 to 5 km in length and oriented perpendicular to the KIP access road route (Map 2-6). All animal signs visible up to 1 m on either side of the thread were recorded during the first site visit in April. Signs included tracks, trails, droppings, shelters, browse or feeding sites, and visual observations. The specific locations of all signs, particularly from moose, caribou, black bear, and gray wolf were recorded with GPS units.

Table 2-5: Survey Effort on Moose and Other Large Mammal Transects 2014

Survey Area	Number of Transects	Total Length (km)	Total Length Surveyed (km)
North of the KIP Access Road	8	75.9	227.7
South of the KIP Access Road	3	31.3	90.6
Total	11	107.2	318.3

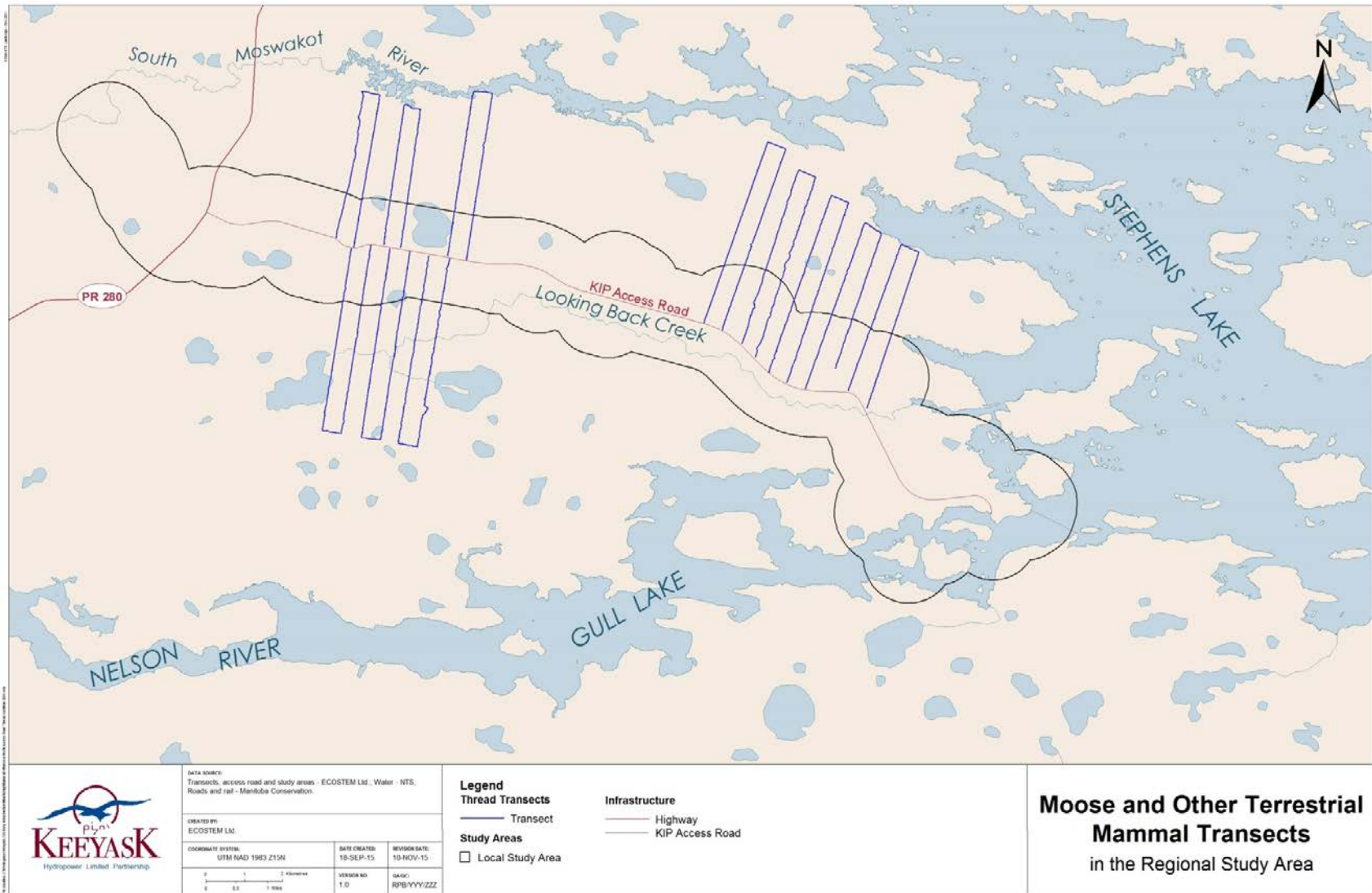
Two subsequent site visits occurred in July and September 2014 (Appendix A, Table A-10). Large mammal distribution and activity were recorded at thread breaks on each transect. When a break in the thread was encountered, the area was searched for signs (*e.g.*, tracks and droppings) to identify the species responsible where possible. Locations of all signs were recorded with a

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GPS unit. All thread breaks were repaired during the second visit to re-form a continuous line and the thread was removed during the third visit.

Moose and other large mammal transects were previously surveyed from 2011 to 2013. In 2013, transects were established in April but were not re-visited a second time in July due to safety concerns related to active forest fires, nor a third time in September because transect threads and the habitat they traversed had burned in the fires. Survey effort from 2011 to 2014 is listed in Appendix A, Table A-11. The relative abundance of moose and other large mammal signs (signs/km) was reported for each survey year.

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Map 2-6: Moose and Other Large Mammal Transects in the Regional Study Area

3.0 RESULTS

3.1 CARIBOU CALVING ISLAND MONITORING

3.1.1 Mammal Sign Surveys

Caribou signs were observed throughout the Regional Study Area from 2011 to 2014. A total of 1,658 signs were observed over all combined visits to all transects in 2014 (Table 3-1). Most were signs of adults. The greatest number of caribou signs was observed in 2013 and the fewest in 2012.

Table 3-1: Number of Caribou Signs on Calving Island Transects 2011–2014

Sex/Age	Year			
	2011	2012	2013	2014
Adult	3,217	629	5,366	1,544
Female	167	140	15	21
Juvenile	133	98	112	83
Male	1	0	0	10
<i>All</i>	<i>3,518</i>	<i>867</i>	<i>5,493</i>	<i>1,658</i>

Signs of moose, black bear, and gray wolf were also observed (Table 3-2). Moose signs were most frequently observed over all combined visits to all transects. The greatest number of moose signs was observed in 2014 and the fewest in 2012. Relatively few signs of black bear and gray wolf were observed.

Signs of 13 other mammals were identified to species (Appendix A, Table A-12). Some, such as wolverine, have very large home ranges and are sparse in the Regional Study Area. Others are more common but are not typically associated with caribou calving habitat (*e.g.*, American marten). Because caribou calving island monitoring focused on caribou and other large mammals, observations of signs of other mammals were not consistently recorded and no inference can be made about the relative abundance of these species.

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Table 3-2: Other Large Mammal Signs on Calving Island Transects 2011–2014

Species	Age/Sex	Year			
		2011	2012	2013	2014
Moose	Adult	2,206	1,765	1,913	2,763
	Female	422	118	55	99
	Juvenile	141	214	204	193
	Male	258	117	77	84
	<i>All</i>	<i>3,027</i>	<i>2,214</i>	<i>2,249</i>	<i>3,319</i>
Black bear	Adult	36	62	41	66
	Juvenile	1	4	1	0
	<i>All</i>	<i>37</i>	<i>66</i>	<i>42</i>	<i>66</i>
Gray wolf	Adult	21	32	28	40
	Juvenile	1	0	0	2
	<i>All</i>	<i>22</i>	<i>32</i>	<i>28</i>	<i>41</i>

3.1.1.1 All Visits

*Project Effects Area**Caribou*

A total of 247 caribou signs were observed on caribou calving islands transects in the Project Effects Area in 2014, or 1.38 signs/km (Appendix A, Table A-13). Caribou signs were recorded in 10 peatland complexes (67%) and on 23 (43%) of the habitat islands. Adult signs were recorded in 10 (67%) peatland complexes, and calf signs were found in five (33%; Appendix A, Table A-14). Signs of adults were observed on 23 habitat islands (43%) and calf signs were observed on three islands (6%).

In previous survey years, the percentage of complexes with adult caribou signs in the Project Effects Area was 100% in 2011, decreased to 67% in 2012, and returned to 100% in 2013 (Appendix A, Table A-14; Figure 3-1). The percentage of complexes with calf signs was 53% in 2011, decreased to 47% in 2012 and again to 7% in 2013, when most transects were only surveyed once in spring due to the forest fires. The percentage of habitat islands with adult

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caribou signs decreased from 77% in 2011 to 42% in 2012, and increased to 72% in 2013. The percentage of islands with caribou calf signs decreased from 15% in 2011 to 9% in 2012 to 2% in 2013.

Other Large Mammals

Signs of black bear, gray wolf, and moose were observed in the Project Effects Area in 2014 (Appendix A, Table A-15). A total of 14 black bear signs and 12 gray wolf signs were observed, for a relative abundance of 0.09 signs/km and 0.08 signs/km, respectively. The relative abundance of black bear signs was 0.01 signs/km in 2011, increased to 0.04 signs/km in 2012, then decreased to zero in 2013. The relative abundance of gray wolf signs was 0.02 signs/km in 2011, increased to 0.10 signs/km in 2012, then decreased to 0.03 signs/km in 2013.

A total of 348 moose signs were recorded in 2014, for a relative abundance of 2.27 signs/km (Appendix A, Table A-15). The relative abundance of moose signs was 2.82 signs/km in 2011, then decreased to 2.12 signs/km in 2012 and to 0.57 signs/km in 2013. In 2014, adult moose signs were observed in 15 peatland complexes (100%) and on 40 habitat islands (75%) and calf signs were found in six complexes (40%) and on 10 islands (19%; Appendix A, Table A-16). In previous survey years, adult moose signs were observed in all peatland complexes in 2011 and 2012, and in 67% of complexes in 2013. The percentage of complexes with moose calf signs increased from 47% in 2011 to 87% in 2012 and then decreased to 7% in 2013 (Figure 3-3). The percentage of habitat islands with adult moose signs was 87% in 2011, 66% in 2012, and 28% in 2013 (Appendix A, Table A-16; Figure 3-4). The percentage of islands with moose calf signs was 19% in 2011, increased to 32% in 2012, and declined to 4% in 2013.

*Undisturbed Comparison Area**Caribou*

A total of 572 caribou signs were observed on caribou calving islands transects in the Undisturbed Comparison Area in 2014, or 1.98 signs/km (Appendix A, Table A-13). Caribou signs were recorded in 17 peatland complexes (94%) and on 65 (66%) of the habitat islands. Adult signs were recorded in 17 (94%) peatland complexes, and calf signs were found in 12

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(67%; Appendix A, Table A-14). Signs of adults were observed on 65 habitat islands (66%) and calf signs were observed on 11 islands (11%).

In previous survey years, the percentage of complexes with adult caribou signs in the Undisturbed Comparison Area was 100% in 2011, decreased to 94% in 2012, and decreased to 89% in 2013 (Appendix A, Table A-14; Figure 3-1). The percentage of complexes with calf signs was 79% in 2011, decreased to 44% in 2012 and then to 28% in 2013. The percentage of habitat islands with adult caribou signs decreased from 82% in 2011 to 64% in 2012, and increased to 84% in 2013. The percentage of islands with caribou calf signs decreased from 21% in 2011 to 11% in 2012 then increased to 14% in 2013.

When distance to the KIP access road in the Project Effects (within 5 km) and Undisturbed Comparison (beyond 5 km) areas was compared, 94% of peatland complexes more than 5 km from the road had signs of caribou and 67% had calf signs in 2014 (Appendix A, Table A-17). Caribou signs were found on 64% of habitat islands more than 5 km from the road and calf signs were found on 11% of islands. Within 5 km of the road, the percentage of peatland complexes with caribou signs ranged from 33% (1 to 2 km) to 100% (2 to 3 km), and the range for calf signs was zero (1 to 2 km and 2 to 3 km) to 75% (3 to 4 km). The percentage of habitat islands with caribou signs ranged from zero (2 to 3 km) to 71% (3 to 4 km). No calf signs were observed within 3 km of the road, and were found on the greatest percentage (21%) of islands 3 to 4 km from the road.

Other Large Mammals

Signs of black bear, gray wolf, and moose were observed in the Undisturbed Comparison Area in 2014 (Appendix A, Table A-15). A total of 20 black bear signs and seven gray wolf signs were observed, for a relative abundance of 0.07 signs/km and 0.02 signs/km, respectively. In previous survey years the relative abundance of black bear signs was 0.07 signs/km in 2011, decreased to 0.06 signs/km in 2012, then decreased to 0.04 signs/km in 2013. The relative abundance of gray wolf signs was 0.03 signs/km in 2011, decreased to 0.10 signs/km in 2012, then returned to 0.03 signs/km in 2013.

A total of 979 moose signs were recorded in 2014, for a relative abundance of 3.27 signs/km (Appendix A, Table A-15). The relative abundance of moose signs was 3.25 signs/km in 2011,

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then decreased to 2.04 signs/km in 2012, and increased to 3.07 signs/km in 2013. In 2014, adult moose signs were observed in 18 peatland complexes (100%) and on 86 habitat islands (88%), and calf signs were found in 14 complexes (78%) and on 22 islands (22%; Appendix A, Table A-16). In previous survey years, adult moose signs were observed in all peatland complexes from 2011 to 2013. The percentage of complexes with moose calf signs increased from 57% in 2011 to 78% in 2012 and then decreased to 67% in 2013 (Figure 3-3). The percentage of habitat islands with adult moose signs decreased from 82% in 2011 to 73% in 2012, and to 72% in 2013 (Appendix A, Table A-16; Figure 3-4). The percentage of islands with moose calf signs was 23% in 2011, decreased to 20% in 2012, and returned to 23% in 2013.

*Traffic Disturbance Comparison Area**Caribou*

A total of 839 caribou signs were observed on caribou calving islands transects in the Traffic Disturbance Comparison Area in 2014, or 1.43 signs/km (Appendix A, Table A-13). Caribou signs were recorded in 21 peatland complexes (91%) and on 133 (66%) of the habitat islands. Adult signs were recorded in 21 (91%) peatland complexes, and calf signs were found in 14 (61%; Appendix A, Table A-14). Signs of adults were observed on 131 habitat islands (65%) and calf signs were observed on 32 islands (16%).

In previous survey years, the percentage of complexes with adult caribou signs in the Traffic Disturbance Comparison Area was 100% in 2011, decreased to 82% in 2012, and increased to 94% in 2013 (Appendix A, Table A-14; Figure 3-1). The percentage of complexes with calf signs was 47% in 2011 and 2012 and increased to 59% in 2013. The percentage of habitat islands with adult caribou signs decreased from 81% in 2011 to 39% in 2012, and increased to 83% in 2013. The percentage of islands with caribou calf signs increased slightly from 12% in 2011 to 13% in 2012 and to 18% in 2013.

When distance to the PR 280 was considered, all peatland complexes more than 5 km from the road had signs of all caribou and 67% had calf signs in 2014 (Appendix A, Table A-18). Signs of caribou were found on 76% of habitat islands more than 5 km from the road and calf signs were found on 24% of islands. The percentage of peatland complexes with caribou signs ranged from 80% (3 to 4 km) to 100% (0 to 1 km and 4 to 5 km), and the range for calf signs was 50% (1 to 2

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km) to 100% (4 to 5 km). The percentage of habitat islands with caribou signs ranged from 55% (0 to 1 km) to 92% (4 to 5 km). Calf signs were found on the smallest percentage (5%) of islands 2 to 3 km from the road and on the greatest percentage (42%) of islands 4 to 5 km from the road.

Other Large Mammals

Signs of black bear, gray wolf, and moose were observed in the Traffic Disturbance Comparison Area in 2014 (Appendix A, Table A-15). A total of 32 black bear signs and 22 gray wolf signs were observed, for a relative abundance of 0.06 signs/km and 0.04 signs/km, respectively. The relative abundance of black bear signs was 0.02 signs/km in 2011, increased to 0.07 signs/km in 2012, then decreased to 0.05 signs/km in 2013. The relative abundance of gray wolf signs increased slightly each year, from 0.01 signs/km in 2011 to 0.02 signs/km in 2012 and to 0.03 signs/km in 2013.

A total of 1,812 moose signs were recorded in 2014, for a relative abundance of 3.17 signs/km (Appendix A, Table A-15). The relative abundance of moose signs was 2.35 signs/km in 2011, decreased to 2.04 signs/km in 2012, and increased to 2.21 signs/km in 2013. In 2014, adult moose signs were observed in 22 peatland complexes (96%) and on 171 habitat islands (84%) and calf signs were found in 13 complexes (57%) and on 52 islands (26%; Appendix A, Table A-16). In previous survey years, adult moose signs were observed in all peatland complexes in 2011 and 2012, and in 94% of complexes in 2013. The percentage of complexes with moose calf signs increased from 41% in 2011 to 59% in 2012 and to 82% in 2013 (Figure 3-3). The percentage of habitat islands with adult moose signs was 84% in 2011, 71% in 2012, and 75% in 2013 (Figure 3-4). The percentage of islands with moose calf signs was 16% in 2011, increased to 19% in 2012, and to 27% in 2013.

3.1.1.2 First Visit***Project Effects Area******Caribou***

A total of 39 caribou signs were observed in the Project Effects Area during the first visit in 2014 (Appendix A, Table A-19). Signs were found on 2% of transects. In previous survey years, signs were recorded on 61% of transects in 2011, no signs were observed in 2012, and signs were found on all transects in 2013.

Other Large Mammals

In 2014, signs of gray wolf and moose were observed in the Project Effects Area during the first visit (Appendix A, Table A-20). A single wolf sign was found, on one (6%) transect. In previous survey years gray wolf signs were found on 33% of transects in 2012 and on 6% of transects in 2013; none were found in 2011. Black bear signs were found on 6% of transects in 2011; none were observed in 2012 or 2013.

A total of 91 moose signs were observed during the first visit in 2014 (Appendix A, Table A-20). Moose signs were found on 67% of transects. In previous survey years moose signs were found on 94% of transects in 2011, 56% of transects in 2012, and 67% of transects in 2013.

3.1.1.3 Second Visit***Project Effects Area******Caribou***

A total of 140 caribou signs were observed on caribou calving islands transects in the Project Effects Area in 2014, or 2.34 signs/km (Appendix A, Table A-21). Caribou signs were recorded in nine peatland complexes (60%) and on 15 (28%) habitat islands. Adult signs were recorded in nine (60%) peatland complexes, and calf signs were found in three (20%; Appendix A, Table A-22). Signs of adults were observed on 15 habitat islands (28%) and calf signs were observed on three islands (6%).

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In previous survey years, the percentage of complexes with adult caribou signs in the Project Effects Area was 87% in 2011, decreased to 36% in 2012, and was 100% in 2013 (Appendix A, Table A-22; Figure 3-5). The percentage of complexes with calf signs was 47% in 2011, decreased to 21% in 2012 and again to 0% in 2013. The percentage of habitat islands with adult caribou signs decreased from 58% in 2011 to 21% in 2012, and increased to 33% in 2013 (Figure 3-6). The percentage of islands with caribou calf signs decreased from 13% in 2011 to 2% in 2012 and to 0% in 2013.

Other Large Mammals

Signs of black bear, gray wolf, and moose were observed in the Project Effects Area in 2014 (Appendix A, Table A-23). A total of 16 black bear signs and seven gray wolf signs were observed, for a relative abundance of 0.27 signs/km and 0.12 signs/km, respectively. The relative abundance of black bear signs was 0.20 signs/km in 2012; no signs were observed in 2011 or 2013. No signs of gray wolf were found from 2011 to 2013.

A total of 154 moose signs were recorded in 2014, for a relative abundance of 2.57 signs/km (Appendix A, Table A-23). The relative abundance of moose signs was 3.48 signs/km in 2011, then decreased to 2.01 signs/km in 2012 and increased to 14.96 signs/km in 2013. In 2014, adult moose signs were observed in 15 peatland complexes (100%) and on 33 habitat islands (62%) and calf signs were found in four complexes (27%) and on three islands (6%; Appendix A, Table A-24). In previous survey years, adult moose signs were observed in 93% of peatland complexes in 2011, 86% in 2012, and in all complexes in 2013. The percentage of complexes with moose calf signs increased from 40% in 2011 to 50% in 2012 and 2013 (Figure 3-7). The percentage of habitat islands with adult moose signs was 52% in 2011, 34% in 2012, and 83% in 2013 (Figure 3-8). The percentage of islands with moose calf signs was 17% in 2011, decreased to 15% in 2012, was zero in 2013.

*Undisturbed Comparison Area**Caribou*

A total of 379 caribou signs were observed on caribou calving islands transects in the Undisturbed Comparison Area in 2014, or 3.93 signs/km (Appendix A, Table A-21). Caribou

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signs were recorded in 16 peatland complexes (89%) and on 57 (58%) of the habitat islands. Adult signs were recorded in 16 (89%) peatland complexes, and calf signs were found in seven (39%; Appendix A, Table A-22). Signs of adults were observed on 57 habitat islands (58%) and calf signs were observed on seven islands (7%).

In previous survey years, the percentage of complexes with adult caribou signs in the Undisturbed Comparison Area was 100% in 2011, decreased to 78% in 2012, and increased to 80% in 2013 (Appendix A, Table A-22; Figure 3-5). The percentage of complexes with calf signs was 71% in 2011, decreased to 28% in 2012, and increased to 33% in 2013. The percentage of habitat islands with adult caribou signs decreased from 61% in 2011 to 46% in 2012, and increased to 67% in 2013 (Figure 3-6). The percentage of islands with caribou calf signs decreased from 15% in 2011 to 6% in 2012 then increased to 18% in 2013.

When distance to the KIP access road in the Project Effects (within 5 km) and Undisturbed Comparison (beyond 5 km) areas was compared, 89% of peatland complexes more than 5 km from the road had signs of caribou and 39% had calf signs in 2014 (Appendix A, Table A-25). Caribou signs were found on 55% of habitat islands and calf signs were found on 6% of islands more than 5 km from the road. Within 5 km of the road, the percentage of peatland complexes with caribou signs ranged from 33% (1 to 2 km) to 100% (2 to 3 km), and the range for calf signs was zero (1 to 2 km and 2 to 3 km) to 50% (3 to 4 km). The percentage of habitat islands with caribou signs ranged from zero (2 to 3 km) to 50% (3 to 4 km). No calf signs were observed on islands within 3 km of the road, and calf signs were found on the greatest percentage (21%) of islands 3 to 4 km from the road.

Other Large Mammals

Signs of black bear, gray wolf, and moose were observed in the Undisturbed Comparison Area in 2014 (Appendix A, Table A-23). A total of six black bear signs and two gray wolf signs were observed, for a relative abundance of 0.06 signs/km and 0.02 signs/km, respectively. In previous survey years the relative abundance of black bear signs was 0.06 signs/km in 2011, increased to 0.09 signs/km in 2012, and then to 0.11 signs/km in 2013. The relative abundance of gray wolf signs was 0.03 signs/km in 2011, decreased to zero in 2012, then increased to 0.05 signs/km in 2013.

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A total of 594 moose signs were recorded in 2014, for a relative abundance of 6.16 signs/km (Appendix A, Table A-23). The relative abundance of moose signs was 5.83 signs/km in 2011, then decreased to 2.75 signs/km in 2012, and increased to 5.14 signs/km in 2013. In 2014, adult moose signs were observed in 17 peatland complexes (94%) and on 77 habitat islands (79%), and calf signs were found in 11 complexes (61%) and on 17 islands (17%; Appendix A, Table A-24). In previous survey years, adult moose signs were observed in 93% or 94% of complexes from 2011 to 2013. The percentage of complexes with moose calf signs increased from 43% in 2011 to 50% in 2012 and then to 60% in 2013 (Figure 3-7). The percentage of habitat islands with adult moose signs decreased from 62% in 2011 to 51% in 2012, and returned to 62% in 2013 (Appendix A, Table A-16; Figure 3-8). The percentage of islands with moose calf signs was 18% in 2011, decreased to 9% in 2012, and increased to 23% in 2013.

*Traffic Disturbance Comparison Area**Caribou*

A total of 559 caribou signs were observed on caribou calving islands transects in the Traffic Disturbance Comparison Area in 2014, or 2.76 signs/km (Appendix A, Table A-21). Caribou signs were recorded in 21 peatland complexes (91%) and on 101 (50%) of the habitat islands. Adult signs were recorded in 21 (91%) peatland complexes, and calf signs were found in 13 (57%; Appendix A, Table A-22). Signs of adults were observed on 99 habitat islands (49%) and calf signs were observed on 25 islands (12%).

In previous survey years, the percentage of complexes with adult caribou signs in the Traffic Disturbance Comparison Area was 71% in 2011, decreased to 67% in 2012, and increased to 82% in 2013 (Appendix A, Table A-22; Figure 3-5). The percentage of complexes with calf signs was 29% in 2011, increased to 53% in 2012, and decreased to 47% in 2013. The percentage of habitat islands with adult caribou signs decreased from 39% in 2011 to 30% in 2012, and increased to 69% in 2013 (Figure 3-6). The percentage of islands with caribou calf signs increased from 3% in 2011 to 12% in 2012 and to 16% in 2013.

When distance to the PR 280 was considered, all peatland complexes more than 5 km from the road had signs of caribou and 67% had calf signs in 2014 (Appendix A, Table A-26). Signs of caribou were found on 57% of habitat islands more than 5 km from the road and calf signs were

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found on 19% of islands. Within 5 km of the road, the percentage of peatland complexes with caribou signs ranged from 80% (3 to 4 km) to 100% (0 to 1 km and 4 to 5 km), and the range for calf signs was 50% (1 to 2 km) to 100% (4 to 5 km). The percentage of habitat islands with caribou signs ranged from 38% (0 to 1 km) to 83% (4 to 5 km). Calf signs were found on the smallest percentage (2%) of islands 2 to 3 km from the road and on the greatest percentage (42%) of islands 4 to 5 km from the road.

