



# Keeyask Generation Project Terrestrial Effects Monitoring Plan

## Caribou Sensory Disturbance Monitoring Report

TEMP-2016-08



# **KEEYASK GENERATION PROJECT**

## **TERRESTRIAL EFFECTS MONITORING PLAN**

REPORT #TEMP-2016-08

### **CARIBOU SENSORY DISTURBANCE**

### **MONITORING REPORT**

Prepared for

Manitoba Hydro

By

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# SUMMARY

## BACKGROUND

Construction of the Keeyask Generation Project (the Project) at Gull Rapids began in July 2014. The Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan to monitor the effects of construction and operation of the generating station on the terrestrial environment. Monitoring results will help the KHLP, government regulators, members of local First Nation communities, and the general public understand how construction and operation of the generating station will affect the environment, and whether or not more needs to be done to reduce harmful effects.

The ranges of three migratory caribou herds extend into the Keeyask Region: barren-ground caribou from the Qamanirjuaq herd, and forest-tundra woodland caribou from the Pen Islands and Cape Churchill coastal caribou herds. Groups of caribou from these herds occasionally overwinter in the Keeyask Region and leave in spring to calve.

A fourth group of caribou occupies the Keeyask Region in spring and summer (referred to as summer resident caribou), and is known to calve on the islands in Gull and Stephens lakes and on peatland complexes (raised treed areas surrounded by low, wet areas, which essentially act as islands). Summer resident caribou likely move within and beyond the Keeyask Region in the winter months, but the extent of their core range is unknown. These caribou remain in the Keeyask Region to calve, but it is unclear whether the same individuals calve in the area in consecutive years.

Predicted Project effects on summer resident caribou in the Keeyask Region include the loss of physical habitat from clearing and development, and the effective loss of habitat due to sensory disturbance (e.g., noise and light from construction activities). Caribou may temporarily avoid or less frequently use otherwise suitable habitat near construction sites due to the sounds, odours, and sights caused by construction activities. A lesser effect may also occur near Project infrastructure and roads during the operation phase. Caribou movement patterns in and through the Keeyask Region could also be affected by the Project.

## WHY IS THE STUDY BEING DONE?

Caribou calving on islands in lakes and in peatland complexes near the Project may be susceptible to effective habitat loss due to noise and light disturbance. The goal of this study is to monitor the effect of these disturbances on caribou distribution and relative abundance near the Project during construction and operation. While the focus of the sensory disturbance study is on caribou, information on moose, gray wolves and black bear is also collected. Moose are included as they could potentially attract wolves that could opportunistically prey on caribou. Gray wolves and black bear are included as these species are common predators of adult caribou and calves and can affect their habitat use.



### Looking for Animal Signs along Transect

## WHAT WAS DONE?

Three different types of ground tracking transects (in areas expected to be affected by the Project, in areas not affected by the Project, and randomly selected areas), in combination with trail cameras, were used to gather information on caribou (and other large mammal) use of islands in lakes, peatland complexes, and habitat near the north and south access roads. Islands in lakes and peatland complex islands were surveyed as these habitats are known to be used by caribou during the calving and calf-rearing period, when caribou are sensitive to disturbance. Habitat along the north and south access roads was surveyed to determine the impacts of traffic disturbance on caribou and other large mammals..

All ground tracking transects were visited three times in 2015 to coincide with the caribou calf-rearing period. The initial visit was conducted in April, prior to cow arrival, to ensure animals were not disturbed during calving. The second visit was conducted in July, to coincide with the early calf-rearing period. The third visit was conducted in September, to coincide with the mid to late calf-rearing period.

In addition to ground tracking transects, a trail camera was placed on each lake island transect and on one island within each peatland complex during the initial visit of the tracking transect. Trail cameras were placed in areas that appeared to have the best chance of detecting caribou activity (*i.e.*, heavily used game trails, large openings). Photographs were reviewed following camera removal, and the species, number, and sex of photographed animals was determined.

The timing of ice breakup in Stephens Lake was also monitored using the trail cameras deployed along the shoreline, to see how it corresponds with caribou use of the islands within the lake.

## WHAT WAS FOUND?

Overall, caribou and moose were relatively common and widely distributed on islands in lakes, peatland complexes, and access road transects. Moose were the most common species of large mammal detected and were more abundant than caribou. Moose and caribou calves were less abundant than adults, but were also widely distributed.

On islands in lakes, caribou were the second most common large mammal species observed. Caribou calves were also detected on islands throughout Stephens Lake, but were less abundant than moose calves. Moose were the most common large mammal species observed on islands in lakes and occupied the majority of islands in Stephens Lake. Moose calves were also detected on a relatively high number of islands in lakes.

Project-affected islands (islands within 2 km of Project infrastructure/borrow sources or within 4 km of the proposed powerhouse) appeared to support fewer caribou and caribou calves, compared to islands further away from the Project construction areas. Similar results were found for moose, moose calves, and black bear. Gray wolf were present on a greater proportion of Project-affected islands, but the number of islands occupied was relatively small.

Black bear and gray wolf presence was limited to relatively few islands, which were distributed throughout Stephens Lake. Detection of predator sign that overlapped with caribou or moose during the same visit was limited to a small number of islands in lakes.

On peatland complexes, caribou were the second most common species observed and were detected on a relatively high number of peatland complexes; however, caribou calves were detected on relatively few complexes. Moose were the most