Other Large Mammals

Signs of black bear, gray wolf, and moose were observed in the Traffic Disturbance Comparison Area in 2014 (Appendix A, Table A-23). A total of 21 black bear signs and three gray wolf signs were observed, for a relative abundance of 0.10 signs/km and 0.01 signs/km, respectively. The relative abundance of black bear signs was 0.02 signs/km in 2011, increased to 0.15 signs/km in 2012, and to 0.17 signs/km in 2013. The relative abundance of gray wolf signs was 0.01 signs/km in 2011, 0.03 signs/km in 2012, and 0.02 signs/km in 2013.

A total of 906 moose signs were recorded in 2014, for a relative abundance of 4.47 signs/km (Appendix A, Table A-23). The relative abundance of moose signs was 2.77 signs/km in 2011, increased to 2.97 signs/km in 2012, and to 3.98 signs/km in 2013. In 2014, adult moose signs were observed in 20 peatland complexes (87%) and on 138 habitat islands (68%) and calf signs were found in 12 complexes (52%) and on 41 islands (20%; Appendix A, Table A-24). In previous survey years, adult moose signs were observed in all peatland complexes in 2011 and 2012, and in 76% of complexes in 2013. The percentage of complexes with moose calf signs increased from 41% in 2011 to 60% in 2012 and decreased slightly to 59% in 2013 (Figure 3-7). The percentage of habitat islands with adult moose signs was 59% in 2011, 64% in 2012, and 60% in 2013 (Figure 3-8). The percentage of islands with moose calf signs was 9% in 2011, increased to 16% in 2012, to 23% in 2013.

3.1.1.4 Third Visit

Project Effects Area

Caribou

A total of 68 caribou signs were observed on caribou calving islands transects in the Project Effects Area in 2014, or 1.14 signs/km (Appendix A, Table A-27). Caribou signs were recorded in six peatland complexes (40%) and on 14 (26%) habitat islands. Adult signs were recorded in six (40%) peatland complexes, and calf signs were found in one (7%; Appendix A, Table A-28). Signs of adults were observed on 14 habitat islands (26%) and no calf signs were observed on islands.

In previous survey years, the percentage of complexes with adult caribou signs in the Project Effects Area was 60% in 2011 and 2012 and 100% in 2013 (Appendix A, Table A-28; Figure 3-9). The percentage of complexes with calf signs was 13% in 2011, increased to 33% in 2012 and again to 50% in 2013. The percentage of habitat islands with adult caribou signs was 32% in 2011 and 31% in 2012, and increased to 100% in 2013 (Figure 3-10). The percentage of islands with caribou calf signs increased from 2% in 2011 to 8% in 2012 and to 25% in 2013.

Other Large Mammals

Signs of black bear, gray wolf, and moose were observed in the Project Effects Area in 2014 (Appendix A, Table A-29). A total of three black bear signs and four gray wolf signs were observed, for a relative abundance of 0.05 signs/km and 0.07 signs/km, respectively. The relative abundance of black bear signs was 0.07 signs/km in 2012; no signs were observed in 2011 or 2013. The relative abundance of gray wolf signs was 0.07 signs/km in 2011, 0.05 signs/km in 2012, and no signs were observed in 2013.

A total of 134 moose signs were recorded in 2014, for a relative abundance of 2.24 signs/km (Appendix A, Table A-29). The relative abundance of moose signs was 2.84 signs/km in 2011, then increased to 3.85 signs/km in 2012 and to 4.55 signs/km in 2013. In 2014, adult moose signs were observed in 15 peatland complexes (100%) and on 30 habitat islands (57%) and calf signs were found in six complexes (40%) and on nine islands (17%; Appendix A, Table A-30). In previous survey years, adult moose signs were observed in 93% of peatland complexes in

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2011 and in all complexes in 2012 and 2013. The percentage of complexes with moose calf signs increased from 7% in 2011 to 53% in 2012 and decreased to 50% in 2013 (Figure 3-11). The percentage of habitat islands with adult moose signs was 62% in 2011 and 2012, and 100% in 2013 (Figure 3-12). The percentage of islands with moose calf signs was 0% in 2011, increased to 21% in 2012, and to 50% in 2013.

*Undisturbed Comparison Area**Caribou*

A total of 179 caribou signs were observed on caribou calving islands transects in the Undisturbed Comparison Area in 2014, or 1.85 signs/km (Appendix A, Table A-27). Caribou signs were recorded in 14 peatland complexes (78%) and on 29 (30%) habitat islands. Adult signs were recorded in 13 (72%) peatland complexes, and calf signs were found in six (33%; Appendix A, Table A-28). Signs of adults were observed on 29 habitat islands (30%) and calf signs were observed on five islands (5%).

In previous survey years, the percentage of peatland complexes with adult caribou signs in the Undisturbed Comparison Area was 93% in 2011, 78% in 2012, and 86% in 2013 (Appendix A, Table A-28; Figure 3-9). The percentage of complexes with calf signs was 43% in 2011, decreased to 22% in 2012 and to 7% in 2013. The percentage of habitat islands with adult caribou signs was 60% in 2011, decreased to 43% in 2012, and increased to 45% in 2013 (Figure 3-10). The percentage of islands with caribou calf signs decreased from 6% in 2011 to 4% in 2012 and to 2% in 2013.

When distance to the KIP access road in the Project Effects (within 5 km) and Undisturbed Comparison (beyond 5 km) areas was compared, 78% of peatland complexes more than 5 km from the road had signs of caribou and 33% had calf signs in 2014 (Appendix A, Table A-31). Signs of all caribou were found on 27% of habitat islands and calf signs were found on 5% of islands more than 5 km from the road. Within 5 km of the road, the percentage of peatland complexes with caribou signs ranged from zero (1 to 2 km and 2 to 3 km) to 75% (0 to 1 km), and calf signs were only found on complexes 3 to 4 km from the road (25%). The percentage of habitat islands with caribou signs ranged from zero (2 to 3 km) to 58% (1 to 2 km). No calf signs were observed on islands within 5 km of the road.

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Other Large Mammals

Signs of black bear, gray wolf, and moose were observed in the Undisturbed Comparison Area in 2014 (Appendix A, Table A-29). A total of six black bear signs and one gray wolf sign were observed, for a relative abundance of 0.06 signs/km and <0.01 signs/km, respectively. The relative abundance of black bear signs was 0.14 signs/km in 2011, 0.05 signs/km in 2012, and 0.03 signs/km in 2013. The relative abundance of gray wolf signs was 0.05 signs/km in 2011, 0.01 signs/km in 2012, 0.03 signs/km in 2013.

A total of 269 moose signs were recorded in 2014, for a relative abundance of 2.79 signs/km (Appendix A, Table A-29). The relative abundance of moose signs was 2.17 signs/km in 2011, then increased to 3.53 signs/km in 2012 and to 4.80 signs/km in 2013. In 2014, adult moose signs were observed in 18 peatland complexes (100%) and on 55 habitat islands (56%) and calf signs were found in five complexes (28%) and on four islands (4%; Appendix A, Table A-30). In previous survey years, adult moose signs were observed in 86% of peatland complexes in 2011, and in all complexes in 2012 and 2013 (Figure 3-11). The percentage of complexes with moose calf signs decreased from 43% in 2011 to 39% in 2012 and increased to 50% in 2013. The percentage of habitat islands with adult moose signs was 40% in 2011, 55% in 2012, and 74% in 2013 (Figure 3-12). The percentage of islands with moose calf signs was 5% in 2011, increased to 10% in 2012, and increased slightly to 11% in 2013.

Traffic Disturbance Comparison Area***Caribou***

A total of 236 caribou signs were observed on caribou calving islands transects in the Traffic Disturbance Comparison Area in 2014, or 1.32 signs/km (Appendix A, Table A-27). Caribou signs were recorded in 11 peatland complexes (69%) and on 67 (40%) habitat islands. Adult signs were recorded in 11 (69%) peatland complexes, and calf signs were found in four (25%; Appendix A, Table A-28). Signs of adults were observed on 67 habitat islands (40%) and calf signs were observed on six islands (4%).

In previous survey years, the percentage of peatland complexes with adult caribou signs in the Traffic Disturbance Comparison Area was 76% in 2011, 67% in 2012, and 82% in 2013

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(Appendix A, Table A-28; Figure 3-9). The percentage of complexes with calf signs was 24% in 2011, increased to 27% in 2012 and to 47% in 2013. The percentage of habitat islands with adult caribou signs was 39% in 2011, decreased to 29% in 2012, and increased to 64% in 2013 (Figure 3-10). The percentage of islands with caribou calf signs decreased from 6% in 2011 to 4% in 2012 and increased to 7% in 2013.

When distance to the PR 280 was considered, all peatland complexes more than 5 km from the road had signs of caribou and 33% had calf signs in 2014 (Appendix A, Table A-32). Caribou signs were found on 52% of habitat islands and calf signs were found on 5% of islands more than 5 km from the road. Within 5 km of the road, the percentage of peatland complexes with caribou signs ranged from 50% (1 to 2 km and 3 to 4 km) to 100% (0 to 1 km and 4 to 5 km), and calf signs were found on all complexes 0 to 1 km from the road and in 50% of complexes 3 to 4 km from the road. Calf signs were not found at other distances from PR 280. The percentage of habitat islands with caribou signs ranged from 28% (0 to 1 km) to 60% (4 to 5 km). The percentage of habitat islands with calf signs ranged from zero (4 to 5 km) to 8% (3 to 4 km).

Other Large Mammals

Signs of black bear, gray wolf, and moose were observed in the Traffic Disturbance Comparison Area in 2014 (Appendix A, Table A-29). A total of six black bear signs and nine gray wolf signs were observed, for a relative abundance of 0.03 signs/km and 0.05 signs/km, respectively. The relative abundance of black bear signs was 0.07 signs/km in 2011, 0.06 signs/km in 2012, and 0.02 signs/km in 2013. The relative abundance of gray wolf signs was 0.01 signs/km in 2012 and 0.08 signs/km in 2013. No signs of gray wolf were observed in 2011.

A total of 566 moose signs were recorded in 2014, for a relative abundance of 3.15 signs/km (Appendix A, Table A-29). The relative abundance of moose signs was 1.92 signs/km in 2011, then increased to 3.00 signs/km in 2012 and decreased slightly to 2.98 signs/km in 2013. In 2014, adult moose signs were observed in 15 peatland complexes (94%) and on 110 habitat islands (65%) and calf signs were found in seven complexes (44%) and on 12 islands (7%; Appendix A, Table A-30). In previous survey years, adult moose signs were observed in 100% of peatland complexes in 2011, 93% in 2012, and 94% in 2013 (Figure 3-11). The percentage of complexes with moose calf signs increased from 24% in 2011 to 40% in 2012 and to 59% in

2013. The percentage of habitat islands with adult moose signs was 48% in 2011, 61% in 2012, and 62% in 2013 (Figure 3-12). The percentage of islands with moose calf signs was 5% in 2011, increased to 9% in 2012, and to 12% in 2013.

3.1.1.5 Caribou Activity on Habitat Islands (Second and Third Visits)

Caribou activity was generally greater on habitat islands in the Undisturbed Comparison Area than in the Project Effects Area, with the exception of 2013 (Table 3-3), when few islands were surveyed in the Project Effects Area due to forest fires. While results were tabulated for this area in 2013, they were omitted from the consideration and discussion of results due to the lack of data.

There was significantly more caribou activity on islands in the Undisturbed Comparison Area than in the Project Effects Area during the third visit ($U = 1597.5$, $p = 0.002$) and combined second and third visits ($U = 7612.0$, $p = 0.022$) in 2011, and during the second and combined visits in 2012 ($U = 1737.5$, $p = 0.007$ and $U = 8013.0$, $p = 0.006$, respectively) and 2014 ($U = 1759.5$, $p = 0.000$ and $U = 2401.0$, $p = 0.001$, respectively; Appendix A, Table A-33). When caribou activity on habitat islands in the Project Effects and Traffic Disturbance Areas was compared, there was significantly more activity on islands in the Project Effects Area during the second visit in 2011 ($U = 5224.5$, $p = 0.006$), and significantly more activity on islands in the Traffic Disturbance Comparison Area than in the Project Effects Area during the second ($U = 3324.5$, $p = 0.006$), third ($U = 3212.5$, $p = 0.033$) and combined ($U = 1320.5$, $p = 0.000$) visits in 2014.

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Table 3-3: Caribou Activity (mean number of thread breaks/island) on Habitat Islands in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison Areas 2011–2014

Year	Visit	Survey Area		
		Project Effects	Undisturbed Comparison	Traffic Disturbance Comparison
2011	2	0.21	0.21	0.12
	3	0.08	0.18	0.10
	2 & 3	0.15	0.20	0.11
2012	2	0.06	0.11	0.06
	3	0.06	0.10	0.07
	2 & 3	0.06	0.11	0.07
2013	2	0.16	0.25	0.25
	3	0.38	0.09	0.15
	2 & 3	0.25	0.17	0.21
2014	2	0.08	0.20	0.15
	3	0.04	0.07	0.07
	2 & 3	0.06	0.13	0.11

In the Project Effects Area, there was significantly less caribou activity on habitat islands during construction of the KIP access road (2012-2014) than before construction began (2011) for the second and combined visits (Table 3-4). There was also significantly less caribou activity in the Undisturbed Comparison Area during the third and combined visits. While caribou activity decreased on habitat islands near the KIP access road construction zone and in undisturbed areas farther away, caribou activity increased significantly in the Traffic Disturbance Comparison Area during construction for the second and combined visits.

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Table 3-4: Comparison of Caribou Activity on Habitat Islands in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison Areas Before (2011) and During (2012-2014) Construction of the KIP Access Road

Survey Area	Visit	Mean Thread Breaks/Island 2011	Mean Thread Breaks/Island 2012-2014	U test statistic	p-value ¹
Project Effects	2	0.21	0.08	3724.0	0.000
	3	0.08	0.06	2954.5	0.780
	2 & 3	0.15	0.07	13481.0	0.001
Undisturbed Comparison	2	0.21	0.18	12528.5	0.306
	3	0.18	0.09	13952.5	0.000
	2 & 3	0.20	0.13	52970.5	0.001
Traffic Disturbance Comparison	2	0.12	0.16	30558.5	0.001
	3	0.10	0.09	32101.5	0.327
	2 & 3	0.11	0.13	124712.5	0.001

1. Bolded values indicate statistically significant results.

Forest fires in 2013 burned much of the caribou calving habitat near the KIP access road (see Map 2-3). There was significantly less caribou activity on habitat islands in the Project Effects Area after the fires during the second visit (Table 3-5). There was no change in caribou activity in the Undisturbed Comparison Area. In the Traffic Disturbance Comparison Area, there was significantly more activity after the fires during the second and combined visits, but significantly less activity after the fires during the third visit.

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Table 3-5: Comparison of Caribou Activity on Habitat Islands in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison Areas Before and After the 2013 Forest Fires

Survey Area	Visit	Mean Thread Breaks/Island 2011-2012	Mean Thread Breaks/Island 2014	U test statistic	p-value ¹
Project Effects	2	0.14	0.08	4362.0	0.014
	3	0.07	0.04	5216.0	0.340
	2 & 3	0.10	0.06	9578.0	0.053
Undisturbed Comparison	2	0.16	0.20	16350.5	0.078
	3	0.14	0.07	17198.5	0.458
	2 & 3	0.15	0.13	33549.0	0.146
Traffic Disturbance Comparison	2	0.09	0.15	51346.0	0.035
	3	0.08	0.07	51864.5	0.009
	2 & 3	0.09	0.11	13210.5	0.006

1. Bolded values indicate statistically significant results.

When distance to the KIP access road was considered, caribou activity on habitat islands tended to be greater or similar farther from the road than closer to it in all survey years during all visits (Appendix A, Table A-34). There was no difference in caribou activity within 1 km or beyond 1 km during the second visit in 2011, before construction began (Appendix A, Table A-35). However, during the third visit that year, there was significantly less caribou activity closer to the road than farther from it, up to 4 km. When construction began in 2012, there was significantly less caribou activity closer to the road than farther from it; up to 4 km during the second visit and up to 3 km during the third visit. There was no difference between caribou activity in the Project Effects Area (*i.e.*, on islands within 5 km of the KIP access road) and Undisturbed Comparison Area (*i.e.*, on islands more than 5 km from the KIP access road) during either visit. In 2014 there was significantly less caribou activity on islands from 2 km to more than 5 km from the KIP access road during the second visit, but there was no difference in caribou activity within 1 km of and beyond 1 km from the KIP access road. There was no difference in caribou activity at any distance from the KIP access road during the third visit in 2014.

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In the Traffic Disturbance Comparison Area, there was less change in caribou activity on habitat islands near and farther from PR 280 during the four-year survey period. During the second visits in 2011 and 2012, there was significantly more activity within 1 km of the road than beyond 1 km (Appendix A, Table A-36). During the second and third visits in 2014 there was significantly less activity within 1 km and 3 km than farther away. There were no other significant differences in caribou activity in the Traffic Disturbance Comparison Area.

Caribou activity was compared between 1-km intervals of the KIP access road and PR 280. In 2011, there was significantly more caribou activity on habitat islands more than 5 km from the KIP access road in the Undisturbed Comparison Area than more than 5 km from PR 280 in the Traffic Disturbance Comparison Area during the second visit (Appendix A, Table A-37). There was no significant difference in caribou activity within 5 km of the roads. In 2012, there was significantly more caribou activity within 1 km of PR 280 than within 1 km of the KIP access road ($U = 83.5$, $p = 0.012$), and from 1 to 2 km of PR 280 than from 1 to 2 km of the KIP access road ($U = 174.0$, $p = 0.015$) during the second visit. During the third visit, there was significantly more caribou activity on habitat islands from 1 to 2 km of PR 280 than from 1 to 2 km of the KIP access road in 2011 ($U = 186.0$, $p = 0.013$). In 2013, there was significantly more caribou activity more than 5 km from PR 280 than more than 5 km from the KIP access road ($U = 290.5$, $p = 0.004$), and in 2014 caribou activity was significantly greater from 4 to 5 km of PR 280 than within the same distance of the KIP access road ($U = 35.0$, $p = 0.028$).

During the second visit to habitat islands, caribou activity was relatively similar within and beyond 1 and 2 km of the KIP access road in 2011, before construction began (Figure 3-13). Caribou activity declined near the KIP access road from 2011 to the beginning of construction in 2012. As indicated in Appendix A, Table A-35, there was significantly less activity closer to the KIP access road than farther from it. No habitat islands were surveyed within 2 km of the KIP access road in 2013, and caribou activity increased in 2014. During the third visit, caribou activity declined on habitat islands more than 1 and 2 km from the KIP access road and less than 1 km from it between 2011 and 2012, but increased on islands less than 2 km from the KIP access road over the same period (Figure 3-14). Caribou activity continued to decline beyond 1 and 2 km of the KIP access road from 2012 to 2014, but increased within 1 and 2 km of the road.

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Caribou activity also declined within and beyond 1 and 2 km of PR 280 from 2011 to 2012 during the second visit (Figure 3-15). Caribou activity on habitat islands was similar nearer and farther from the road in 2011, but tended to be greater farther from PR 280 than closer to it in 2013. Caribou activity declined from 2013 to 2014 at all distances from the road. During the third visit, caribou activity was greater beyond 1 and 2 km of PR 280 than closer to it in 2011 but was similar at all distances in 2012, when activity decreased within 2 km and beyond 1 and 2 km, but increased within 1 km of PR 280. Caribou activity increased on habitat islands at all distances from the road from 2012 to 2013 then declined in 2014, as in the second visit.

3.1.2 Trail Camera Monitoring

Caribou were photographed at five locations on three transects in the Project Effects and Undisturbed Comparison areas in 2014 (Table 3-6). A total of six events were recorded; all were of lone males or single caribou whose sex was not identified (Appendix C, Photo 3-1 to Photo 3-4). No calves were photographed in 2014. Caribou were photographed in both the Project Effects and Undisturbed Comparison areas in all survey years (Appendix A, Table A-38). However, during construction (after 2011), caribou were only photographed at two locations (EA018_1 and EA018_2) in the Project Effects Area, both south of Gull Lake (Map 3-1). Only one calf was photographed over the four-year survey period, in the Project Effects Area in 2011.

Table 3-6: Caribou Events in the Undisturbed Comparison Area 2014

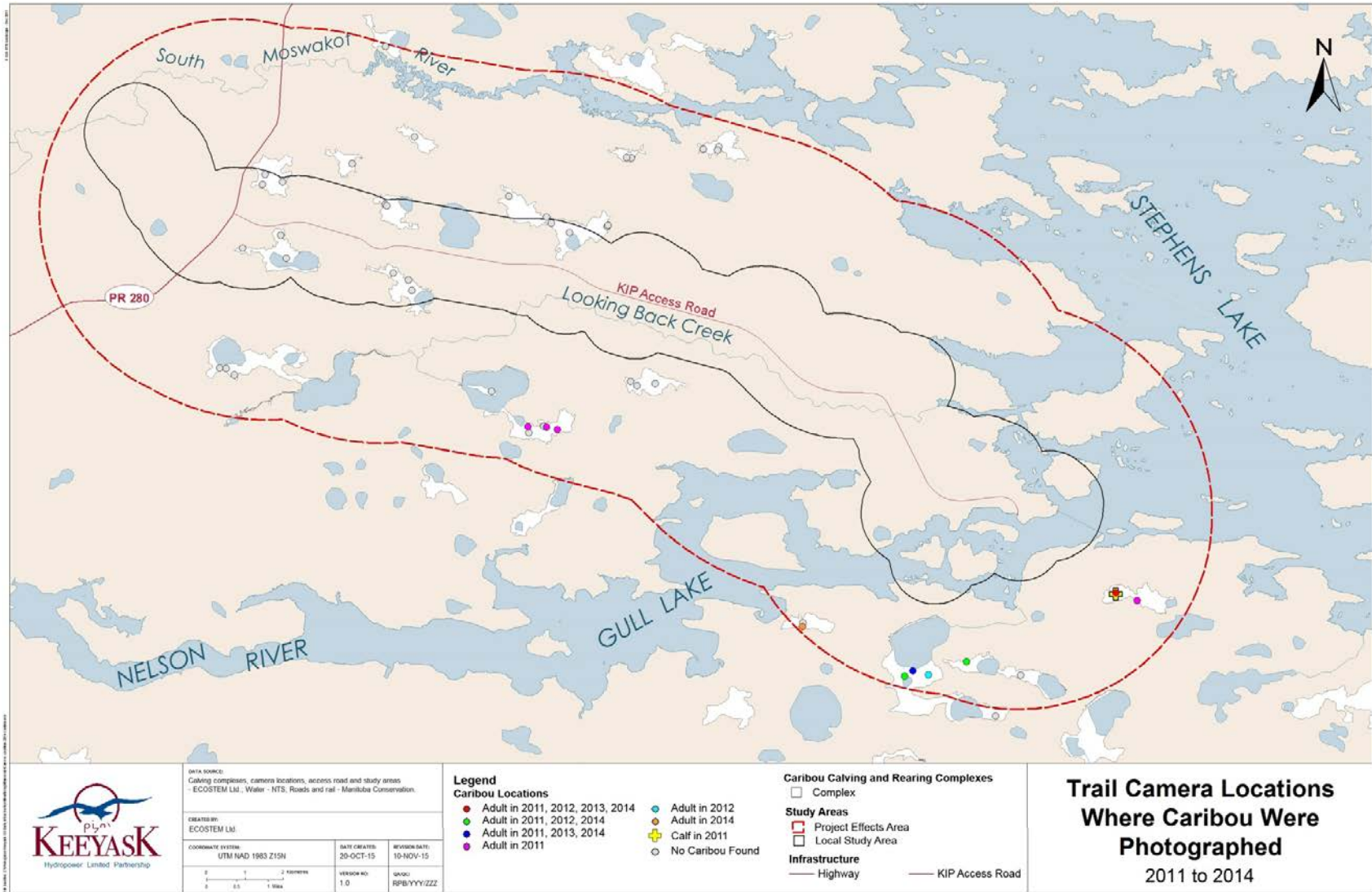
Survey Area	Transect	Camera	Date	Sex	Number of Individuals
Project Effects	EA018	1	Sept. 16	male	1
		2	June 13	male	1
			June 14	male	1
Undisturbed Comparison	EA020	1	June 2	unknown	1
		2	June 2	male	1
	EA021	1	May 29	male	1

Other large mammals were photographed in the Project Effects and Undisturbed Comparison areas (Appendix A, Table A-38). Moose were photographed in both survey areas in 2014 (Appendix C, Photo 3-5 to Photo 3-8) and from 2011 to 2013. Moose calves were photographed

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in the Project Effects Area each year, but were only photographed in the Undisturbed Comparison Area in 2011. Black bears and gray wolves were also photographed, but less frequently than moose. Black bears were photographed in the Project Effects Area in 2014 (Appendix C, Photo 3-9) and from 2011 to 2013, and in the Undisturbed Comparison Area in 2012 and 2013. Gray wolves were photographed in the Project Effects Area in 2014 (Appendix C, Photo 3-10), 2011, and 2013, and in the Undisturbed Comparison Area in 2011 and 2013. Seven other mammal species were photographed over the four-year survey period (Appendix A, Table A-39). Of these, only American marten, red fox, and North American river otter were photographed in 2014.

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Map 3-1: Trail Camera Locations Where Caribou Were Photographed 2011 to 2014

3.2 MOOSE AND OTHER LARGE MAMMAL MONITORING

Moose signs were observed throughout the Regional Study Area in 2014 and from 2011 to 2013. A total of 1,245 signs were observed over all combined visits to all transects in 2014 (Table 3-7). Most were signs of adults; unidentified signs were predominantly browse. The greatest number of moose signs was observed in 2011 and the fewest in 2013.

Table 3-7: Moose Signs on Moose and Other Large Mammal Monitoring Transects During Three Visits 2011 to 2014

Sex/Age	Year			
	2011	2012	2013	2014
Adult	1,108	480	95	904
Female	93	198	1	187
Juvenile	83	83	5	85
Male	112	60	0	69
Unidentified	57	27	52	0
<i>All</i>	<i>1,453</i>	<i>848</i>	<i>153</i>	<i>1,245</i>

Signs of caribou, black bear, and gray wolf were also observed (Table 3-8). Caribou signs were most frequently observed over all combined visits to all transects. Relatively few signs of black bear (range = 3 to 17) and gray wolf (range = 1 to 34) were observed, particularly in 2013, when survey effort was reduced due to the forest fires.

Signs of 11 other mammals were identified to species (Appendix A, Table A-40). Weasel signs were also observed but not identified to species. Some species, such as fisher, are typically sparse in the Regional Study Area. Others are more common but are not easily as easily detected with sign surveys as larger mammals (*e.g.*, American marten). Because moose and other large mammals monitoring focused on large mammals, observations of signs of other mammals were not consistently recorded and no inference can be made about the relative abundance of these species.

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Table 3-8: Large Mammal Signs on Moose and Other Large Mammal Transects 2011 to 2014

Species	Age/Sex	Year			
		2011	2012	2013	2014
Caribou	Adult	759	52	430	175
	Female	10	36	0	1
	Juvenile	15	12	0	14
	Male	0	0	0	1
	Unidentified	14	0	351	0
	<i>All</i>	<i>798</i>	<i>100</i>	<i>781</i>	<i>191</i>
Black bear	Adult	17	12	2	14
	Juvenile	0	1	0	0
	Unidentified	0	1	1	1
	<i>All</i>	<i>17</i>	<i>14</i>	<i>3</i>	<i>15</i>
Gray wolf	Adult	32	16	0	23
	Juvenile	0	1	0	0
	Unidentified	2	0	1	0
	<i>All</i>	<i>34</i>	<i>17</i>	<i>1</i>	<i>23</i>

3.2.1 All Visits**3.2.1.1 KIP Access Road North Side**

In 2014, 753 moose signs were observed on moose and other large mammal transects north of the KIP access road (Appendix A, Table A-41). The relative abundance of moose signs was 3.31 signs/km. One hundred and sixteen caribou signs were found for a relative abundance of 0.51 signs/km. Fewer signs of black bear ($n = 14$) and gray wolf ($n = 14$) were observed. The relative abundance of black bear signs and gray wolf signs was the same (0.06 signs/km).

In previous survey years, the relative abundance of moose signs ranged from 1.91 signs/km in 2013 to 5.01 signs/km in 2011 (Appendix A, Table A-41). The relative abundance of moose signs decreased 41% from 2011 to 2012, increased 35% from 2012 to 2013, and increased 73% from 2013 to 2014. The relative abundance of caribou signs ranged from 0.24 signs/km in 2012

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to 5.07 signs/km in 2013. The relative abundance of caribou signs decreased 88% from 2011 to 2012, increased 2,012% from 2012 to 2013, and decreased 90% from 2013 to 2014. The relative abundance of black bear signs ranged from 0.04 signs/km in 2013 to 0.06 signs/km in 2011 and 2012. The relative abundance of black bear signs decreased 33% from 2012 to 2013 and increased 50% from 2013 to 2014. The relative abundance of gray wolf signs ranged from 0.01 signs/km in 2013 to 0.12 signs/km in 2011. The relative abundance of gray wolf signs decreased 42% from 2011 to 2012, decreased 88% from 2012 to 2013, and increased 500% from 2013 to 2024.

Moose signs were widely distributed in 2014, observed on all transects north of the KIP access road (Appendix A, Table A-42). Caribou signs were found on 75% of transects, black bear signs were found on 50% of transects, and gray wolf signs were found on 63% of transects.

In previous survey years, moose signs were observed on all transects from 2011 to 2013 (Appendix A, Table A-42). Caribou signs were found on the greatest percentage of transects (100%) in 2011 and 2013, and on the smallest percentage of transects in 2012 (88%). Black bear signs were observed on the greatest percentage of transects (75%) in 2012, and on the smallest percentage of transects (13%) in 2013. Gray wolf signs were found on the greatest percentage of transects (88%) in 2011 and on the smallest percentage of transects (13%) in 2013.

3.2.1.2 KIP Access Road South Side

In 2014, 492 moose signs were observed on moose and other large mammal transects south of the KIP access road (Appendix A, Table A-41). The relative abundance of moose signs was 5.24 signs/km. Seventy-five caribou signs were found for a relative abundance of 0.80 signs/km. Fewer signs of black bear ($n = 1$) and gray wolf ($n = 9$) were observed. The relative abundance of black bear and gray wolf signs was 0.01 and 0.10 signs/km, respectively.

In previous survey years, the relative abundance of moose signs ranged from 0.26 signs/km in 2013 to 3.45 signs/km in 2011 (Appendix A, Table A-41). The relative abundance of moose signs decreased 40% from 2011 to 2012, decreased 87% from 2012 to 2013, and increased 1,915% from 2013 to 2014. The relative abundance of caribou signs ranged from 0.49 signs/km in 2012 to 12.65 signs/km in 2013. The relative abundance of caribou signs decreased 87% from

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2011 to 2012, increased 2,482% from 2012 to 2013, and decreased 94% from 2013 to 2014. The relative abundance of black bear signs ranged from 0 signs/km in 2013 to 0.03 signs/km in 2011. The relative abundance of black bear signs decreased 67% from 2011 to 2012 and decreased 100% from 2012 to 2013. The relative abundance of gray wolf signs ranged from 0 signs/km in 2013 to 0.07 signs/km in 2011. The relative abundance of gray wolf signs decreased 86% from 2011 to 2012 and decreased 100% from 2012 to 2013.

Moose signs were widely distributed in 2014, observed on all transects south of the KIP access road (Appendix A, Table A-42). Caribou signs were found on all transects, black bear signs were found on 33% of transects, and gray wolf signs were found on 67% of transects.

In previous survey years, moose signs were observed on all transects in 2011 and 2012, and on 67% of transects in 2013 (Appendix A, Table A-42). Caribou signs were found on the greatest percentage of transects (100%) in 2011 and 2013, and on the smallest percentage of transects in 2012 (67%). Black bear signs were observed on the greatest percentage of transects (67%) in 2011, and on the smallest percentage of transects (0%) in 2013. Gray wolf signs were found on the greatest percentage of transects (33%) in 2011 and 2012 and on the smallest percentage of transects (0%) in 2013.

When all transects are considered for both north and south sides of the KIP access road, a relatively small decline in moose activity (16%) was observed in 2014 compared to 2011.

3.2.2 First Visit

3.2.2.1 KIP Access Road North Side

In 2014, 55 moose signs were observed on moose and other large mammal transects north of the KIP access road during the first visit (Appendix A, Table A-43). The relative abundance of moose signs was 0.72 signs/km. One caribou sign was found for a relative abundance of 0.01 signs/km. Fewer signs of gray wolf ($n = 4$) and no signs of black bear were observed. The relative abundance of gray wolf signs was 0.05 signs/km.

In previous survey years, the relative abundance of moose signs ranged from 1.15 signs/km in 2012 to 6.06 signs/km in 2011 (Appendix A, Table A-43). The relative abundance of moose

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signs decreased 81% from 2011 to 2012, increased 66% from 2012 to 2013, and decreased 62% from 2013 to 2014. The relative abundance of caribou signs ranged from 0 signs/km in 2012 to 5.07 signs/km in 2013. The relative abundance of caribou signs decreased 100% from 2011 to 2012 and decreased more than 99% from 2013 to 2014. The relative abundance of black bear signs ranged from 0.03 signs/km in 2011 and 2012 to 0.04 signs/km in 2013. The relative abundance of black bear signs was the same in 2011 and 2012, and increased 33% from 2012 to 2013. The relative abundance of gray wolf signs ranged from 0.01 signs/km in 2013 to 0.25 signs/km in 2011. The relative abundance of gray wolf signs decreased 40% from 2011 to 2012, decreased 93% from 2012 to 2013, and increased 400% from 2013 to 2014.

Moose signs were widely distributed in 2014, observed on all transects north of the KIP access road (Appendix A, Table A-44). Caribou signs were found on 13% of transects, no black bear signs were found, and gray wolf signs were observed on 38% of transects.

In previous survey years, moose signs were observed on all transects in 2011 and 2013, and on 88% of transects in 2012 (Appendix A, Table A-44). Caribou signs were found on the greatest percentage of transects (100%) in 2011 and 2013, and none were observed in 2012. Black bear signs were observed on the greatest percentage of transects (25%) in 2011 and 2012, and on the smallest percentage of transects (13%) in 2013. Gray wolf signs were found on the greatest percentage of transects (63%) in 2011 and on the smallest percentage of transects (13%) in 2013.

3.2.2.2 *KIP Access Road South Side*

In 2014, 102 moose signs were observed on moose and other large mammal transects south of the KIP access road during the first visit (Appendix A, Table A-43). The relative abundance of moose signs was 3.16 signs/km. No signs of caribou or black bear were found. Four gray wolf signs were observed, for a relative abundance of 0.12 signs/km.

In previous survey years, the relative abundance of moose signs ranged from 0.26 signs/km in 2013 to 3.10 signs/km in 2011 (Appendix A, Table A-43). The relative abundance of moose signs decreased 79% from 2011 to 2012, decreased 59% from 2012 to 2013, and increased 1,115% from 2013 to 2014. The relative abundance of caribou signs ranged from 0 signs/km in 2012 to 12.65 signs/km in 2013. The relative abundance of black bear signs ranged from

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0 signs/km in 2012 and 2013 to 0.10 signs/km in 2011. The relative abundance of gray wolf signs ranged from 0 signs/km in 2013 to 0.13 signs/km in 2011. The relative abundance of gray wolf signs decreased 77% from 2011 to 2012 and 100% from 2012 to 2013.

Moose signs were widely distributed in 2014, observed on all transects south of the KIP access road (Appendix A, Table A-44). No signs of caribou or black bear were observed, and gray wolf signs were found on 33% of transects.

In previous survey years, moose signs were observed on all transects in 2011 and on 67% of transects in 2012 and 2013 (Appendix A, Table A-44). Caribou signs were found on the greatest percentage of transects (100%) in 2011 and 2013 and on the smallest percentage of transects (0%) in 2012. Black bear signs were observed on the greatest percentage of transects (67%) in 2011, and on the smallest percentage of transects (0%) in 2012 and 2013. Gray wolf signs were found on the greatest percentage of transects (33%) in 2011 and 2012 and on the smallest percentage of transects (0%) in 2013.

3.2.3 Second Visit

3.2.3.1 KIP Access Road North Side

In 2014, 332 moose signs were observed on moose and other large mammal transects north of the KIP access road during the second visit (Appendix A, Table A-45). The relative abundance of moose signs was 4.37 signs/km. One hundred and eleven caribou signs were found for a relative abundance of 1.46 signs/km. Fewer signs of black bear ($n = 14$, relative abundance = 0.18 signs/km) and gray wolf ($n = 5$, relative abundance = 0.07) were observed.

In previous survey years, the relative abundance of moose signs was 5.01 signs/km in 2011 and 3.90 signs/km in 2012 (Appendix A, Table A-45). No transects were surveyed in 2013 due to the forest fires. The relative abundance of moose signs decreased 22% from 2011 to 2012 and was 12% greater in 2014 than in 2012. The relative abundance of caribou signs was 2.35 signs/km in 2011 and 0.58 signs/km in 2012, a 75% increase. The relative abundance of caribou signs was 157% greater in 2014 than in 2012. The relative abundance of black bear signs was 0.08 signs/km in 2011 and 0.11 signs/km in 2012, a 38% decrease. The relative abundance of black bear signs was 64% greater in 2014 than in 2012. The relative abundance of gray wolf

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signs was 0.12 signs/km in 2011 and 0.03 signs/km in 2012, a 75% decrease. The relative abundance of gray wolf signs was 133% greater in 2014 than in 2012.

Moose signs were widely distributed in 2014, observed on all transects north of the KIP access road (Appendix A, Table A-46). Caribou signs were found on 50% of transects, black bear signs were observed on 38% of transects, and gray wolf signs were observed on 25% of transects.

In previous survey years, moose signs were observed on all transects in 2011 and 2012 (Appendix A, Table A-46). Caribou signs were found on the greatest percentage of transects (100%) in 2011 and were found on 88% of transects in 2012. Black bear signs were observed on 38% of transects in 2011 and 2012, and gray wolf signs were found on 50% of transects in 2011 and on 25% of transects in 2012.

3.2.3.2 KIP Access Road South Side

In 2014, 218 moose signs were observed on moose and other large mammal transects south of the KIP access road during the second visit (Appendix A, Table A-45). The relative abundance of moose signs was 6.96 signs/km. Thirty-eight caribou signs were found for a relative abundance of 1.21 signs/km. Fewer signs of black bear ($n = 1$, relative abundance = 0.03 signs/km) and gray wolf ($n = 2$, relative abundance = 0.06) were observed.

In previous survey years, the relative abundance of moose signs was 3.37 signs/km in 2011 and 3.51 signs/km in 2012 (Appendix A, Table A-45). No transects were surveyed in 2013 due to the forest fires. The relative abundance of moose signs decreased 4% from 2011 to 2012 and was 98% greater in 2014 than in 2012. The relative abundance of caribou signs was 5.10 signs/km in 2011 and 1.12 signs/km in 2012, a 78% decrease. The relative abundance of caribou signs was 8% greater in 2014 than in 2013. No black bear signs were observed in 2011 or 2012. The relative abundance of gray wolf signs was 0.03 signs/km in 2011; no signs were observed in 2012.

Moose and caribou signs were widely distributed in 2014, observed on all transects south of the KIP access road (Appendix A, Table A-46). Black bear signs were observed on 38% of transects, and gray wolf signs were observed on 25% of transects.

In previous survey years, moose signs were also observed on all transects in 2011 and 2012 (Appendix A, Table A-46). Caribou signs were found on all transects in 2011 and on 67% of transects in 2012. Gray wolf signs were found on 33% of transects in 2011.

3.2.4 Third Visit

3.2.4.1 KIP Access Road North Side

In 2014, 366 moose signs were observed on moose and other large mammal transects north of the KIP access road during the third visit (Appendix A, Table A-47). The relative abundance of moose signs was 4.82 signs/km. Four caribou signs and four black bear signs were found for a relative abundance of 0.05 signs/km each. No signs of black bear were observed.

In previous survey years, the relative abundance of moose signs was 3.95 signs/km in 2011 and 3.82 signs/km in 2012 (Appendix A, Table A-47). No transects were surveyed in 2013 due to the forest fires. The relative abundance of moose signs decreased 48% from 2011 to 2012 and was 172% greater in 2014 than in 2012. The relative abundance of caribou signs was 2.53 signs/km in 2011 and 0.16 signs/km in 2012, a 94% decrease. The relative abundance of caribou signs was 69% lower in 2014 than in 2012. The relative abundance of black bear signs was 0.08 signs/km in 2011 and 0.04 signs/km in 2012, a 50% decrease. The relative abundance of gray wolf signs was 0.04 signs/km in 2012; no signs were observed in 2011.

Moose signs were widely distributed in 2014, observed on all transects north of the KIP access road (Appendix A, Table A-48). Caribou signs were found on 38% of transects, gray wolf signs were observed on 25% of transects, and no black bear signs were recorded.

In previous survey years, moose signs were observed on all transects in 2011 and 2012 (Appendix A, Table A-48). Caribou signs were found on the greatest percentage of transects (100%) in 2011 and were found on 63% of transects in 2012. Black bear signs were observed on 25% of transects in 2011 and on 38% of transects in 2012, and gray wolf signs were found on 13% of transects in 2011.

3.2.4.2 KIP Access Road South Side

In 2014, 172 moose signs were observed on moose and other large mammal transects south of the KIP access road during the third visit (Appendix A, Table A-47). The relative abundance of moose signs was 5.50 signs/km. Thirty-seven caribou signs and gray wolf signs were found for a relative abundance of 1.18 signs/km each. No signs of black bear were observed.

In previous survey years, the relative abundance of moose signs was 3.89 signs/km in 2011 and 2.02 signs/km in 2012 (Appendix A, Table A-47). No transects were surveyed in 2013 due to the forest fires. The relative abundance of moose signs decreased 40% from 2011 to 2012 and was 69% greater in 2014 than in 2012. The relative abundance of caribou signs was 2.88 signs/km in 2011 and 0.36 signs/km in 2012, an 88% decrease. The relative abundance of caribou signs was 228% greater in 2014 than in 2012. The relative abundance of black bear signs was 0.03 signs/km in 2011; no signs were found in 2012. The relative abundance of gray wolf signs was 0.03 signs/km in 2011; no signs were observed in 2012.

Moose and caribou signs were widely distributed in 2014, observed on all transects south of the KIP access road (Appendix A, Table A-48). Gray wolf signs were observed on 33% of transects, and no black bear signs were found.

In previous survey years, moose signs were observed on all transects in 2011 and 2012 (Appendix A, Table A-48). Caribou signs were found on the greatest percentage of transects (100%) in 2011 and were found on 33% of transects in 2012. Black bear signs were observed on 33% of transects in 2012, and gray wolf signs were found on 33% of transects in 2011.

4.0 DISCUSSION

4.1 CARIBOU

Caribou calving islands were monitored in 2011, before KIP construction began, and during construction from 2012 to 2014. Keyask Generation Project construction began in July 2014, after the calving period. Caribou calf-rearing activity near the KIP access road may have decreased due to increased construction disturbances during the second and third visits in 2014.

Large numbers of caribou signs were observed in peatland complexes and on habitat islands in all survey areas in 2013. In the Project Effects Area, the number of signs observed in 2013 was at least five times greater than in any other year (809 compared with 156 in 2011; see Appendix A, Table A-19) despite the fact that most transects were only surveyed once in 2013 due to the forest fires. Large groups of woodland caribou from the migratory Pen Islands herd moved through the region in the winter of 2012/13, and likely left many of the caribou signs in all survey areas during the first visit in spring 2013. The analysis of caribou activity in calving habitat focused on the second and third visits; so the migration of Pen Islands animals through the area did not affect the results.

Caribou tend to avoid habitat near construction (Mahoney and Schaefer 2002) and human development (Dyer *et al.* 2001). As predicted in the KIP Environmental Assessment Report (KHLP 2009), caribou activity declined on habitat islands in the Project Effects Area during construction of the KIP access road. However, there was also less caribou activity in the Undisturbed Comparison Area during construction. If caribou were disturbed by construction activity near the road, a re-distribution to the Undisturbed Comparison Area could have been expected, in which case caribou activity would have increased there while decreasing in the Project Effects Area. Decreased caribou activity in both areas could be an indication that caribou activity declined in the region for reasons other than KIP access road construction. Because caribou return to the same general calving areas from year to year, but not to specific sites (Schaefer *et al.* 2000; Rettie and Messier 2001; Committee on the Status of Endangered Wildlife in Canada 2011; Environment Canada 2012; Manitoba Boreal Woodland Caribou Management

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Committee 2015), the difference could have been due, at least in part, to natural variation in the selection of calving habitat.

While there was no increase in caribou activity in the Undisturbed Comparison Area as activity decreased in the Project Effects Area, there was more caribou activity in the Traffic Disturbance Comparison Area during construction years than in 2011, before construction began. Some caribou return to an area shortly after construction disturbance (*e.g.* Mahoney and Schaefer 2002). As there were few significant differences in caribou activity nearer to or farther from PR 280 over the four-year survey period, the increased activity in the Traffic Disturbance Comparison Area may indicate that some caribou avoided the disturbance in the Project Effects Area by moving nearer PR 280, a potentially more familiar and likely lesser source of disturbance.

Caribou abundance has been shown to decline within 1 to 5 km of a disturbance (Cameron *et al.* 1992; Smith *et al.* 2000; Dyer *et al.* 2001; Mahoney and Schaefer 2002). The KIP monitoring plan predicted that there would be no caribou activity or that activity would decline on habitat islands within 2 km of the KIP access road during construction, based on results from the Wuskwatim Generation Project caribou monitoring program (Manitoba Hydro 2011). When distance to the KIP access road was considered, caribou activity declined up to 4 km from the construction disturbance in 2012, the year construction began. No increase in caribou activity farther from the road was observed at that time, when caribou could be expected to move away from the disturbance in the Project Effects Area and re-locate to alternative habitat in the Undisturbed Comparison Area. There also tended to be less caribou activity nearer the KIP access road than farther away in 2014, but there was no difference in caribou activity within 1 km of the road or beyond 1 km of the road during the second visit. Caribou activity generally declined within 1 and 2 km of the KIP access road from the pre-construction period to the year construction began. Dissimilar trends were observed in the Traffic Disturbance Comparison Area from 2011 to 2014, indicating that the reduction in caribou activity on habitat islands near the KIP access road could likely at least partly be attributed to construction disturbance.

Caribou may avoid existing roads (James and Stuart-Smith 2000; Dyer *et al.* 2001, 2002; Beauchesne *et al.* 2014). In the Regional Study Area, caribou activity near PR 280 may be an

indication of future effects of the KIP access road on caribou and their use of calving habitat. While caribou activity tended to decrease in the Project Effects Area during construction and near the KIP access road, there was less change in caribou activity at all distances from PR 280. During the second visit in 2011 and 2012 caribou activity was greater within 1 km of PR 280 than beyond 1 km. This could indicate that traffic on the existing road was not a substantial disturbance to some caribou in the area, particularly since calf signs were observed on habitat islands within 1 km of PR 280 during the second and/or third visits each survey year. There was also more caribou activity on habitat islands within 1 and 2 km of PR 280 than on islands the same distances from the KIP access road the year construction began. If PR 280 is an indication of the effects of an existing road on caribou activity in nearby habitat, caribou will likely habituate to traffic disturbance along the KIP access road in the future, when construction in the area is complete and traffic and other disturbances are reduced.

The forest fires in 2013 altered much of the available calving and rearing habitat in the Project Effects Area. Caribou activity declined on habitat islands in the area after the fires, suggesting that some reduction in caribou activity could be attributed to the removal of suitable habitat. As there was no concurrent increase in caribou activity in the Undisturbed Comparison Area, it does not appear that caribou re-located to this habitat as a result of the fires. However, the increase in caribou activity in the Traffic Disturbance Comparison Area after the fires could be due at least in part to the redistribution of caribou to this area, as caribou relocate to undisturbed portions of their ranges after habitat alteration (Environment Canada 2012). Other areas in the broader region, such as the islands in Stephens Lake, are also suitable for calving and calf-rearing. As caribou prefer mature forests for calving and calf-rearing, it may take 40 years or more for burned peatland complexes to regenerate into suitable habitat (Environment Canada 2012), resulting in a long-term reduction in caribou activity in the Project Effects Area.

4.2 MOOSE AND OTHER LARGE MAMMALS

Moose activity did not appear to be substantially affected by construction activity in the Regional Study Area, and moose appeared to be less sensitive to construction disturbance than caribou. Moose activity declined 28% on caribou calving island transects in the Project Effects Area from 2011 (pre-construction) to 2012, when construction began (see Appendix A, Table A-15), but

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also declined in the Undisturbed Comparison and Traffic Disturbance Comparison areas at the same time, which suggests factors other than the construction of the access road may be affecting moose activity in the region. Moose activity remained widely distributed in the region over the four-year study period; moose signs were observed on most (67% to 100%) caribou calving island transects in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison areas over all visits (see Appendix A, Table A-16). Moose calf signs were found in the greatest percentage of peatland complexes in the Project Effects Area in 2012, the year construction began. Similarly, moose cows and calves were observed by workers during construction of the Wuskwatim Generating Station, and moose activity remained high during the access road construction period (Manitoba Hydro 2011). Moose use the same general calving areas year to year; successive calving sites can be only 1 to 2 km apart (McGraw *et al.* 2011). Fidelity to a relatively small calving area could be why moose activity did not decrease in the Project Effects Area during construction.

Moose activity also declined on moose and other large mammal transects from 2011 to 2012 over all visits (see Appendix A, Table A-41). The relative abundance of moose signs decreased by similar amounts north (41%) and south (40%) of the KIP access road when construction began, but increased each year north of the road. South of the road, the relative abundance of moose signs continued to decrease during the second year of construction (2013), but a very large increase (1,915%) in moose activity was observed from 2013 to 2014, for reasons that are unclear. It is possible however, that moose signs were easier to observe the year after the fire. When all transects are considered, moose activity was 16% lower in 2014 than in 2011, and the decline in moose activity during construction appeared to be temporary with no substantial effect on moose in the region.

Relatively few signs of black bear and gray wolf were observed on caribou calving island and moose and other large mammal transects over the four-year survey period. There was little change in predator activity on caribou calving island transects in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison areas or in predator abundance and distribution on moose and other large mammal transects. As such, there is little to suggest that these species were affected by KIP construction activity or that they affected caribou or their use

of habitat in the region. While predators appear sparse in the region, it is usually more difficult to observe their tracks than those of ungulates, due to the shape of their foot and depending on the terrain in which they are left. Black bears and gray wolves may be more common in the region than indicated by these sign surveys.

4.3 WILDLIFE MORTALITY

Part of the KIP mammals monitoring includes wildlife mortality caused by KIP.

A moose-vehicle collision occurred on August 2, 2014. The collision occurred near km 10 on the KIP access road; no construction was taking place in the area. A young (1 to 2 years old) female was struck and killed by a pickup truck. The incident was reported to Manitoba Conservation and Water Stewardship and staff onsite were reminded to watch for wildlife while driving and to respect posted speed limits (Manitoba Hydro 2015). The meat was provided to an elder from the Tataskweyak Cree Nation.

5.0 CONCLUSIONS

As this is the final monitoring report for the KIP, a summary of conclusions for monitoring components in all Project years are included.

Caribou activity was observed on habitat islands in peatland complexes near the KIP access road and in the Regional Study Area throughout the four-year survey period. Caribou activity declined on islands up to 4 km from the KIP access road during construction; this loss of effective habitat was greater than the 2 km predicted in the TAMP. The simultaneous increase in caribou activity in the Traffic Disturbance Comparison Area could be due at least in part to displaced caribou relocating to suitable alternative habitat, and most likely as a result of the 2013 fires. As there was little difference in caribou activity near or farther from PR 280 before or during construction, caribou activity will likely increase in the Project Effects Area after the construction disturbance ends, and the loss of some effective habitat will likely be temporary. However, data also suggested that caribou activity on calving islands may remain slightly depressed, and not return to levels as high as in undisturbed comparison habitats more than 5 km from roads. In addition, the forest fires in 2013 altered a considerable amount of potential

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calving and calf-rearing habitat near the KIP access road. Peatland complexes and habitat islands in the burned areas will likely be less suitable for caribou for decades, long after the construction period has ended, until such time as the vegetation matures.

Moose were likely less affected by construction disturbance than caribou; moose activity remained relatively high and widely distributed throughout the study area during construction. Few signs of gray wolf and black bear were observed in peatland complexes and on habitat islands before and during construction, and no conclusions about Project effects on these species can be made due to the paucity of data.

Black bear den surveys were conducted in 2011, 2012 and 2013 before Project footprints were cleared. One gray wolf den survey also occurred in 2012. No black bear or gray wolf dens were discovered during these searches so, the implementation of protection measures such as buffering dens by 100 metres was not required for the KIP.

While wildlife observations were noted frequently by Project staff in all construction years, few instances of wildlife mortality were reported during KIP construction. No caribou mortality was reported. Two moose-vehicle collisions occurred on the KIP access road (one in 2013 and one in 2014) that resulted in one moose fatality in 2014. Mitigation measures such as speed limits on the KIP access road appeared to have aided in minimizing wildlife-vehicle collisions, although it is unknown if collisions were actually avoided because "near-misses" may not have been reported.

Throughout the monitoring period, numerous foxes and black bear were observed near the Project site. To address this, site workers were reminded not to feed or harass wildlife at all worker orientations and at a number of contractor safety meetings (Manitoba Hydro 2014). These measures should continue at future project sites.

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Appendix A
Tables

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit		
		1	2	3
Project Effects	EA001	April 23	July 17	Sept. 17
	EA002	April 22	July 17	Sept. 16
	EA003	April 23	July 19	Sept. 16
	EA004	April 22	July 19	Sept. 16
	EA005	April 22	July 12	Sept. 18, 19
	EA006	April 22	July 19	Sept. 16
	EA007	April 22	July 17	Sept. 14
	EA008	April 22	July 12	Sept. 17, 18
	EA009	April 23, 25	July 12	Sept. 16
	EA010	April 23	July 12	Sept. 17-19
	EA011	April 22	July 12, 19	Sept. 14
	EA012	April 22	July 19	Sept. 14
	EA013	April 22	July 18	Sept. 13
	EA014	April 22	July 18	Sept. 14
	EA015	April 23	July 18	Sept. 13
	EA016	April 12	July 9	Sept. 6, 13
	EA017	April 13	July 10	Sept. 6
	EA018	April 14	July 6	Sept. 6
Undisturbed Comparison	CA001	April 14	July 5, 8, 9	Sept. 5
	CA002	April 15	July 7	Sept. 6
	CA003	April 15	July 6	Sept. 6
	CA004	April 15	July 7	Sept. 4
	CA005	April 15	July 6	Sept. 6
	CA006	April 13, 15	July 5, 6	Sept. 4, 5
	CA007	April 15	July 5	Sept. 6
	CA008	April 18	July 23	Sept. 11
	CA009	April 18	July 23	Sept. 11
	CA010	April 18	July 22, 23	Sept. 11

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit			
		1	2	3	
Undisturbed Comparison	CA011	April 18	July 23	Sept. 11	
	CA012	April 17	July 11	Sept. 8	
	CA013	April 16	July 11	Sept. 8	
	CA014	April 6, 16	July 11	Sept. 8	
	CA015	April 16	July 11	Sept. 8	
	CA016	April 16	July 11	Sept. 8	
	EA019	April 13	July 10	Sept. 4	
	EA020	April 13	July 10	Sept. 4	
	EA021	April 13	July 10	Sept. 4	
	EA022	April 12	July 10	Sept. 4	
	EA023	April 12, 13	July 9	Sept. 4	
	EA024	April 14	July 9	Sept. 6	
	EA025	April 12	July 8, 9	Sept. 6	
	Traffic Disturbance Comparison	RC001	April 28	July 24	Sept. 10
		RC002	April 20	July 22	Sept. 7
RC003		July 13	Sept. 19		
RC004		July 13	Sept. 19		
RC005		April 27	July 23	Sept. 11	
RC006		April 27	July 23	Sept. 11	
RC007		April 27	July 23	Sept. 12	
RC008		April 27	July 22	Sept. 12	
RC009		April 18	July 23	Sept. 11	
RC010		April 18	July 23	Sept. 12	
RC011		April 28	July 24	Sept. 12	
RC012		April 27	July 24	Sept. 10	
RC013		April 28	July 24	Sept. 10	
RC014		April 28	July 24	Sept. 10	
RC015		April 28	July 24	Sept. 10	

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit		
		1	2	3
Traffic Disturbance Comparison	RC016	April 28	July 24	Sept. 10
	RC017	April 28	July 24	Sept. 10
	RC018	April 28	July 24	Sept. 10
	RC019	April 28	July 24	Sept. 10
	RC020	April 28, 29	July 24	Sept. 12
	RC021	April 27	July 24	Sept. 10
	RC022	April 28	Sept. 12	
	RC023	April 28	July 23	Sept. 11
	RC024	April 27	July 23	Sept. 11
	RC025	July 23	Sept. 11	
	RC026	April 27	July 23	Sept. 11
	RC027	July 13	Sept. 25	
	RC028	July 13	Sept. 25	
	RC029	July 21	Sept. 11	
	RC030	July 13	Sept. 25	
	RC031	July 13	Sept. 25	
	RC032	July 21	Sept. 11	
	RC033	July 13	Sept. 25	
	RC034	July 13	Sept. 25	
	RC035	April 27	July 22	Sept. 11
	RC036	July 22	Sept. 11	
	RC037	April 28	July 24	Sept. 12
	RC038	July 24	Sept. 12	
	RC039	April 27	July 23	Sept. 10
	RC040	April 27	July 23	Sept. 10
	RC041	April 28	July 3	Sept. 25, 26
	RC042	July 3	Sept. 19	
	RC043	April 28	July 3	Sept. 19

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit		
		1	2	3
Traffic Disturbance Comparison	RC044	July 3	Sept. 25	
	RC045	April 28	July 3	Sept. 19
	RC046	April 28	July 3	Sept. 19
	RC047	July 3	Sept. 19	
	RC048	April 28	July 3	Sept. 19
	RC049	April 28	July 3	Sept. 19
	RC050	July 24	Sept. 19	
	RC051	July 24	Sept. 25	
	RC052	July 3	Sept. 25	
	RC053	July 13	Sept. 19	
	RC054	July 24	Sept. 25	
	RC055	July 13	Sept. 19	
	RC056	April 27	July 13	Sept. 12
	RC057	April 20	July 22	Sept. 12
	RC058	April 27	July 22	Sept. 12
	RC059	April 27	July 22	Sept. 12
	RC060	April 20	July 22	Sept. 12
	RC061	April 27	July 13	Sept. 12
	RC062	April 27	July 22	Sept. 12
	RC063	April 27	July 22	Sept. 12
	RC064	April 27	July 13	Sept. 12
RC065	April 27	July 22	Sept. 12	
RC066	April 27	July 13	Sept. 12	
RC067	April 27	July 22	Sept. 12	
RC068	April 27	July 22	Sept. 12	
RC069	April 27	July 13	Sept. 12	
RC070	April 20	July 22	Sept. 12	
RC071	April 20	July 22	Sept. 12	

Mammals Monitoring

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit		
		1	2	3
Traffic Disturbance Comparison	RC072	April 20	July 22	Sept. 12
	RC073	April 20	July 22	Sept. 7
	RC074	April 20	July 22	Sept. 7
	RC075	April 20	July 22	Sept. 7
	RC076	April 20	July 22	Sept. 7
	RC077	April 19, 20	July 22	Sept. 7
	RC078	April 20	July 22	Sept. 7
	RC079	April 20	July 22	Sept. 7
	RC080	April 20	July 21	Sept. 10
	RC081	April 20	July 21	Sept. 10
	RC082	April 20	July 21	Sept. 7
	RC083	April 19	July 21	Sept. 10
	RC084	April 19	July 21	Sept. 10
	RC085	April 19	July 21	Sept. 10
	RC086	April 19	July 21	Sept. 10
	RC087	April 19	July 21	Sept. 10
	RC088	April 19	July 21	Sept. 10
	RC089	April 19	July 21	Sept. 9
	RC090	April 19, 20	July 21	Sept. 9
	RC091	April 19	July 21	Sept. 9
RC092	April 16	July 21	Sept. 9	
RC093	April 19	July 21	Sept. 9	
RC094	April 17	July 20	Sept. 9	
RC095	April 19	July 21	Sept. 10	
RC096	April 19	July 21	Sept. 10	
RC097	April 16	July 21	Sept. 10	
RC098	April 19	July 21	Sept. 10	
RC099	April 17	July 11	Sept. 10	

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit		
		1	2	3
Traffic Disturbance Comparison	RC100	April 17	July 11	Sept. 10
	RC101	April 17	July 11	Sept. 10
	RC102	April 17, 19	July 11, 21	Sept. 10
	RC103	April 26	July 19	Sept. 23
	RC104	April 26	July 19	Sept 23, 26
	RC105	April 26	July 19	Sept. 28
	RC106	April 27	July 13	–
	RC107	April 27	July 14	–
	RC108	April 27	July 14	–
	RC109	April 27	July 14	–
	RC110	April 27	July 14	–
	RC111	April 27	July 14	–
	RC112	April 27	July 14	–
	RC113	April 23	July 13	–
	RC114	April 23	July 13	–
	RC115	April 23	July 13	–
	RC116	April 27	July 14	–
	RC117	April 27	July 14	–
	RC118	April 27	July 14	Sept. 26
	RC119	April 27	July 14	Sept. 21
	RC120	April 27	July 14	Sept. 21
	RC121	April 27	July 14	Sept. 21
	RC122	April 27	July 14	Sept. 21
	RC123	April 27	July 15	Sept. 26
	RC124	April 27	July 15	Sept. 28
	RC125	April 27	July 15	Sept. 28
	RC126	April 27	July 15	Sept. 26
RC127	April 27	July 15	Sept. 26	

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit		
		1	2	3
Traffic Disturbance Comparison	RC128	April 28	July 15	Sept. 24
	RC129	April 28	July 15	Sept. 26
	RC130	April 28	July 15	Sept. 26
	RC131	April 28	July 15	Sept. 26
	RC132	April 21	July 14	Sept. 24
	RC133	April 21	July 14	Sept. 24
	RC134	April 21	July 14	Sept. 24
	RC135	July 14	Sept. 24	–
	RC136	July 14	Sept. 24	–
	RC137	April 5, 21	July 4	Sept. 20
	RC138	April 3	July 15	Sept. 27
	RC139	April 3	July 15	Sept. 22
	RC140	April 7	July 13	Sept. 3
	RC141	April 3	July 15	Sept. 22
	RC142	April 17	July 13	Sept. 3
	RC143	April 5, 7	July 13	Sept. 3
	RC144	April 3	July 15	Sept. 27
	RC145	April 5	July 13	Sept. 3
	RC146	April 21	July 13	Sept. 3
	RC147	April 4	July 20	Sept. 22
	RC148	April 3	July 15	Sept. 27
	RC149	April 21	July 13	Sept. 3
	RC150	April 21	July 13	Sept. 3
	RC151	April 3	July 15	Sept. 27
	RC152	April 4	July 13	Sept. 6
RC153	April 3	July 15	Sept. 22	
RC154	April 4	July 20	Sept. 22	
RC155	April 3	July 15	Sept. 27	

Mammals Monitoring

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit		
		1	2	3
Traffic Disturbance Comparison	RC156	April 21	July 13	Sept. 3
	RC157	April 7	July 13	Sept.6
	RC158	April 4	July 20	Sept. 22
	RC159	April 5	July 13	Sept. 3
	RC160	April 4	July 20	Sept.22
	RC161	April 7	July 24	Sept. 3, 6
	RC162	April 3	July 15	Sept. 28
	RC163	April 7	July 13	Sept. 3
	RC164	April 4	July 4	Sept. 22
	RC165	April 4	July 4	Sept. 22
	RC166	April 21	July 4	Sept. 20
	RC167	April 5	July 13	Sept. 3
	RC168	April 5	July 13	Sept. 3
	RC169	April 21	July 4	Sept. 20
	RC170	April 4	July 20	Sept. 24
	RC171	April 4	July 4	Sept. 22
	RC172	April 21	July 20	Sept. 22
	RC173	April 6	July 4	Sept. 22
	RC174	April 5	July 13	Sept. 20
	RC175	April 4	July 4	Sept. 22
	RC176	April 5	July 13	Sept. 3
	RC177	April 3	July 15	Sept. 28
	RC178	April 5	July 13	Sept. 3
RC179	April 4	July 20	Sept. 24	
RC180	April 21	July 4	Sept. 27	
RC181	April 3	July 15	Sept. 27	
RC182	April 21	July 20	Sept. 22	
RC183	April 6	July 4	Sept. 22	

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit		
		1	2	3
Traffic Disturbance Comparison	RC184	April 21	July 4	Sept. 27
	RC185	April 6	July 15	Sept. 27
	RC186	April 6	July 4	Sept. 22
	RC187	April 5	July 24	Sept. 20
	RC188	April 5	July 4	Sept. 27
	RC189	April 3	July 24	Sept. 28
	RC190	April 21	July 15	Sept. 28
	RC191	April 21	July 20	Sept. 22
	RC192	April 21	July 20	Sept. 22
	RC193	April 4	July 4	Sept. 22
	RC194	April 21	July 4	Sept. 27
	RC195	April 3	July 24	Sept. 28
	RC196	April 5	July 4	Sept. 27
	RC197	April 5	July 24	Sept. 20
	RC198	April 6	July 15	Sept. 27
	RC199	April 6	July 4	Sept. 22
	RC200	April 4	July 4	Sept. 22
	RC201	April 4, 21	July 20	Sept. 24
	RC202	April 5	July 4	Sept. 18
	RC203	April 21	July 20	Sept. 24
	RC204	April 6, 21	July 4	Sept. 22
RC205	April 7	July 4	Sept. 22	
RC206	April 6	July 15	Sept. 28	
RC207	April 6	July 20	Sept. 22	
RC208	April 6	July 4	Sept. 22	
RC209	April 6	July 4	Sept. 22	
RC210	April 6	July 20	Sept. 22	
RC211	April 7	July 4	Sept. 22	

Table A-1: Caribou Calving Island Sign Survey Dates 2014¹

Survey Area	Transect	Visit		
		1	2	3
Traffic Disturbance Comparison	RC212	April 4	July 20	Sept. 24
	RC213	April 7	July 4	Sept. 22
	RC214	April 6	July 4	Sept. 22
	RC215	April 21	July 15	Sept. 28
	RC216	April 4	July 4	Sept. 22
	RC217	April 21	July 15	Sept. 28
	RC218	April 21	July 20	Sept. 24
	RC219	April 7	July 4	Sept. 22
	RC220	April 21	July 20	Sept. 24
	RC221	April 21	July 15	Sept. 28
	RC222	April 3	July 15	Sept. 27
	RC223	April 5	July 13	Sept. 3

1. Survey dates for previous years can be found in the 2011 to 2013 monitoring reports.

Mammals Monitoring

Table A-2: Mammal Sign Survey Effort on Caribou Calving Island Transects 2011– 2014

Year	Survey Area	Number of Transects	Length of Transects (km)	Total Length Surveyed (km)
2011	Project Effects	18	59.8	179.5
	Undisturbed Comparison	19	86.0	255.4
	Traffic Disturbance Comparison	209	191.1	573.0
	<i>Total</i>	<i>246</i>	<i>336.9</i>	<i>1,007.9</i>
2012	Project Effects	18	59.8	175.6
	Undisturbed Comparison	23	96.5	288.0
	Traffic Disturbance Comparison	211	191.7	536.1
	<i>Total</i>	<i>252</i>	<i>348.1</i>	<i>999.6</i>
2013	Project Effects	18	59.8	71.9
	Undisturbed Comparison	23	96.5	238.2
	Traffic Disturbance Comparison	211	191.7	511.1
	<i>Total</i>	<i>252</i>	<i>348.1</i>	<i>821.1</i>
2014	Project Effects	18	59.8	179.6
	Undisturbed Comparison	23	96.5	289.5
	Traffic Disturbance Comparison	223	202.9	584.8
	<i>Total</i>	<i>264</i>	<i>359.3</i>	<i>1,053.9</i>

Mammals Monitoring

Table A-3: Caribou Calving Island Surveys on Burned Transects 2013

Survey Area	Transect	Visit		
		1	2	3
Project Effects	EA001	April 17	–	–
	EA002	April 17	–	–
	EA003	April 17	–	–
	EA005	April 17	–	–
	EA006	April 17	–	–
	EA007	April 17	–	–
	EA008	April 17	–	–
	EA009	April 17	–	–
	EA010	April 20	–	–
	EA011	April 20	–	–
	EA012	April 17	–	–
	EA013	April 20	–	–
	EA014	April 17	–	–
	EA015	April 20	–	–
	EA018	April 19	July 23	–
Undisturbed Comparison	CA002	April 19	–	–
	CA008	April 13	–	–
	CA009	April 15	–	–
	CA010	April 15	–	–
	CA011	April 15	–	–
	EA023	April 10	July 23	Sept. 4 (part)
	EA024	April 10	–	Sept. 4 (part)
Traffic Disturbance Comparison	RC003	April 14	–	–
	RC005	April 15	–	–
	RC008	April 13	–	–
	RC009	April 15	–	–
	RC022	April 16	–	–
	RC027	April 23	July 28	–

Mammals Monitoring

Table A-3: Caribou Calving Island Surveys on Burned Transects 2013

Survey Area	Transect	Visit		
		1	2	3
	RC028	April 23	July 28	–
Traffic Disturbance Comparison	RC030	April 23	July 28	–
	RC031	April 23	July 28	–
	RC033	April 23	–	–
	RC034	April 23	July 28	–
	RC040	April 23	July 27	–
	RC041	April 23	–	–
	RC048	April 15	July 28	–
	RC050	April 23	July 28	–
	RC052	April 23	July 25	–
	RC057	April 13	July 27	–
	RC060	April 13	July 27	–
	RC061	April 23	July 25	–
	RC062	April 13	July 28	–
	RC065	April 13	July 27	–
	RC070	April 14	July 27	–
	RC071	April 14	July 27	–
	RC072	April 14	July 27	–
	RC073	April 14	July 27	–
	RC074	April 15	July 27	–
	RC075	April 15	July 27	–
	RC076	April 15	July 27	–
	RC081	April 11	July 19	–
	RC082	April 11	July 19	–
RC098	April 12	July 22	–	
RC103	April 19	July 22	–	
RC151	April 22	July 28	–	
RC155	April 22	July 28	–	

Mammals Monitoring

Table A-3: Caribou Calving Island Surveys on Burned Transects 2013

Survey Area	Transect	Visit		
		1	2	3
	RC181	April 22	July 28	–

Mammals Monitoring

Table A-4: Number of Peatland Complexes and Habitat Islands Surveyed at Increasing Distances from the KIP Access Road and Provincial Road 280 in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison Areas 2011

Visit	Distance from Road (km)	KIP Access Road		Provincial Road 280	
		Number of Complexes	Number of Islands	Number of Complexes ¹	Number of Islands
1	0 to 1	4	10	3	41
	1 to 2	3	12	6	64
	2 to 3	1	3	0	42
	3 to 4	4	14	4	13
	4 to 5	3	18	1	10
	5+	14	83	3	21
2	0 to 1	4	10	3	41
	1 to 2	3	12	6	64
	2 to 3	1	3	0	42
	3 to 4	4	13	4	13
	4 to 5	3	18	1	10
	5+	14	83	3	21
3	0 to 1	4	10	3	41
	1 to 2	3	12	6	64
	2 to 3	1	3	0	42
	3 to 4	4	14	4	13
	4 to 5	3	18	1	10
	5+	14	81	3	20

1. There were no peatland complexes whose centre was located 2 to 3 km from PR 280.

Mammals Monitoring

Table A-5: Number of Peatland Complexes and Habitat Islands Surveyed at Increasing Distances from the KIP Access Road and Provincial Road 280 in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison Areas 2012

Visit	Distance from Road (km)	KIP Access Road		Provincial Road 280	
		Number of Complexes	Number of Islands	Number of Complexes ¹	Number of Islands
1	0 to 1	4	10	3	41
	1 to 2	3	12	6	64
	2 to 3	1	3	0	42
	3 to 4	4	14	4	13
	4 to 5	3	18	1	10
	5+	18	94	3	21
2	0 to 1	4	10	3	35
	1 to 2	3	12	6	58
	2 to 3	1	3	0	34
	3 to 4	4	14	3	11
	4 to 5	2	12	0	6
	5+	18	94	3	18
3	0 to 1	4	10	3	35
	1 to 2	3	12	6	59
	2 to 3	1	3	0	32
	3 to 4	4	13	3	10
	4 to 5	3	18	0	6
	5+	18	94	3	18

1. There were no peatland complexes whose centre was located 2 to 3 km from PR 280.

Mammals Monitoring

Table A-6: Number of Peatland Complexes and Habitat Islands Surveyed at Increasing Distances from the KIP Access Road and Provincial Road 280 in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison Areas 2013

Visit	Distance from Road (km)	KIP Access Road		Provincial Road 280	
		Number of Complexes	Number of Islands	Number of Complexes ¹	Number of Islands
1	0 to 1	4	10	3	41
	1 to 2	3	12	6	64
	2 to 3	1	3	0	42
	3 to 4	4	14	4	13
	4 to 5	3	18	1	10
	5+	18	94	3	21
2	0 to 1	0	0	3	29
	1 to 2	0	0	6	63
	2 to 3	0	0	0	37
	3 to 4	1	3	4	12
	4 to 5	1	8	1	10
	5+	15	68	3	21
3	0 to 1	0	0	3	25
	1 to 2	0	0	6	59
	2 to 3	0	0	0	28
	3 to 4	1	2	4	11
	4 to 5	1	7	1	10
	5+	14	61	3	19

1. There were no peatland complexes whose centre was located 2 to 3 km from PR 280.

Mammals Monitoring

Table A-7: Number of Peatland Complexes and Habitat Islands Surveyed at Increasing Distances from the KIP Access Road and Provincial Road 280 in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison Areas 2014

Visit	Distance from Road (km)	KIP Access Road		Provincial Road 280	
		Number of Complexes	Number of Islands	Number of Complexes ¹	Number of Islands
1	0 to 1	4	10	5	49
	1 to 2	3	12	8	66
	2 to 3	1	3	0	42
	3 to 4	4	14	5	13
	4 to 5	3	18	2	12
	5+	18	94	3	21
2	0 to 1	4	10	5	48
	1 to 2	3	12	8	66
	2 to 3	1	3	0	42
	3 to 4	4	14	5	13
	4 to 5	3	18	2	12
	5+	18	94	3	21
3	0 to 1	4	10	2	25
	1 to 2	3	12	6	58
	2 to 3	1	3	0	42
	3 to 4	4	14	4	13
	4 to 5	3	18	1	10
	5+	18	94	3	21

1. There were no peatland complexes whose centre was located 2 to 3 km from PR 280.

Mammals Monitoring

Table A-8: Number of Islands Surveyed in Caribou Calving Habitat at Increasing Distances from the KIP Access Road and Provincial Road 280 During the Second and Third Visits 2011–2014

Road	Year	Visit	Distance from Road (km)						
			0-1	1-2	2-3	3-4	4-5	5+	
KIP Access	2011	2	10	12	3	13	18	83	
		3	10	12	3	14	18	81	
	2012	2	10	12	3	14	12	94	
		3	10	12	3	13	18	94	
	2013	2	0	0	0	3	8	68	
		3	0	0	0	2	7	60	
	2014	2	10	12	3	14	18	94	
		3	10	12	3	14	18	94	
	PR 280	2011	2	35	50	40	11	8	19
			3	35	50	40	11	8	19
		2012	2	32	46	33	10	4	16
			3	32	48	30	8	4	16
2013		2	24	51	34	10	8	19	
		3	22	47	26	9	8	17	
2014		2	34	51	40	11	8	19	
		3	24	46	39	11	8	19	

Mammals Monitoring

Table A-9: Trail Cameras on Transects in the Project Effects Area 2014

Survey Area	Sign Survey Transect	Number of Cameras	Installation Date	Removal Date	Location
Project	EA001	1	April 23	Sept. 17	15V 348117 6257275
	EA002	1	April 22	Sept. 16	15V 346498 6256572
Effects	EA003	1	April 23	Sept. 14	15V 347360 6259624
	EA004	2	April 22	Sept. 16	15V 344780 6254104 15V 344631 6254705
	EA005	3	April 22	Sept. 19	15V 344155 6256034 15V 344670 6256098 15V 344225 6256286
	EA006	1	April 22	Sept. 16	15V 343628 6254365
	EA007	2	April 22	Sept. 14	15V 347348 6255503 15V 347395 6255476
	EA008	3	April 22	Sept. 18	15V 347565 6253720 15V 348058 6253275 15V 347959 6253540
	EA009	3	April 23	Sept. 16	15V 343033 6251245 15V 343420 6251066 15V 343208 6251236
	EA010	6	April 23	Sept. 19	15V 351567 6255176 15V 351691 6255018 15V 353148 6254929 15V 353181 6254962 15V 352168 6254769 15V 350590 6255726
	EA011	5	April 22	Sept. 14	15V 351568 6249708 15V 351490 6249727 15V 351086 6249723 15V 351104 6249557 15V 351850 6249639
	EA012	1	April 22	Sept. 14	15V 350137 6250636

Mammals Monitoring

Table A-9: Trail Cameras on Transects in the Project Effects Area 2014

Survey Area	Sign Survey Transect	Number of Cameras	Installation Date	Removal Date	Location
Project Effects	EA013	3	April 22	Sept. 13	15V 353930 6250783
					15V 353761 6250890
					15V 354407 6250839
	EA014	2	April 22	Sept. 14	15V 353784 6256715
					15V 353664 6256733
	EA015	3	April 23	Sept. 13	15V 355664 6256955
					15V 356068 6257012
15V 356040 6256926					
EA016	2	April 12	Sept. 13	15V 366994 6245191	
				15V 366437 6245386	
EA017	1	April 13	Sept. 6	15V 363951 6243243	
EA018	2	April 14	Sept. 6	15V 366437 6245386	
				15V 362543 6243591	
Undisturbed	EA019	1	April 14	Sept. 4	15V 363300 6242183
Comparison	EA020	3	April 14	Sept. 4	15V 361140 6243358
					15V 360921 6243217
					15V 361544 6243252
EA021	2	April 13	Sept. 4	15V 358251 6244512	
				15V 358265 6244612	

Mammals Monitoring

Table A-10: Moose and Other Mammal Sign Survey Dates 2014

Transect	Visit		
	1	2	3
NNR001	April 24	July 14	Sept. 13
NNR002	April 24	July 14	Sept. 13
NNR003	April 24, 25	July 14	Sept. 13
NNR004	April 24, 25	July 14	Sept. 14
NNR005	April 25	July 14	Sept. 14
NNR006	April 25	July 16	Sept. 16
NNR007	April 25	July 16	Sept. 16, 17
NNR008	April 24	July 16	Sept. 16
SNR001	April 25, 26	July 16	Sept. 17
SNR002	April 26	July 17	Sept. 17
SNR003	April 26	July 17	Sept. 16, 17

Mammals Monitoring

Table A-11: Mammal Sign Survey Effort on Moose and Other Mammal Transects 2011–2014

Year	Survey Area	Number of Transects	Length of Transects (km)	Total Length Surveyed (km)
2011	North of the KIP Access Road	8	75.9	227.7
	South of the KIP Access Road	3	31.3	90.6
	<i>Total</i>	<i>11</i>	<i>107.2</i>	<i>318.3</i>
2012	North of the KIP Access Road	8	75.1	222.6
	South of the KIP Access Road	3	31.3	93.3
	<i>Total</i>	<i>11</i>	<i>106.4</i>	<i>315.9</i>
2013	North of the KIP Access Road	8	75.9	75.9
	South of the KIP Access Road	3	31.3	31.3
	<i>Total</i>	<i>11</i>	<i>107.2</i>	<i>107.2</i>
2014	North of the KIP Access Road	8	75.9	227.7
	South of the KIP Access Road	3	31.3	93.9
	<i>Total</i>	<i>11</i>	<i>107.2</i>	<i>321.6</i>

Mammals Monitoring

Table A-12: Other Mammal Signs Observed on Caribou Calving Island Transects 2011–2014

Species	Year			
	2011	2012	2013	2014
American marten	16	62	377	868
Arctic fox	0	0	0	2
American beaver	2	1	1	4
Ermine	0	1	2	23
Fisher	5	3	6	18
Lynx	0	0	5	13
Mink	4	6	31	90
Muskrat	1	0	0	0
Red fox	7	62	40	95
Red squirrel	1	0	0	21
North American river otter	14	8	40	71
Snowshoe hare	8	3	0	127
Weasel	0	0	3	20
Wolverine	0	10	7	25

Mammals Monitoring

Table A-13: Caribou Signs Observed Over Three Visits to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Total Length Surveyed (km)	Total Number of Caribou Signs	Relative Abundance (signs/km)
Project Effects	2011	15	100	41	77	179.5	536	2.99
	2012	11	73	24	45	175.6	115	0.65
	2013	15	100	38	72	71.9	866	12.04
	2014	10	67	23	43	179.6	247	1.38
Undisturbed Comparison	2011	14	100	72	83	255.4	912	3.57
	2012	17	94	63	64	288	321	1.11
	2013	16	89	82	84	238.2	1,635	6.86
	2014	17	94	65	66	289.5	572	1.98
Traffic Disturbance Comparison	2011	17	100	154	81	573	2,070	3.61
	2012	14	82	84	44	536.1	431	0.80
	2013	16	94	160	84	511.1	2,992	5.85
	2014	21	91	133	66	584.8	839	1.43

Mammals Monitoring

Table A-14: Adult and Calf Caribou Sign Observed Over Three Visits to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number of Complexes with Adult Signs	Number of Complexes with Calf Signs	Percentage of Complexes with Adult Signs	Percentage of Complexes with Calf Signs	Number of Islands with Adult Signs	Number of Islands with Calf Signs	Percentage of Islands with Adult Signs	Percentage of Islands with Calf Signs
Project Effects	2011	15	8	100	53	41	8	77	15
	2012	10	7	67	47	22	5	42	9
	2013	15	1	100	7	38	1	72	2
	2014	10	5	67	33	23	3	43	6
Undisturbed Comparison	2011	14	11	100	79	71	18	82	21
	2012	17	8	94	44	63	11	64	11
	2013	16	5	89	28	82	14	84	14
	2014	17	12	94	67	65	11	66	11
Traffic Disturbance Comparison	2011	17	8	100	47	154	22	81	12
	2012	14	8	82	47	75	24	39	13
	2013	16	10	94	59	159	35	83	18
	2014	21	14	91	61	131	32	65	16

Mammals Monitoring

Table A-15: Other Large Mammal Signs Observed Over Three Visits to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Black Bear		Gray Wolf		Moose	
		Number of Signs	Relative Abundance (signs/km)	Number of Signs	Relative Abundance (signs/km)	Number of Signs	Relative Abundance (signs/km)
Project Effects	2011	1	0.01	4	0.02	519	2.82
	2012	7	0.04	17	0.10	367	2.12
	2013	0	0	2	0.03	35	0.57
	2014	14	0.09	12	0.08	348	2.27
Undisturbed Comparison	2011	20	0.07	9	0.03	1,000	3.25
	2012	22	0.06	4	0.01	699	2.04
	2013	11	0.04	8	0.03	903	3.07
	2014	20	0.07	7	0.02	979	3.27
Traffic Disturbance Comparison	2011	16	0.02	9	0.01	1,508	2.35
	2012	37	0.07	11	0.02	1,148	2.04
	2013	31	0.05	18	0.03	1,311	2.21
	2014	32	0.06	22	0.04	1,812	3.17

Mammals Monitoring

Table A-16: Moose Signs Observed Over Three Visits to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number of Complexes with Adult Signs	Number of Complexes with Calf Signs	Percentage of Complexes with Adult Signs	Percentage of Complexes with Calf Signs	Number of Islands with Adult Signs	Number of Islands with Calf Signs	Percentage of Islands with Adult Signs	Percentage of Islands with Calf Signs
Project Effects	2011	15	7	100	47	46	10	87	19
	2012	15	13	100	87	35	17	66	32
	2013	10	1	67	7	15	2	28	4
	2014	15	6	100	40	40	10	75	19
Undisturbed Comparison	2011	14	8	100	57	71	20	82	23
	2012	18	14	100	78	72	20	73	20
	2013	18	12	100	67	71	23	72	23
	2014	18	14	100	78	86	22	88	22
Traffic Disturbance Comparison	2011	17	7	100	41	160	31	84	16
	2012	17	10	100	59	135	37	71	19
	2013	16	14	94	82	144	52	75	27
	2014	22	13	96	57	171	52	84	26

Mammals Monitoring

Table A-17: Caribou Signs Observed at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas Over Three Visits to Caribou Calving Island Transects 2011–2014

Year	Distance from KIP access road (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2011	0 to 1	4	100	3	75	6	60	1	10
	1 to 2	3	100	2	67	9	75	3	25
	2 to 3	1	100	0	0	3	100	0	0
	3 to 4	4	100	1	25	13	93	1	7
	4 to 5	3	100	2	67	14	78	4	22
	5+	13	93	11	79	68	82	17	20
2012	0 to 1	3	75	2	50	1	10	0	0
	1 to 2	2	67	1	33	4	33	2	17
	2 to 3	1	100	0	0	1	33	0	0
	3 to 4	3	75	3	50	9	64	1	7
	4 to 5	2	67	2	67	13	72	2	11
	5+	17	94	8	44	59	63	11	12

Mammals Monitoring

Table A-17: Caribou Signs Observed at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas Over Three Visits to Caribou Calving Island Transects 2011–2014

Year	Distance from KIP access road (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2013	0 to 1	4	100	0	0	8	80	0	0
	1 to 2	3	100	0	0	9	75	0	0
	2 to 3	1	100	0	0	2	67	0	0
	3 to 4	3	100	1	25	13	93	1	7
	4 to 5	1	50	0	0	9	50	3	17
	5+	16	89	5	28	79	84	11	12
2014	0 to 1	3	75	1	25	2	20	0	0
	1 to 2	1	33	0	0	8	67	0	0
	2 to 3	1	100	0	0	0	0	0	0
	3 to 4	3	75	3	75	10	71	3	21
	4 to 5	2	67	1	33	8	44	1	6
	5+	17	94	12	67	60	64	10	11

Mammals Monitoring

Table A-18: Caribou Signs Observed at Increasing Distances from Provincial Road 280 in the Traffic Disturbance Comparison Area Over Three Visits to Caribou Calving Island Transects 2011–2014

Year	Distance from PR 280 (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs ¹	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2011	0 to 1	3	100	1	33	33	80	2	5
	1 to 2	6	100	4	67	49	77	4	6
	2 to 3	-	-	-	-	31	74	9	21
	3 to 4	4	100	0	0	13	100	2	15
	4 to 5	1	100	1	100	10	100	3	30
	5+	3	100	2	67	18	86	2	10
2012	0 to 1	2	67	2	67	20	49	8	20
	1 to 2	6	100	4	67	27	42	4	6
	2 to 3	-	-	-	-	16	38	5	12
	3 to 4	3	75	0	0	6	46	2	15
	4 to 5	0	0	0	0	4	40	2	20
	5+	3	100	2	67	11	52	3	14

Mammals Monitoring

Table A-18: Caribou Signs Observed at Increasing Distances from Provincial Road 280 in the Traffic Disturbance Comparison Area Over Three Visits to Caribou Calving Island Transects 2011–2014

Year	Distance from PR 280 (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs ¹	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2013	0 to 1	3	100	2	67	31	76	3	7
	1 to 2	6	100	4	67	55	86	16	25
	2 to 3	-	-	-	-	34	81	6	14
	3 to 4	3	75	1	25	11	85	2	15
	4 to 5	1	100	0	0	10	100	2	20
	5+	3	100	3	100	19	90	6	29
2014	0 to 1	5	100	3	60	27	55	7	14
	1 to 2	7	88	4	50	44	67	8	12
	2 to 3	-	-	-	-	24	57	2	5
	3 to 4	4	80	3	60	11	85	5	38
	4 to 5	2	100	2	100	11	92	5	42
	5+	3	100	2	67	16	76	5	24

1. There were no peatland complexes whose centre was located 2 to 3 km from PR 280.

Mammals Monitoring

Table A-19: Caribou Signs Observed During the First Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number of Signs Observed	Number of Transects with Signs	Percentage of Transects with Signs
Project Effects	2011	156	11	61
	2012	0	0	0
	2013	809	18	100
	2014	39	2	11
Undisturbed Comparison	2011	210	14	74
	2012	7	3	13
	2013	930	16	70
	2014	14	4	17
Traffic Disturbance Comparison	2011	1,271	136	65
	2012	7	3	1
	2013	1,391	128	61
	2014	44	19	9

Mammals Monitoring

Table A-20: Other Large Mammal Signs Observed During the First Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Black Bear			Gray Wolf			Moose		
		Number of Signs	Number of Transects with Signs	Percentage of Transects with Signs	Number of Signs	Number of Transects with Signs	Percentage of Transects with Signs	Number of Signs	Number of Transects with Signs	Percentage of Transects with Signs
Project Effects	2011	1	1	6	0	0	0	202	17	94
	2012	0	0	0	14	6	33	49	10	56
	2013	0	0	0	2	1	6	44	12	67
	2014	0	0	0	1	1	6	91	12	67
Undisturbed Comparison	2011	3	2	11	2	1	5	257	18	95
	2012	0	0	0	3	3	13	74	13	57
	2013	1	1	4	1	1	4	66	16	70
	2014	3	1	4	4	2	9	85	10	43
Traffic Disturbance Comparison	2011	0	0	0	7	6	3	611	133	64
	2012	0	0	0	5	4	2	120	43	20
	2013	0	0	0	2	1	<1	194	74	35
	2014	5	2	1	10	6	3	340	68	30

Mammals Monitoring

Table A-21: Caribou Signs Observed During the Second Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Total Length Surveyed (km)	Total Number of Signs	Relative Abundance (signs/km)
Project Effects	2011	14	93	30	58	59.8	266	4.45
	2012	5	36	10	21	56.2	56	1.00
	2013	2	100	2	33	6.5	27	4.12
	2014	9	60	15	28	59.8	140	2.34
Undisturbed Comparison	2011	14	100	53	61	86.0	413	4.80
	2012	14	78	45	46	95.9	148	1.54
	2013	12	80	49	67	74.5	468	6.28
	2014	16	89	57	58	96.5	379	3.93
Traffic Disturbance Comparison	2011	12	71	75	39	191.1	480	2.51
	2012	10	67	58	36	172.1	230	1.34
	2013	14	82	120	70	165.5	1,094	6.61
	2014	21	91	101	50	202.5	559	2.76

Mammals Monitoring

Table A-22: Adult and Calf Caribou Sign Observed During the Second Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number of Complexes with Adult Signs	Number of Complexes with Calf Signs	Percentage of Complexes with Adult Signs	Percentage of Complexes with Calf Signs	Number of Islands with Adult Signs	Number of Islands with Calf Signs	Percentage of Islands with Adult Signs	Percentage of Islands with Calf Signs
Project Effects	2011	13	7	87	47	30	7	58	13
	2012	5	3	36	21	10	1	21	2
	2013	2	0	100	0	2	0	33	0
	2014	9	3	60	20	15	3	28	6
Undisturbed Comparison	2011	14	10	100	71	53	13	61	15
	2012	14	5	78	28	45	6	46	6
	2013	12	5	80	33	49	13	67	18
	2014	16	7	89	39	57	7	58	7
Traffic Disturbance Comparison	2011	12	5	71	29	75	5	39	3
	2012	10	8	67	53	48	20	30	12
	2013	14	8	82	47	118	27	69	16
	2014	21	13	91	57	99	25	49	12

Mammals Monitoring

Table A-23: Other Large Mammal Signs Observed During the Second Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Black Bear		Gray Wolf		Moose	
		Number of Signs	Relative Abundance (signs/km)	Number of Signs	Relative Abundance (signs/km)	Number of Signs	Relative Abundance (signs/km)
Project Effects	2011	0	0	0	0	208	3.48
	2012	11	0.20	0	0	113	2.01
	2013	0	0	1	0	98	14.96
	2014	16	0.27	7	0.12	154	2.57
Undisturbed Comparison	2011	5	0.06	3	0.03	501	5.83
	2012	9	0.09	0	0	264	2.75
	2013	8	0.11	4	0.05	383	5.14
	2014	6	0.06	2	0.02	594	6.16
Traffic Disturbance Comparison	2011	3	0.02	2	0.01	530	2.77
	2012	26	0.15	5	0.03	511	2.97
	2013	28	0.17	3	0.02	659	3.98
	2014	21	0.10	3	0.01	906	4.47

Mammals Monitoring

Table A-24: Moose Signs Observed During the Second Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number of Complexes with Adult Signs	Number of Complexes with Calf Signs	Percentage of Complexes with Adult Signs	Percentage of Complexes with Calf Signs	Number of Islands with Adult Signs	Number of Islands with Calf Signs	Percentage of Islands with Adult Signs	Percentage of Islands with Calf Signs
Project Effects	2011	14	6	93	40	27	9	52	17
	2012	12	7	86	50	16	7	34	15
	2013	2	1	100	50	5	0	83	0
	2014	15	4	100	27	33	3	62	6
Undisturbed Comparison	2011	13	6	93	43	54	16	62	18
	2012	17	9	94	50	50	9	51	9
	2013	14	9	93	60	45	17	62	23
	2014	17	11	94	61	77	17	79	17
Traffic Disturbance Comparison	2011	17	7	100	41	112	17	59	9
	2012	15	9	100	60	103	26	64	16
	2013	13	10	76	59	104	40	60	23
	2014	20	12	87	52	138	41	68	20

Mammals Monitoring

Table A-25: Caribou Signs Observed at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas During the Second Visit to Caribou Calving Island Transects 2011–2014

Year	Distance from KIP Access Road (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2011	0 to 1	3	75	3	75	4	40	1	10
	1 to 2	3	100	2	67	6	50	3	25
	2 to 3	1	100	0	0	3	100	0	0
	3 to 4	4	100	1	25	10	77	1	8
	4 to 5	3	100	1	33	11	61	3	17
	5+	14	100	10	71	49	59	12	14
2012	0 to 1	1	25	1	25	1	10	0	0
	1 to 2	1	33	0	0	0	0	0	0
	2 to 3	0	0	0	0	0	0	0	0
	3 to 4	2	50	2	50	4	29	0	0
	4 to 5	1	50	0	0	9	75	1	8
	5+	14	78	5	28	41	44	6	6

Mammals Monitoring

Table A-25: Caribou Signs Observed at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas During the Second Visit to Caribou Calving Island Transects 2011–2014

Year	Distance from KIP Access Road (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2013	0 to 1	-	-	-	-	-	-	-	-
	1 to 2	-	-	-	-	-	-	-	-
	2 to 3	-	-	-	-	-	-	-	-
	3 to 4	1	100	0	0	0	0	0	0
	4 to 5	1	100	0	0	5	63	2	25
	5+	12	80	5	33	46	68	11	16
2014	0 to 1	2	50	1	25	1	10	0	0
	1 to 2	1	33	0	0	4	33	0	0
	2 to 3	1	100	0	0	0	0	0	0
	3 to 4	3	75	2	50	7	50	3	21
	4 to 5	2	67	0	0	8	44	1	6
	5+	16	89	7	39	52	55	6	6

Mammals Monitoring

Table A-26: Caribou Signs Observed at Increasing Distances from Provincial Road 280 in the Traffic Disturbance Comparison Area During the Second Visit to Caribou Calving Island Transects 2011–2014

Year	Distance from PR 280 (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs ¹	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2011	0 to 1	3	100	1	33	16	39	0	0
	1 to 2	3	50	2	33	21	33	1	2
	2 to 3	-	-	-	-	19	45	2	5
	3 to 4	2	50	0	0	8	62	0	0
	4 to 5	1	100	0	0	4	40	1	10
	5+	3	100	2	67	7	33	1	5
2012	0 to 1	2	67	2	67	16	46	8	23
	1 to 2	3	50	4	67	18	31	4	7
	2 to 3	-	-	-	-	8	24	3	9
	3 to 4	1	33	0	0	4	36	0	0
	4 to 5	-	-	-	-	4	67	2	33
	5+	3	100	2	67	8	44	3	17

Mammals Monitoring

Table A-26: Caribou Signs Observed at Increasing Distances from Provincial Road 280 in the Traffic Disturbance Comparison Area During the Second Visit to Caribou Calving Island Transects 2011–2014

Year	Distance from PR 280 (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs ¹	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2013	0 to 1	2	67	2	67	18	62	1	3
	1 to 2	5	83	3	50	45	71	13	21
	2 to 3	-	-	-	-	27	73	5	14
	3 to 4	3	75	1	25	9	75	1	8
	4 to 5	1	100	0	0	8	80	1	10
	5+	3	100	2	67	13	62	6	29
2014	0 to 1	5	100	2	40	18	38	4	8
	1 to 2	7	88	4	50	33	50	6	9
	2 to 3	-	-	-	-	19	45	1	2
	3 to 4	4	80	3	60	9	69	5	38
	4 to 5	2	100	2	100	10	83	5	42
	5+	3	100	2	67	12	57	4	19

1. There were no peatland complexes whose centre was located 2 to 3 km from PR 280.

Mammals Monitoring

Table A-27: Caribou Signs Observed During the Third Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Total Length Surveyed (km)	Total Number of Signs	Relative Abundance (signs/km)
Project Effects	2011	9	60	17	32	59.9	114	1.90
	2012	10	67	18	35	59.5	59	0.99
	2013	2	100	4	100	5.5	30	5.45
	2014	6	40	14	26	59.9	68	1.14
Undisturbed Comparison	2011	13	93	51	60	83.4	289	3.47
	2012	14	78	42	43	95.5	166	1.74
	2013	12	86	30	45	67.1	237	3.53
	2014	14	78	29	30	96.5	179	1.85
Traffic Disturbance Comparison	2011	13	76	75	39	190.9	319	1.67
	2012	10	67	48	30	172.5	194	1.12
	2013	14	82	98	64	153.9	507	3.29
	2014	11	69	67	40	179.4	236	1.32

Mammals Monitoring

Table A-28: Adult and Calf Caribou Signs Observed During the Third Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number of Complexes with Adult Signs	Number of Complexes with Calf Signs	Percentage of Complexes with Adult Signs	Percentage of Complexes with Calf Signs	Number of Islands with Adult Signs	Number of Islands with Calf Signs	Percentage of Islands with Adult Signs	Percentage of Islands with Calf Signs
Project Effects	2011	9	2	60	13	17	1	32	2
	2012	9	5	60	33	16	4	31	8
	2013	2	1	100	50	4	1	100	25
	2014	6	1	40	7	14	0	26	0
Undisturbed Comparison	2011	13	6	93	43	51	5	60	6
	2012	14	4	78	22	42	4	43	4
	2013	12	1	86	7	30	1	45	2
	2014	13	6	72	33	29	5	30	5
Traffic Disturbance Comparison	2011	13	4	76	24	75	11	39	6
	2012	10	4	67	27	47	7	29	4
	2013	14	8	82	47	98	10	64	7
	2014	11	4	69	25	67	6	40	4

Mammals Monitoring

Table A-29: Other Large Mammal Signs Observed During the Third Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Black Bear		Gray Wolf		Moose	
		Number of Signs	Relative Abundance (signs/km)	Number of Signs	Relative Abundance (signs/km)	Number of Signs	Relative Abundance (signs/km)
Project Effects	2011	0	0	4	0.07	170	2.84
	2012	4	0.07	3	0.05	229	3.85
	2013	0	0	0	0	25	4.55
	2014	3	0.05	4	0.07	134	2.24
Undisturbed Comparison	2011	12	0.14	4	0.05	181	2.17
	2012	5	0.05	1	0.01	337	3.53
	2013	2	0.03	2	0.03	322	4.80
	2014	6	0.06	1	<0.01	269	2.79
Traffic Disturbance Comparison	2011	13	0.07	0	0	367	1.92
	2012	11	0.06	1	0.01	517	3.00
	2013	3	0.02	13	0.08	458	2.98
	2014	6	0.03	9	0.05	566	3.15

Mammals Monitoring

Table A-30: Moose Signs Observed During the Third Visit to Caribou Calving Island Transects 2011–2014

Survey Area	Year	Number of Complexes with Adult Signs	Number of Complexes with Calf Signs	Percentage of Complexes with Adult Signs	Percentage of Complexes with Calf Signs	Number of Islands with Adult Signs	Number of Islands with Calf Signs	Percentage of Islands with Adult Signs	Percentage of Islands with Calf Signs
Project Effects	2011	14	1	93	7	33	0	62	0
	2012	15	8	100	53	32	11	62	21
	2013	2	1	100	50	4	2	100	50
	2014	15	6	100	40	30	9	57	17
Undisturbed Comparison	2011	12	6	86	43	34	4	40	5
	2012	18	7	100	39	54	10	55	10
	2013	14	7	100	50	49	7	74	11
	2014	18	5	100	28	55	4	56	4
Traffic Disturbance Comparison	2011	17	4	100	24	91	9	48	5
	2012	14	6	93	40	98	15	61	9
	2013	16	10	94	59	94	18	62	12
	2014	15	7	94	44	110	12	65	7

Mammals Monitoring

Table A-31: Caribou Signs Observed at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas During the Third Visit to Caribou Calving Island Transects 2011–2014

Year	Distance from KIP Access Road (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2011	0 to 1	1	25	0	0	1	10	0	0
	1 to 2	0	0	0	0	0	0	0	0
	2 to 3	1	100	0	0	2	67	0	0
	3 to 4	4	100	1	25	8	57	0	0
	4 to 5	3	100	1	33	10	56	2	11
	5+	13	93	6	43	47	58	4	5
2012	0 to 1	2	50	2	50	0	0	0	0
	1 to 2	2	67	0	0	4	33	2	17
	2 to 3	1	100	0	0	1	33	0	0
	3 to 4	3	75	1	25	6	46	1	8
	4 to 5	2	67	2	67	8	44	1	6
	5+	14	78	4	22	41	44	4	4

Mammals Monitoring

Table A-31: Caribou Signs Observed at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas During the Third Visit to Caribou Calving Island Transects 2011–2014

Year	Distance from KIP Access Road (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2013	0 to 1	-	-	-	-	-	-	-	-
	1 to 2	-	-	-	-	-	-	-	-
	2 to 3	-	-	-	-	-	-	-	-
	3 to 4	1	100	1	100	2	100	1	50
	4 to 5	1	100	0	0	5	71	1	14
	5+	12	86	1	7	27	44	0	0
2014	0 to 1	3	75	0	0	1	10	0	0
	1 to 2	0	0	0	0	7	58	0	0
	2 to 3	0	0	0	0	0	0	0	0
	3 to 4	2	50	1	25	5	36	0	0
	4 to 5	1	33	0	0	6	33	0	0
	5+	14	78	6	33	25	27	5	5

Mammals Monitoring

Table A-32: Caribou Signs Observed at Increasing Distances from Provincial Road 280 in the Traffic Disturbance Comparison Area During the Third Visit to Caribou Calving Island Transects 2011–2014

Year	Distance from PR 280 (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs	Percentage of Complexes with Signs ¹	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2011	0 to 1	2	67	1	33	15	37	1	2
	1 to 2	5	83	2	33	20	31	2	3
	2 to 3	-	-	-	-	18	43	5	12
	3 to 4	3	75	0	0	6	46	1	8
	4 to 5	1	100	1	100	5	50	1	10
	5+	2	67	0	0	11	55	1	5
2012	0 to 1	2	67	2	67	9	26	1	3
	1 to 2	4	67	0	0	14	24	0	0
	2 to 3	-	-	-	-	11	34	2	6
	3 to 4	2	67	0	0	4	40	2	20
	4 to 5	-	-	-	-	2	33	1	17
	5+	2	67	2	67	8	44	1	6

Mammals Monitoring

Table A-32: Caribou Signs Observed at Increasing Distances from Provincial Road 280 in the Traffic Disturbance Comparison Area During the Third Visit to Caribou Calving Island Transects 2011–2014

Year	Distance from PR 280 (km)	All Caribou		Calf Caribou		All Caribou		Calf Caribou	
		Number of Complexes with Signs	Percentage of Complexes with Signs ¹	Number of Complexes with Signs	Percentage of Complexes with Signs	Number of Islands with Signs	Percentage of Islands with Signs	Number of Islands with Signs	Percentage of Islands with Signs
2013	0 to 1	3	100	2	67	14	56	2	8
	1 to 2	5	83	3	50	38	64	3	5
	2 to 3	-	-	-	-	17	61	2	7
	3 to 4	2	50	0	0	8	73	1	9
	4 to 5	1	100	0	0	6	60	1	10
	5+	3	100	3	100	15	79	1	5
2014	0 to 1	2	100	2	100	7	28	1	4
	1 to 2	3	50	0	0	21	36	2	3
	2 to 3	-	-	-	-	15	36	1	2
	3 to 4	2	50	2	50	7	54	1	8
	4 to 5	1	100	0	0	6	60	0	0
	5+	3	100	1	33	11	52	1	5

1. There were no peatland complexes whose centre was located 2 to 3 km from PR 280.

Mammals Monitoring

Table A-33: Statistical Comparison of the Mean Number of Thread Breaks on Habitat Islands in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison Areas During the Second and Third Visits 2011–2014

Survey Area	Year	Visit	U test statistic	p-value ¹	Interpretation
Project Effects vs. Undisturbed Comparison	2011	2	2216.0	0.837	
		3	1597.5	0.002	More activity in Undisturbed Comparison than Project Effects
		2 & 3	7612.0	0.022	More activity in Undisturbed Comparison than Project Effects
	2012	2	1737.5	0.007	More activity in Undisturbed Comparison than Project Effects
		3	2287.5	0.247	
		2 & 3	8013.0	0.006	More activity in Undisturbed Comparison than Project Effects
	2013 ²	2	159.5	0.263	
		3	241.0	0.002	More activity in Undisturbed Comparison than Project Effects
		2 & 3	809.0	0.348	
	2014	2	1759.5	0.000	More activity in Undisturbed Comparison than Project Effects
		3	2401.5	0.353	
		2 & 3	8302.5	0.001	More activity in Undisturbed Comparison than Project Effects
Project Effects vs. Traffic Disturbance	2011	2	5224.5	0.006	More activity in Project Effects than Traffic Disturbance
		3	3973.0	0.327	
		2 & 3	18504.0	0.167	
	2012	2	2809.0	0.068	
		3	3657.0	0.810	
		2 & 3	12893.0	0.249	
	2013 ²	2	304.0	0.200	
		3	437.0	0.017	More activity in Project Effects than Traffic Disturbance
		2 & 3	1463.5	0.727	

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Table A-33: Statistical Comparison of the Mean Number of Thread Breaks on Habitat Islands in the Project Effects, Undisturbed Comparison, and Traffic Disturbance Comparison Areas During the Second and Third Visits 2011–2014

Survey Area	Year	Visit	U test statistic	p-value ¹	Interpretation
Project Effects vs. Traffic Disturbance	2014	2	3324.5	0.006	More activity in Traffic Disturbance than Project Effects
		3	3212.5	0.033	More activity in Traffic Disturbance than Project Effects
		2 & 3	1320.5	0.000	More activity in Traffic Disturbance than Project Effects

1. Bolded values indicate statistically significant results.

2. Very few habitat islands were surveyed in the Project Effects Area in 2013.

Mammals Monitoring

Table A-34: Caribou Activity (mean number of thread breaks/island) at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas 2011–2014

Survey Area	Distance from KIP Access Road (km)	2011		2012		2013		2014	
		Visit 2	Visit 3	Visit 2	Visit 3	Visit 2	Visit 3	Visit 2	Visit 3
Project Effects	0-1	0.21	0.01	<0.01	0	-	-	0.06	0.03
	1+	0.21	0.15	0.10	0.09	0.24	0.10	0.17	0.06
	0-2	0.18	0.01	<0.01	0.02	-	-	0.05	0.05
	2+	0.22	0.17	0.11	0.10	0.24	0.10	0.18	0.06
	0-3	0.19	0.01	<0.01	0.01	-	-	0.05	0.04
	3+	0.22	0.17	0.12	0.10	0.24	0.10	0.18	0.06
	0-4	0.19	0.06	0.04	0.04	0	0.53	0.08	0.06
	4+	0.22	0.17	0.12	0.10	0.25	0.09	0.19	0.06
Undisturbed Comparison	0-5	0.21	0.12	0.07	0.05	0.19	0.30	0.10	0.06
	5+	0.21	0.16	0.11	0.11	0.25	0.08	0.19	0.06

Mammals Monitoring

Table A-35: Statistical Comparison of Caribou Activity (mean number of thread breaks/island) at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas During the Second and Third Visits 2011–2014

Visit	Year	Comparison	U test statistic	p-value ¹	Interpretation
2	2011	Activity of caribou < 1 km vs. > 1 km of road	628.0	0.887	
		Activity of caribou < 2 km vs. > 2 km of road	1165.5	0.471	
		Activity of caribou < 3 km vs. > 3 km of road	1374.5	0.776	
		Activity of caribou < 4 km vs. > 4 km of road	1863.5	0.788	
		Activity of caribou < 5 km vs. > 5 km of road	2337.0	0.954	
2012	2012	Activity of caribou < 1 km vs. > 1 km of road	435.5	0.034	Less activity closer to the road
		Activity of caribou < 2 km vs. > 2 km of road	771.5	0.000	Less activity closer to the road
		Activity of caribou < 3 km vs. > 3 km of road	833.0	0.000	Less activity closer to the road
		Activity of caribou < 4 km vs. > 4 km of road	1316.5	0.000	Less activity closer to the road
		Activity of caribou < 5 km vs. > 5 km of road	1978.0	0.049	
2013	2013	Activity of caribou < 1 km vs. > 1 km of road	-	-	
		Activity of caribou < 2 km vs. > 2 km of road	-	-	
		Activity of caribou < 3 km vs. > 3 km of road	-	-	
		Activity of caribou < 4 km vs. > 4 km of road	30.0	0.029	Less activity closer to the road
		Activity of caribou < 5 km vs. > 5 km of road	307.5	0.339	
2014	2014	Activity of caribou < 1 km vs. > 1 km of road	488.5	0.082	
		Activity of caribou < 2 km vs. > 2 km of road	990.5	0.015	Less activity closer to the road
		Activity of caribou < 3 km vs. > 3 km of road	1035.5	0.004	Less activity closer to the road
		Activity of caribou < 4 km vs. > 4 km of road	1614.5	0.009	Less activity closer to the road
		Activity of caribou < 5 km vs. > 5 km of road	2078.5	0.013	Less activity closer to the road

Mammals Monitoring

Table A-35: Statistical Comparison of Caribou Activity (mean number of thread breaks/island) at Increasing Distances from the KIP Access Road in the Project Effects and Undisturbed Comparison Areas During the Second and Third Visits 2011–2014

Visit	Year	Comparison	U test statistic	p-value ¹	Interpretation
3	2011	Activity of caribou < 1 km vs. > 1 km of road	340.5	0.009	Less activity closer to the road
		Activity of caribou < 2 km vs. > 2 km of road	556.5	0.000	Less activity closer to the road
		Activity of caribou < 3 km vs. > 3 km of road	690.0	0.000	Less activity closer to the road
		Activity of caribou < 4 km vs. > 4 km of road	1302.5	0.002	Less activity closer to the road
		Activity of caribou < 5 km vs. > 5 km of road	1890.0	0.054	
	2012	Activity of caribou < 1 km vs. > 1 km of road	395.0	0.010	Less activity closer to the road
		Activity of caribou < 2 km vs. > 2 km of road	979.0	0.010	Less activity closer to the road
		Activity of caribou < 3 km vs. > 3 km of road	1088.0	0.007	Less activity closer to the road
		Activity of caribou < 4 km vs. > 4 km of road	1770.5	0.082	
		Activity of caribou < 5 km vs. > 5 km of road	2302.0	0.149	
2013	Activity of caribou < 1 km vs. > 1 km of road	-	-	-	
	Activity of caribou < 2 km vs. > 2 km of road	-	-	-	
	Activity of caribou < 3 km vs. > 3 km of road	-	-	-	
	Activity of caribou < 4 km vs. > 4 km of road	132.5	0.012	More activity closer to the road	
	Activity of caribou < 5 km vs. > 5 km of road	431.5	0.002	More activity closer to the road	
2014	Activity of caribou < 1 km vs. > 1 km of road	556.0	0.174		
	Activity of caribou < 2 km vs. > 2 km of road	1472.5	0.731		
	Activity of caribou < 3 km vs. > 3 km of road	1558.0	0.917		
	Activity of caribou < 4 km vs. > 4 km of road	2261.5	0.688		
	Activity of caribou < 5 km vs. > 5 km of road	2774.0	0.657		

1. Bolded values indicate statistically significant results.

Mammals Monitoring

Table A-36: Statistical Comparison of Caribou Activity (mean number of thread breaks/island) at Increasing Distances from Provincial Road 280 in the Traffic Disturbance Comparison Area During the Second and Third Visits 2011–2014

Visit	Year	Contrast	U test statistic	p-value	Interpretation
2	2011	Activity of caribou < 1 km vs. > 1 km of road	2259.5	0.008	More activity closer to the road
		Activity of caribou < 2 km vs. > 2 km of road	3094.0	0.408	
		Activity of caribou < 3 km vs. > 3 km of road	2418.0	0.849	
		Activity of caribou < 4 km vs. > 4 km of road	2017.0	0.363	
		Activity of caribou < 5 km vs. > 5 km of road	1506.0	0.422	
	2012	Activity of caribou < 1 km vs. > 1 km of road	2128.0	0.033	More activity closer to the road
		Activity of caribou < 2 km vs. > 2 km of road	2771.5	0.142	
		Activity of caribou < 3 km vs. > 3 km of road	1619.0	0.794	
		Activity of caribou < 4 km vs. > 4 km of road	1090.5	0.426	
		Activity of caribou < 5 km vs. > 5 km of road	873.5	0.354	
	2013	Activity of caribou < 1 km vs. > 1 km of road	1237.0	0.226	
		Activity of caribou < 2 km vs. > 2 km of road	2432.0	0.362	
		Activity of caribou < 3 km vs. > 3 km of road	1915.0	0.645	
		Activity of caribou < 4 km vs. > 4 km of road	1357.5	0.205	
		Activity of caribou < 5 km vs. > 5 km of road	1204.5	0.991	
	2014	Activity of caribou < 1 km vs. > 1 km of road	1619.5	0.013	Less activity closer to the road
		Activity of caribou < 2 km vs. > 2 km of road	3023.5	0.304	
		Activity of caribou < 3 km vs. > 3 km of road	1843.0	0.027	Less activity closer to the road
		Activity of caribou < 4 km vs. > 4 km of road	1584.5	0.096	
		Activity of caribou < 5 km vs. > 5 km of road	1189.5	0.327	

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Table A-36: Statistical Comparison of Caribou Activity (mean number of thread breaks/island) at Increasing Distances from Provincial Road 280 in the Traffic Disturbance Comparison Area During the Second and Third Visits 2011–2014

Visit	Year	Contrast	U test statistic	p-value	Interpretation
3	2011	Activity of caribou < 1 km vs. > 1 km of road	1942.0	0.185	
		Activity of caribou < 2 km vs. > 2 km of road	2865.5	0.100	
		Activity of caribou < 3 km vs. > 3 km of road	2054.0	0.166	
		Activity of caribou < 4 km vs. > 4 km of road	1017.0	0.243	
		Activity of caribou < 5 km vs. > 5 km of road	1210.5	0.370	
	2012	Activity of caribou < 1 km vs. > 1 km of road	1566.5	0.439	
		Activity of caribou < 2 km vs. > 2 km of road	2061.0	0.186	
		Activity of caribou < 3 km vs. > 3 km of road	1359.5	0.258	
		Activity of caribou < 4 km vs. > 4 km of road	1017.0	0.243	
		Activity of caribou < 5 km vs. > 5 km of road	846.5	0.308	
	2013	Activity of caribou < 1 km vs. > 1 km of road	923.0	0.107	
		Activity of caribou < 2 km vs. > 2 km of road	1962.0	0.605	
		Activity of caribou < 3 km vs. > 3 km of road	1520.5	0.609	
		Activity of caribou < 4 km vs. > 4 km of road	1315.0	0.928	
		Activity of caribou < 5 km vs. > 5 km of road	823.5	0.365	
	2014	Activity of caribou < 1 km vs. > 1 km of road	1108.5	0.035	Less activity closer to the road
		Activity of caribou < 2 km vs. > 2 km of road	2395.5	0.204	
		Activity of caribou < 3 km vs. > 3 km of road	1578.5	0.017	Less activity closer to the road
		Activity of caribou < 4 km vs. > 4 km of road	1312.5	0.093	
		Activity of caribou < 5 km vs. > 5 km of road	1130.5	0.590	

1. Bolded values indicate statistically significant results.

Mammals Monitoring

Table A-37: Statistical Comparison of Caribou Activity (mean number of thread breaks/island) at 1 km Intervals from the KIP Access Road and Provincial Road 280 During the Second and Third Visits 2011–2014

Visit	Year	Contrast	U test statistic	p-value	Interpretation
2	2011	Activity of caribou 0-1 km from road	201.0	0.429	
		Activity of caribou 1-2 km from road	351.0	0.294	
		Activity of caribou 2-3 km from road	89.5	0.131	
		Activity of caribou 3-4 km from road	86.0	0.394	
		Activity of caribou 4-5 km from road	94.5	0.188	
		Activity of caribou >5 km from road	1091.0	0.007	More activity in Undisturbed Comparison than Traffic Disturbance Comparison
2012	2012	Activity of caribou 0-1 km from road	83.5	0.012	More activity in Traffic Disturbance than Project Effects
		Activity of caribou 1-2 km from road	174.0	0.015	More activity in Traffic Disturbance than Project Effects
		Activity of caribou 2-3 km from road	36.0	0.310	
		Activity of caribou 3-4 km from road	69.0	0.944	
		Activity of caribou 4-5 km from road	35.0	0.175	
		Activity of caribou >5 km from road	765.5	0.901	
2013	2013	Activity of caribou 0-1 km from road	-	-	
		Activity of caribou 1-2 km from road	-	-	
		Activity of caribou 2-3 km from road	-	-	
		Activity of caribou 3-4 km from road	4.5	0.062	
		Activity of caribou 4-5 km from road	20.5	0.225	
		Activity of caribou >5 km from road	637.5	0.929	

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Table A-37: Statistical Comparison of Caribou Activity (mean number of thread breaks/island) at 1 km Intervals from the KIP Access Road and Provincial Road 280 During the Second and Third Visits 2011–2014

Visit	Year	Contrast	U test statistic	p-value	Interpretation
2	2014	Activity of caribou 0-1 km from road	150.5	0.498	
		Activity of caribou 1-2 km from road	200.5	0.050	
		Activity of caribou 2-3 km from road	31.5	0.134	
		Activity of caribou 3-4 km from road	58.0	0.286	
		Activity of caribou 4-5 km from road	52.5	0.254	
		Activity of caribou >5 km from road	868.0	0.841	
3	2011	Activity of caribou 0-1 km from road	126.0	0.103	
		Activity of caribou 1-2 km from road	186.0	0.013	More activity in Traffic Disturbance than Project Effects
		Activity of caribou 2-3 km from road	64.0	0.836	
		Activity of caribou 3-4 km from road	88.5	0.514	
		Activity of caribou 4-5 km from road	86.0	0.418	
		Activity of caribou >5 km from road	853.0	0.447	
	2012	Activity of caribou 0-1 km from road	115.0	0.064	
		Activity of caribou 1-2 km from road	37.0	0.926	
		Activity of caribou 2-3 km from road	38.0	0.611	
		Activity of caribou 3-4 km from road	61.5	0.457	
		Activity of caribou 4-5 km from road	37.0	0.926	
		Activity of caribou >5 km from road	765.0	0.904	

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Table A-37: Statistical Comparison of Caribou Activity (mean number of thread breaks/island) at 1 km Intervals from the KIP Access Road and Provincial Road 280 During the Second and Third Visits 2011–2014

Visit	Year	Contrast	U test statistic	p-value	Interpretation
3	2013	Activity of caribou 0-1 km from road	-	-	
		Activity of caribou 1-2 km from road	-	-	
		Activity of caribou 2-3 km from road	-	-	
		Activity of caribou 3-4 km from road	-	-	
		Activity of caribou 4-5 km from road	41.0	0.126	
		Activity of caribou >5 km from road	290.5	0.004	More activity in Traffic Disturbance than Undisturbed Comparison
2014		Activity of caribou 0-1 km from road	103.5	0.377	
		Activity of caribou 1-2 km from road	292.0	0.740	
		Activity of caribou 2-3 km from road	34.5	0.179	
		Activity of caribou 3-4 km from road	67.0	0.554	
		Activity of caribou 4-5 km from road	35.0	0.028	More activity in Traffic Disturbance than Project Effects
		Activity of caribou >5 km from road	717.0	0.108	

1. Bolded values indicate statistically significant results.

Mammals Monitoring

Table A-38: Number of Trail Camera Locations at Which Large Mammal Species Were Photographed in the Project Effects and Undisturbed Comparison Areas 2011–2014

Year	Age of Animal	Caribou		Black Bear		Gray Wolf		Moose	
		Project Effects Area	Undisturbed Comparison Area	Project Effects Area	Undisturbed Comparison Area	Project Effects Area	Undisturbed Comparison Area	Project Effects Area	Undisturbed Comparison Area
2011	Adult	7	2	7	0	3	1	15	2
	Juvenile	1	0	1	0	0	0	3	1
	All	7	2	7	0	3	1	15	2
2012	Adult	2	2	4	4	0	0	15	1
	Juvenile	0	0	0	0	0	0	2	0
	All	2	2	4	4	0	0	15	1
2013	Adult	1	1	2	1	1	0	10	1
	Juvenile	0	0	1	0	0	0	2	0
	All	1	1	2	1	1	1	10	1
2014	Adult	2	3	4	0	2	0	12	2
	Juvenile	0	0	1	0	0	0	3	0
	All	2	3	4	0	1	0	12	2

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Table A-39: Number of Trail Camera Locations at Which Other Mammal Species Were Photographed in the Project Effects and Undisturbed Comparison Areas 2011–2014

Species	2011	2012	2013	2014
American marten	7	0	21	7
Fisher	0	1	0	0
Canada lynx	2	0	0	0
Red fox	43	8	6	23
Red squirrel	0	1	0	0
North American river otter	20	0	0	2
Snowshoe hare	0	0	26	0

Table A-40: Number of Signs of Other Mammal Species Observed on Moose and Other Large Mammal Transects During All Visits 2011–2014

Species	2011	2012	2013	2014
American marten	10	58	236	36
American beaver	13	1	0	0
Ermine	0	0	6	0
Fisher	3	2	6	0
Canada lynx	1	0	2	0
Mink	1	17	36	3
Red fox	0	26	26	10
Red squirrel	10	3	0	4
North American river otter	8	7	22	34
Snowshoe hare	38	1	1	9
Weasel	0	0	1	1
Wolverine	0	0	0	3

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Table A-41: Moose and Other Large Mammal Signs Observed on Moose and Other Large Mammal Transects During all Visits 2011–2014

Year	Side of Road	Survey Effort (km)	Moose		Caribou		Black Bear		Gray Wolf	
			Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)
2011	North	227.7	1,140	5.01	445	1.95	14	0.06	28	0.12
	South	90.6	313	3.45	353	3.90	3	0.03	6	0.07
2012	North	222.6	656	2.95	54	0.24	13	0.06	16	0.07
	South	93.3	192	2.06	46	0.49	1	0.01	1	0.01
2013	North	75.9	145	1.91	385	5.07	3	0.04	1	0.01
	South	31.3	8	0.26	396	12.65	0	0	0	0
2014	North	227.7	753	3.31	116	0.51	14	0.06	14	0.06
	South	93.9	492	5.24	75	0.80	1	0.01	9	0.10

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Table A-42: Distribution of Moose and Other Large Mammal Signs on Moose and Other Large Mammal Transects During All Visits 2011–2014

Year	Side of Road	Survey Effort (transects surveyed)	Moose		Caribou		Black Bear		Gray Wolf	
			Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs
2011	North	8	8	100	8	100	4	50	7	88
	South	3	3	100	3	100	2	67	1	33
2012	North	8	8	100	7	88	6	75	6	75
	South	3	3	100	2	67	1	33	1	33
2013	North	8	8	100	8	100	1	13	1	13
	South	3	2	67	3	100	0	0	0	0
2014	North	8	8	100	6	75	4	50	5	63
	South	3	3	100	3	100	1	33	2	67

Mammals Monitoring

Table A-43: Moose and Other Large Mammal Signs Observed on Moose and Other Large Mammals Transects During the First Visit 2011–2014

Year	Side of Road	Survey Effort (km)	Moose		Caribou		Black Bear		Gray Wolf	
			Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)
2011	North	75.9	460	6.06	75	0.99	2	0.03	19	0.25
	South	31.3	97	3.10	118	3.77	3	0.10	4	0.13
2012	North	75.1	86	1.15	0	0	2	0.03	11	0.15
	South	31.3	20	0.64	0	0	0	0	1	0.03
2013	North	75.9	145	1.91	385	5.07	3	0.04	1	0.01
	South	31.3	8	0.26	396	12.65	0	0	0	0
2014	North	75.9	55	0.72	1	0.01	0	0	4	0.05
	South	32.3	102	3.16	0	0	0	0	4	0.12

Mammals Monitoring

Table A-44: Distribution of Moose and Other Large Mammal Signs on Moose and Other Large Mammal Transects During the First Visit 2011–2014

Year	Side of Road	Survey Effort (transects surveyed)	Moose		Caribou		Black Bear		Gray Wolf	
			Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs
2011	North	8	8	100	8	100	2	25	5	63
	South	3	3	100	3	100	2	67	1	33
2012	North	8	7	88	0	0	2	25	4	50
	South	3	2	67	0	0	0	0	1	33
2013	North	8	8	100	8	100	1	13	1	13
	South	3	2	67	3	100	0	0	0	0
2014	North	8	8	100	1	13	0	0	3	38
	South	3	3	100	0	0	0	0	1	33

Mammals Monitoring

Table A-45: Moose and Other Large Mammal Signs Observed on Moose and Other Large Mammal Transects During the Second Visit 2011–2014

Year	Side of Road	Survey Effort (km)	Moose		Caribou		Black Bear		Gray Wolf	
			Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)
2011	North	75.9	380	5.01	178	2.35	6	0.08	9	0.12
	South	28.8	97	3.37	147	5.10	0	0	1	0.03
2012	North	72.4	282	3.90	42	0.58	8	0.11	2	0.03
	South	31.3	110	3.51	35	1.12	0	0	0	0
2013	North	0	-	-	-	-	-	-	-	-
	South	0	-	-	-	-	-	-	-	-
2014	North	75.9	332	4.37	111	1.46	14	0.18	5	0.07
	South	31	218	6.96	38	1.21	1	0.03	2	0.06

Mammals Monitoring

Table A-46: Distribution of Moose and Other Large Mammal Signs on Moose and Other Large Mammal Transects During the Second Visit 2011–2014

Year	Side of Road	Survey Effort (transects surveyed)	Moose		Caribou		Black Bear		Gray Wolf	
			Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs
2011	North	8	8	100	8	100	3	38	4	50
	South	3	3	100	3	100	0	0	1	33
2012	North	8	8	100	7	88	3	38	2	25
	South	3	3	100	2	67	0	0	0	0
2013	North	0	-	-	-	-	-	-	-	-
	South	0	-	-	-	-	-	-	-	-
2014	North	8	8	100	4	50	3	38	2	25
	South	3	3	100	3	100	1	33	1	33

Mammals Monitoring

Table A-47: Moose and Other Large Mammal Signs Observed on Moose and Other Large Mammal Transects During the Third Visit 2011–2014

Year	Side of Road	Survey Effort (km)	Moose		Caribou		Black Bear		Gray Wolf	
			Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)	Number of Signs	Sign Frequency (signs/km)
2011	North	75.9	300	3.95	192	2.53	6	0.08	0	0
	South	30.6	119	3.89	88	2.88	0	0	1	0.03
2012	North	75.1	287	3.82	12	0.16	3	0.04	3	0.04
	South	30.7	62	2.02	11	0.36	1	0.03	0	0
2013	North	0	-	-	-	-	-	-	-	-
	South	0	-	-	-	-	-	-	-	-
2014	North	75.9	366	4.82	4	0.05	0	0	4	0.05
	South	31	172	5.50	37	1.18	0	0	37	1.18

Mammals Monitoring

Table A-48: Distribution of Moose and Other Large Mammal Signs on Moose and Other Large Mammal Transects During the Third Visit 2011–2014

Year	Side of Road	Survey Effort (transects surveyed)	Moose		Caribou		Black Bear		Gray Wolf	
			Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs	Number of Transects With Signs	Percentage of Transects With Signs
2011	North	8	8	100	8	100	2	25	0	0
	South	3	3	100	3	100	0	0	1	33
2012	North	8	8	100	5	63	3	38	1	13
	South	3	3	100	1	33	1	33	0	0
2013	North	0	-	-	-	-	-	-	-	-
	South	0	-	-	-	-	-	-	-	-
2014	North	8	8	100	3	38	0	0	2	25
	South	3	3	100	3	100	0	0	1	33

Appendix B
Figures

Mammals Monitoring

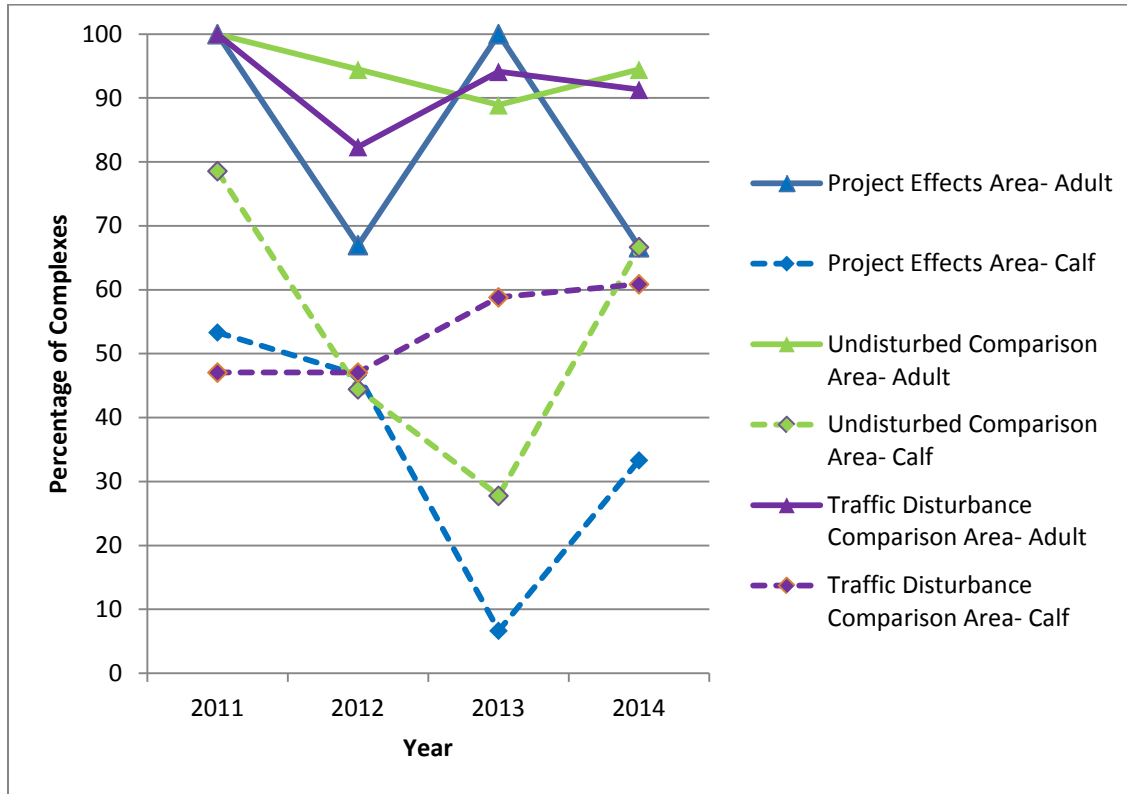


Figure 3-1: Percentage of Peatland Complexes with Caribou Adult and Calf Signs in Three Survey Areas Over Three Visits 2011–2014

Mammals Monitoring

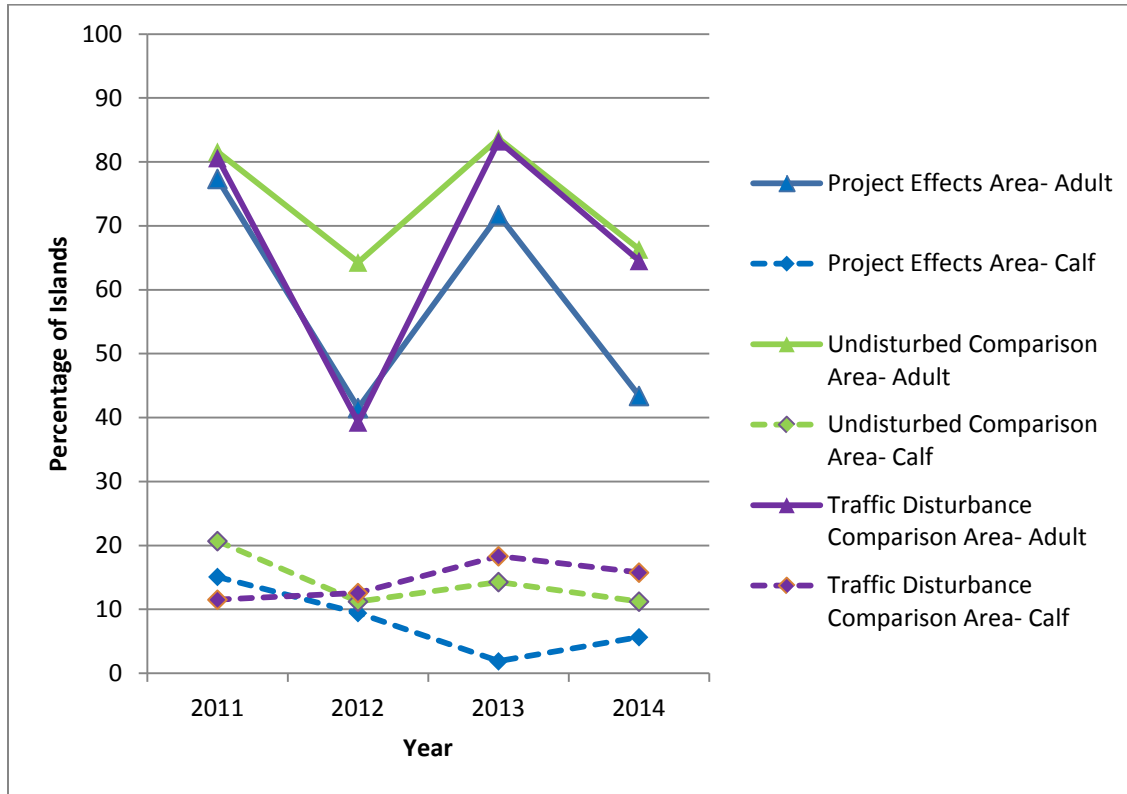


Figure 3-2: Percentage of Habitat Islands with Caribou Adult and Calf Signs in Three Survey Areas Over Three Visits 2011–2014

Mammals Monitoring

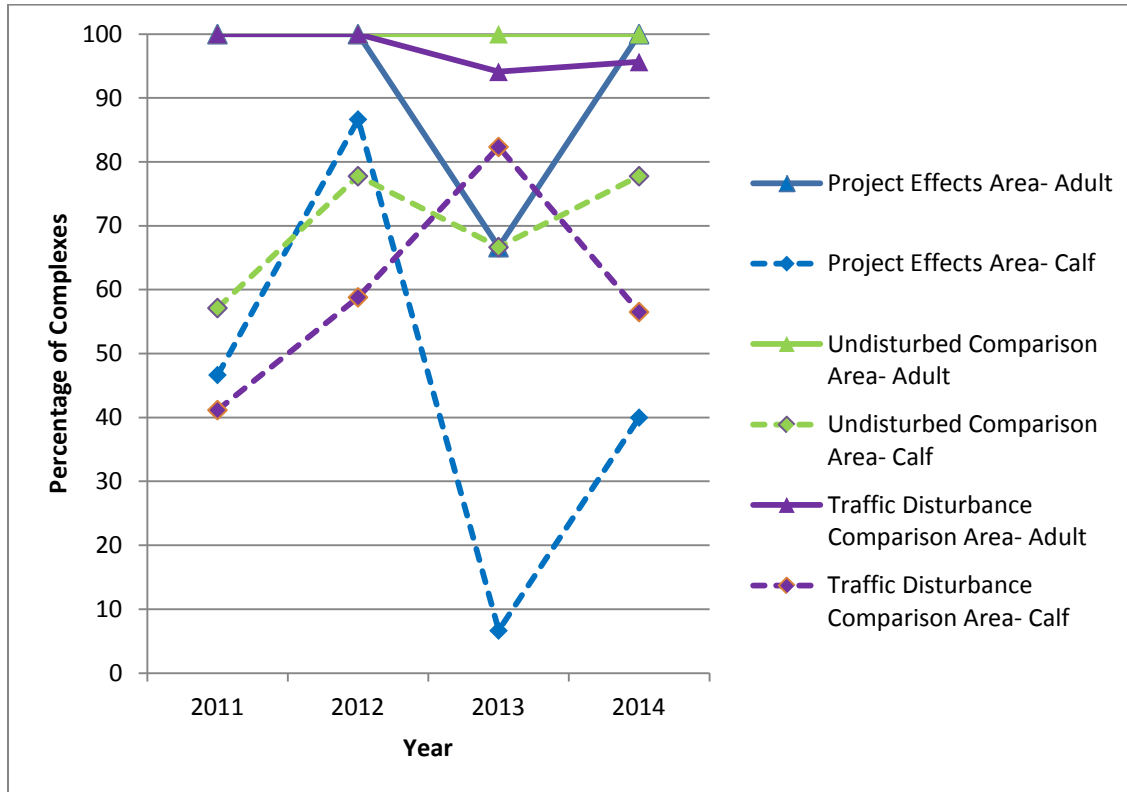


Figure 3-3: Percentage of Peatland Complexes with Moose Adult and Calf Signs in Three Survey Areas Over Three Visits 2011–2014

Mammals Monitoring

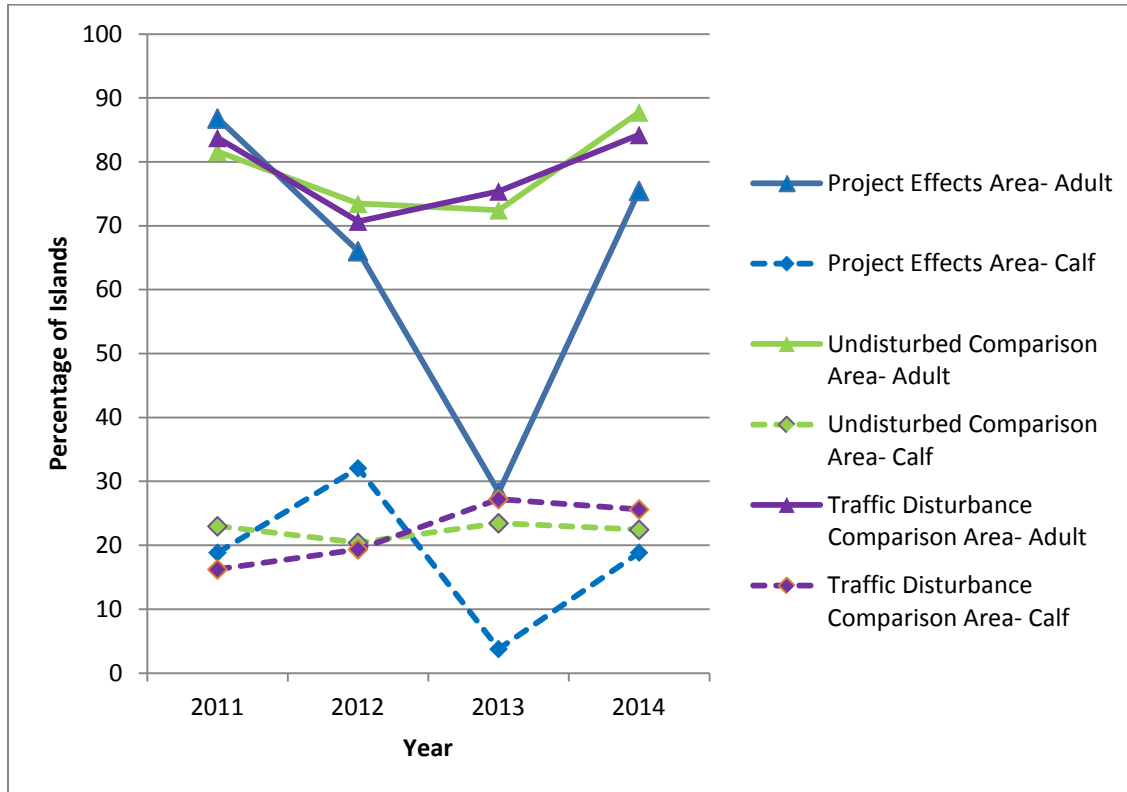


Figure 3-4: Percentage of Habitat Islands with Moose Adult and Calf Signs in Three Survey Areas Over Three Visits 2011–2014

Mammals Monitoring

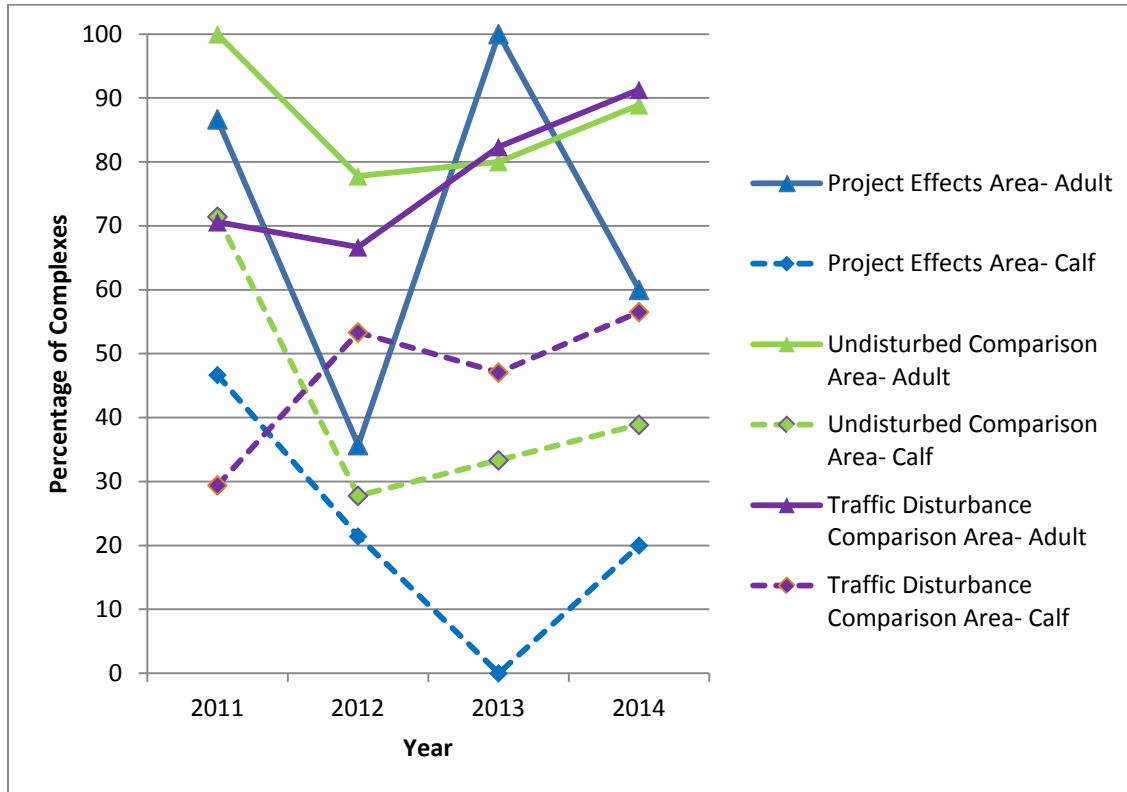


Figure 3-5: Percentage of Peatland Complexes with Caribou Adult and Calf Signs in Three Survey Areas During the Second Visit 2011–2014 (Note: very few complexes were surveyed in 2013)

Mammals Monitoring

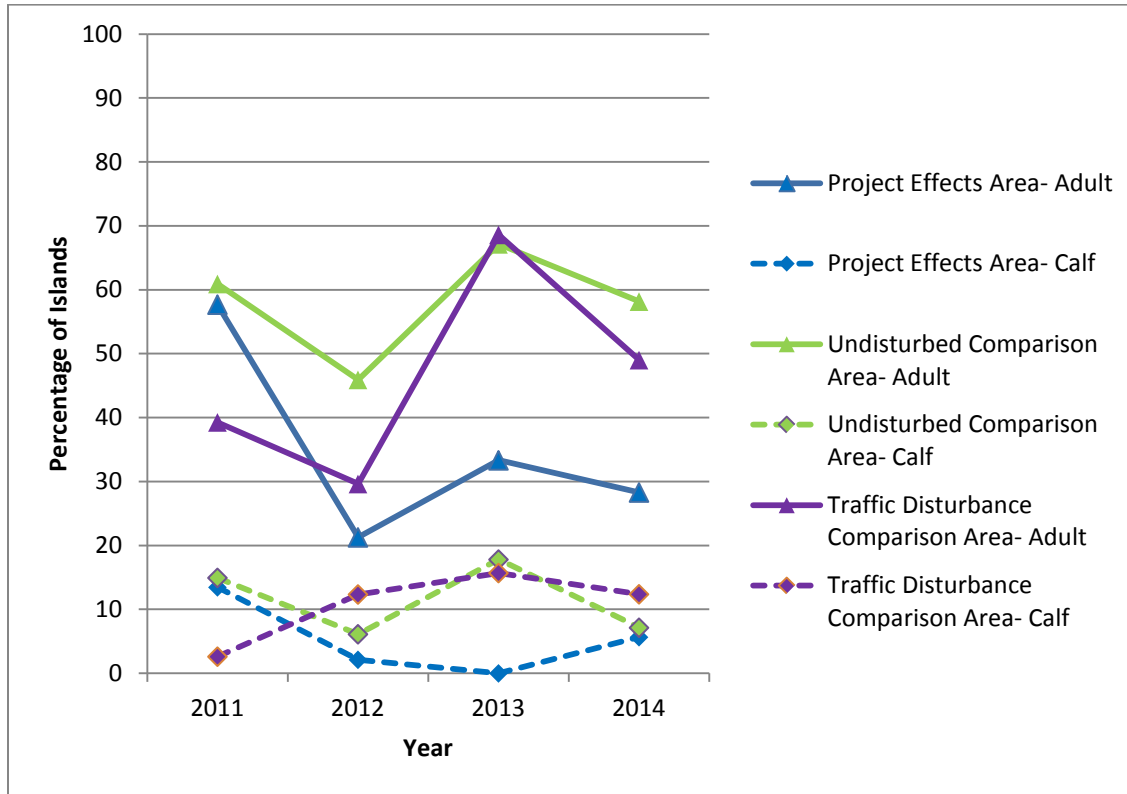


Figure 3-6: Percentage of Habitat Islands with Caribou Adult and Calf Signs in Three Survey Areas During the Second Visit 2011–2014 (Note: very few islands were surveyed in 2013)

Mammals Monitoring

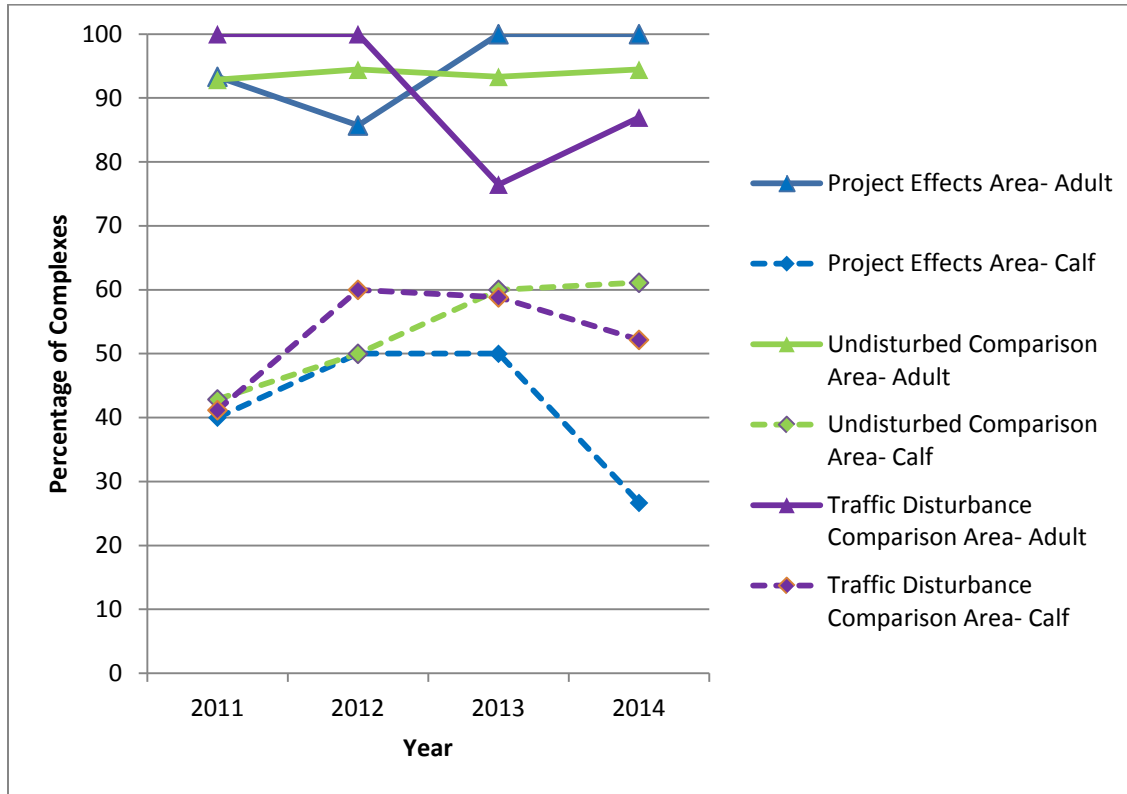


Figure 3-7: Percentage of Peatland Complexes with Moose Adult and Calf Signs in Three Survey Areas During the Second Visit 2011–2014 (Note: very few complexes were surveyed in 2013)

Mammals Monitoring

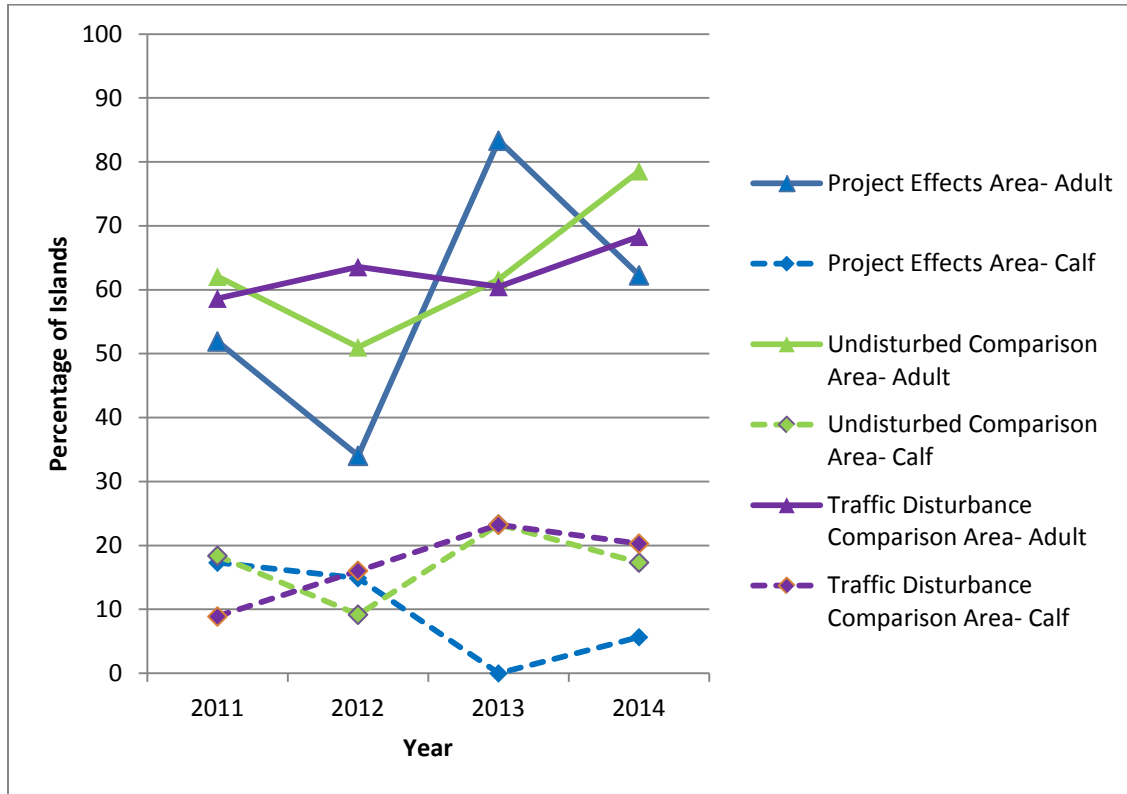


Figure 3-8: Percentage of Habitat Islands with Moose Adult and Calf Signs in Three Survey Areas During the Second Visit 2011–2014 (Note: very few islands were surveyed in 2013)

Mammals Monitoring

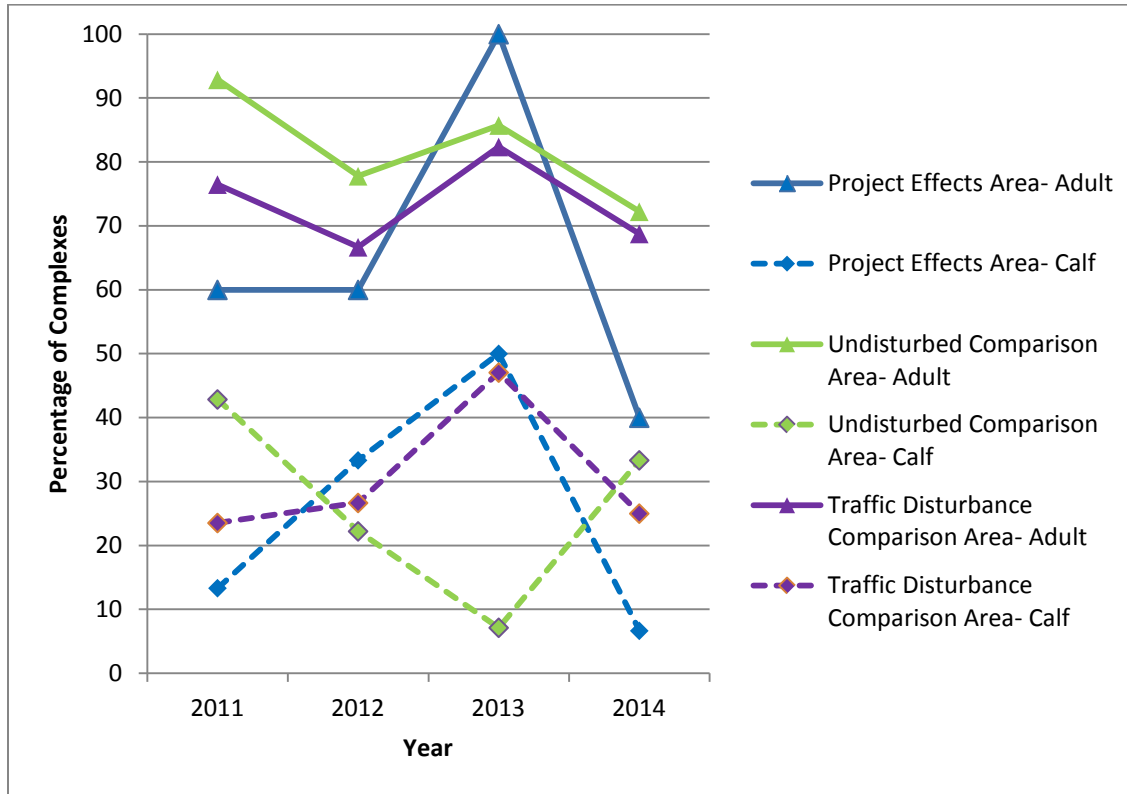


Figure 3-9: Percentage of Peatland Complexes with Caribou Adult and Calf Signs in Three Survey Areas During the Third Visit 2011–2014 (Note: very few complexes were surveyed in 2013)

Mammals Monitoring

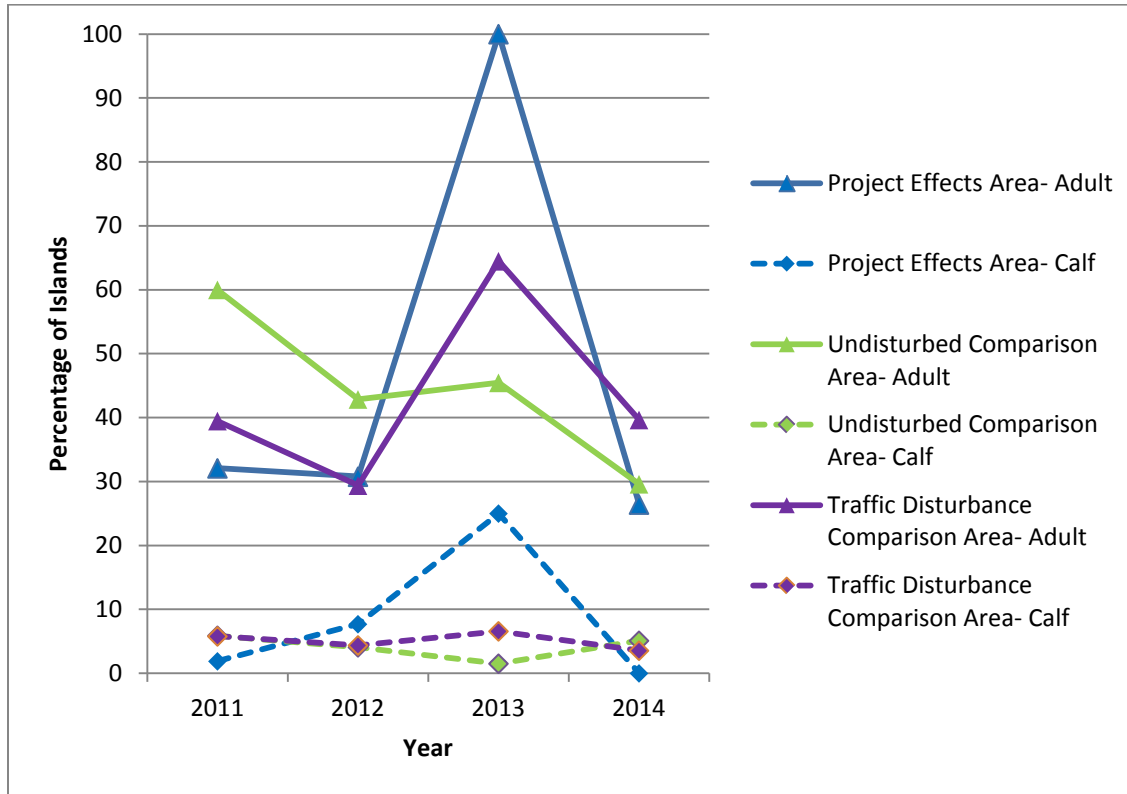


Figure 3-10: Percentage of Habitat Islands with Caribou Adult and Calf Signs in Three Survey Areas During the Third Visit 2011–2014 (Note: very few islands were surveyed in 2013)

Mammals Monitoring

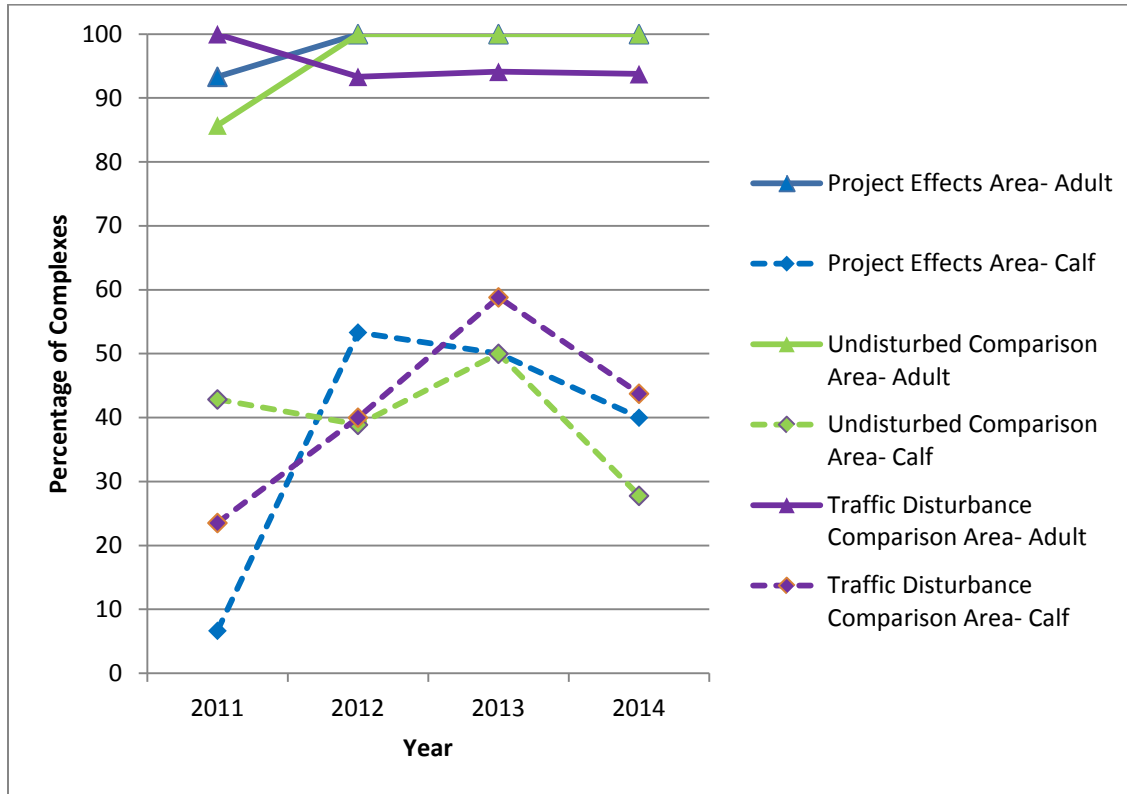


Figure 3-11: Percentage of Peatland Complexes with Moose Adult and Calf Signs in Three Survey Areas During the Third Visit 2011–2014 (Note: very few complexes were surveyed in 2013)

Mammals Monitoring

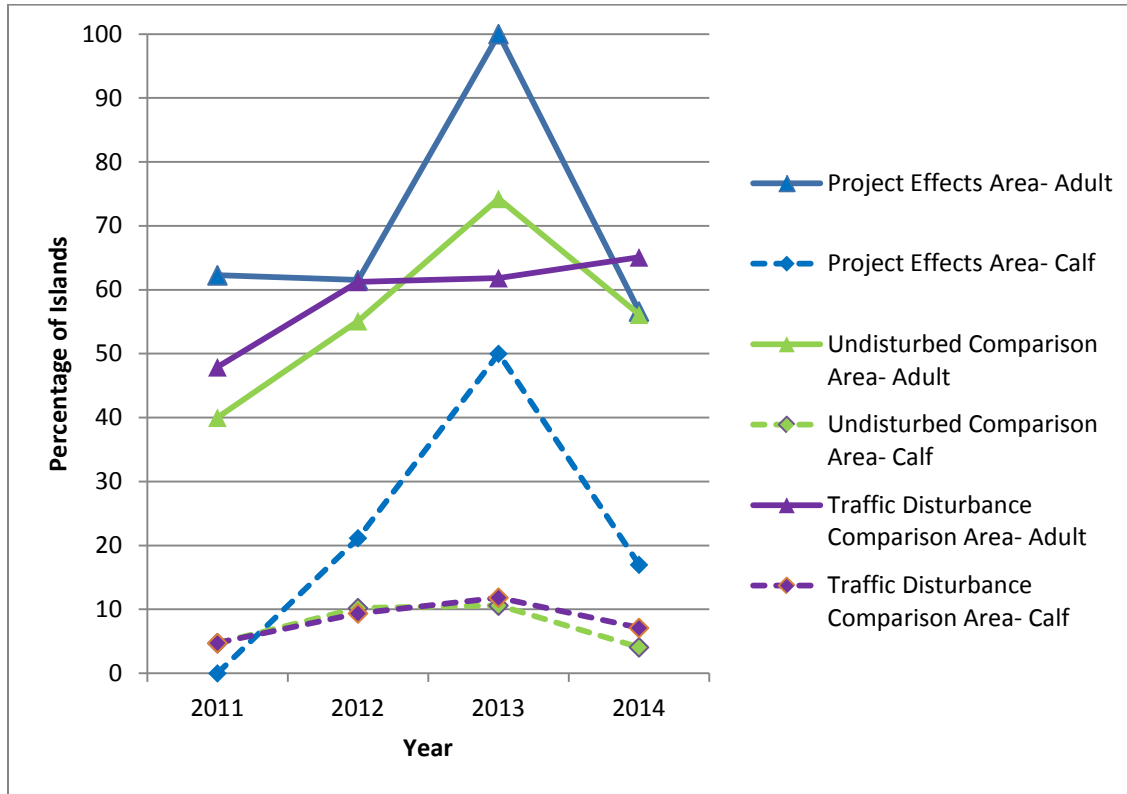


Figure 3-12: Percentage of Habitat Islands with Moose Adult and Calf Signs in Three Survey Areas During the Third Visit 2011–2014 (Note: very few islands were surveyed in 2013)

Mammals Monitoring

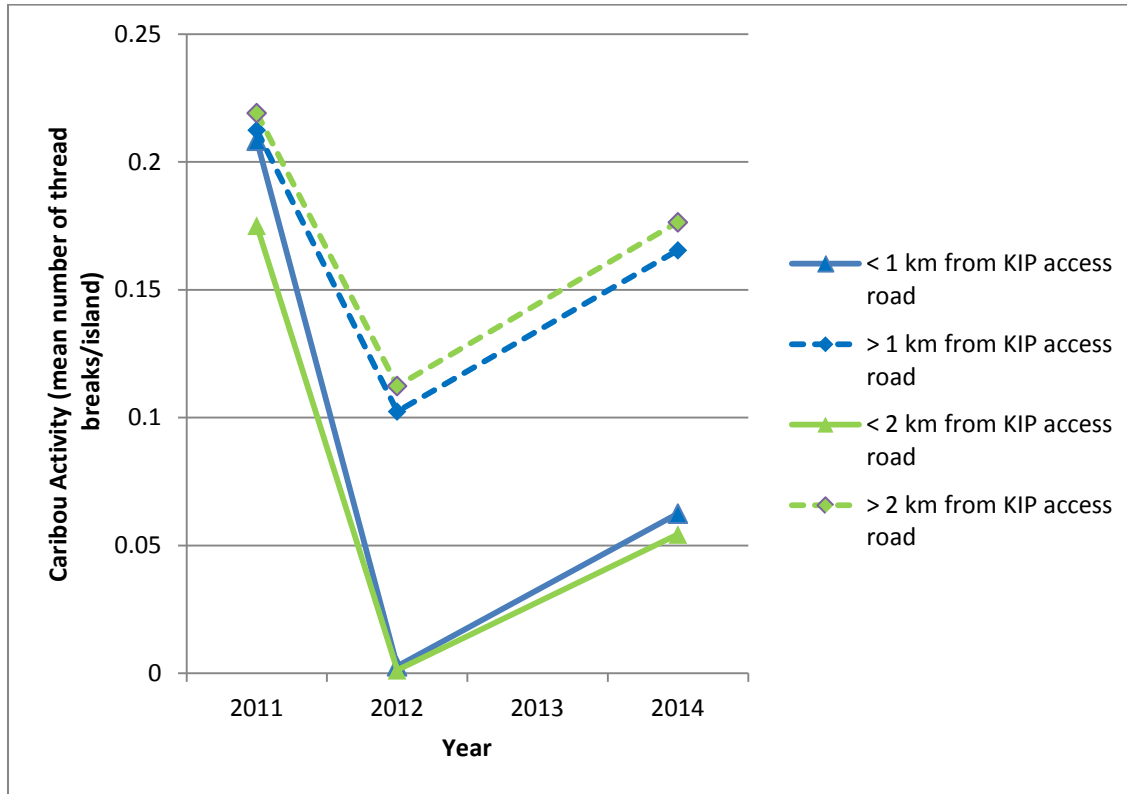


Figure 3-13: Caribou Activity on Habitat Islands Within and Beyond 1 and 2 km of the KIP Access Road During the Second Visit 2011–2014

Mammals Monitoring

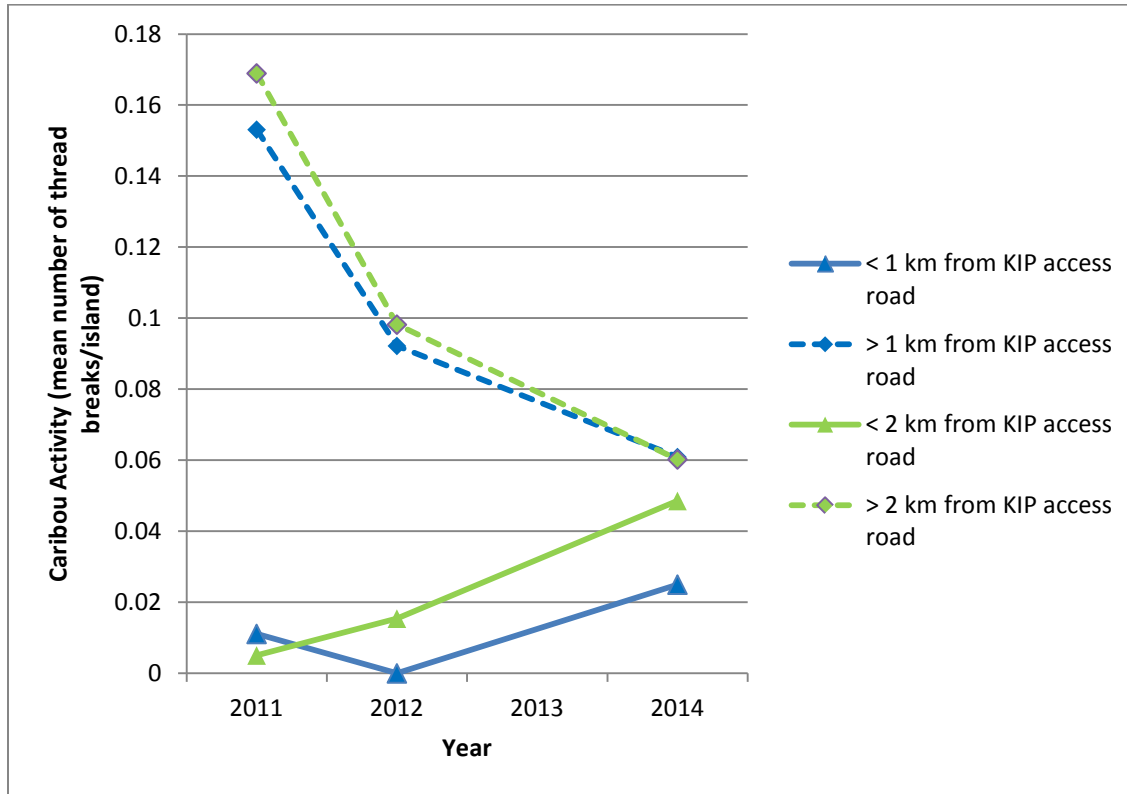


Figure 3-14: Caribou Activity on Habitat Islands Within and Beyond 1 and 2 km of the KIP Access Road During the Third Visit 2011–2014

Mammals Monitoring

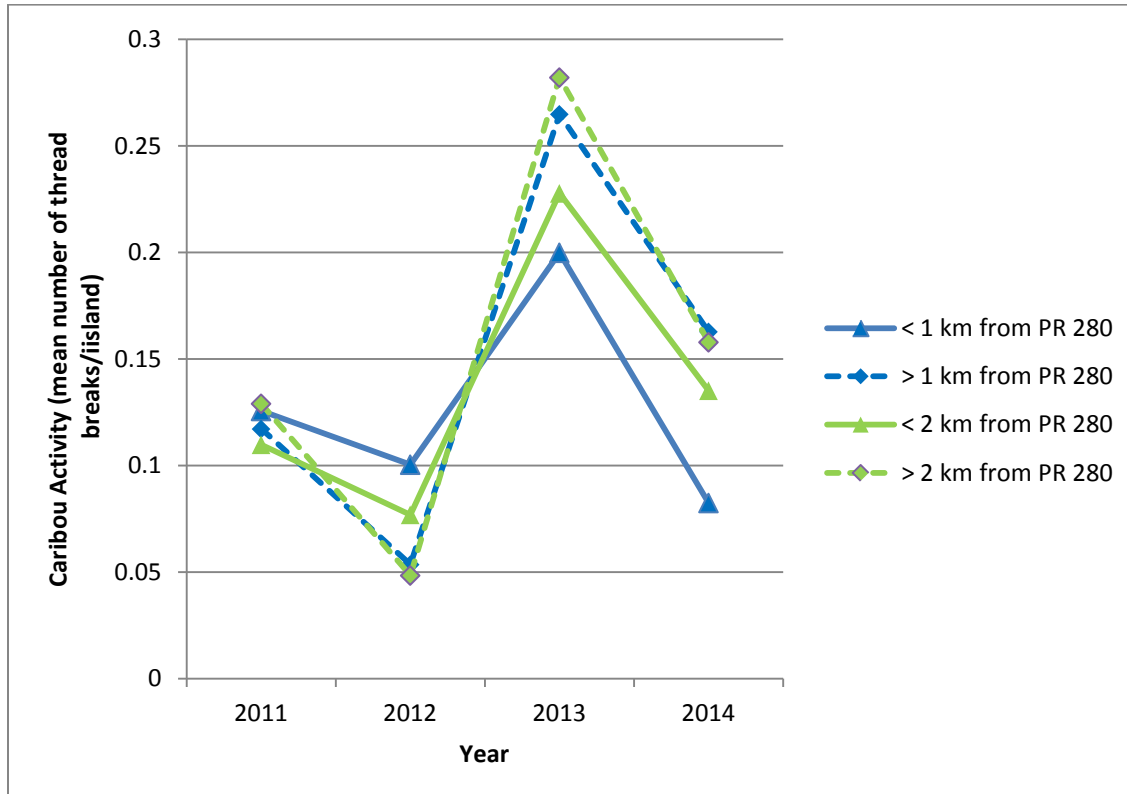


Figure 3-15: Caribou Activity on Habitat Islands Within and Beyond 1 and 2 km of Provincial Road 280 During the Second Visit 2011–2014

Mammals Monitoring

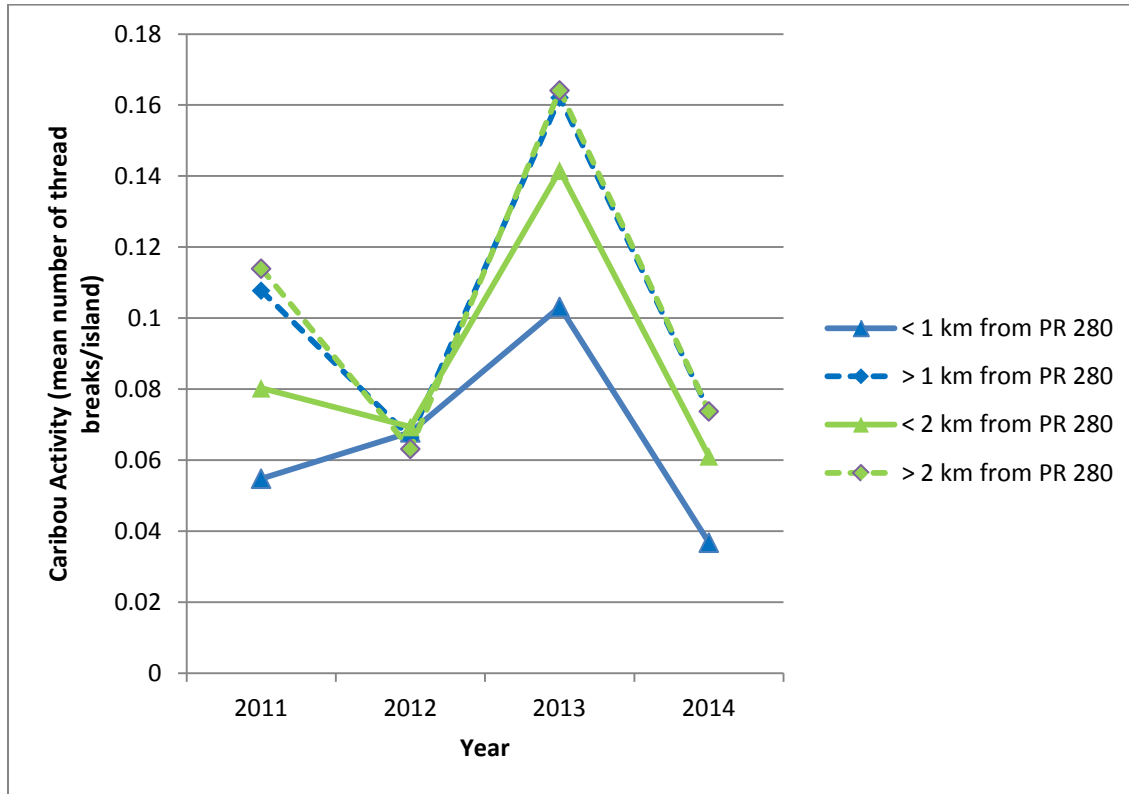


Figure 3-16: Caribou Activity on Habitat Islands Within and Beyond 1 and 2 km of Provincial Road 280 During the Third Visit 2011–2014

Appendix C
Photos



Note the heavy use caribou trail at bottom right.

Photo 1-1: Habitat Islands in a Peatland Complex



Photo 3-1: Male Caribou Photographed in the Project Effects Area (EA018 2) June 14, 2014



**Photo 3-2: Adult Caribou Photographed in the Undisturbed Comparison Area (EA020 1)
June 2, 2014**



**Photo 3-3: Male Caribou Photographed in the Undisturbed Comparison Area (EA020 2)
June 2, 2014**



**Photo 3-4: Male Caribou Photographed in the Undisturbed Comparison Area (EA21 1)
May 29, 2014**



Photo 3-5: Female Moose and Two Calves Photographed in the Project Effects Area (EA005 3) June 20, 2014

Mammals Monitoring



Photo 3-6: Male Moose Photographed in the Project Effects Area (EA008 3) May 1, 2014



**Photo 3-7: Male Moose Photographed in the Undisturbed Comparison Area (EA019 1)
May 19, 2014**



**Photo 3-8: Male Moose Photographed in the Undisturbed Comparison Area (EA021 1)
May 23, 2014**



Photo 3-9: Black Bear Photographed in the Project Effects Area (EA002) May 25, 2014



Photo 3-10: Gray Wolf Photographed in the Project Effects Area (EA002) July 1, 2014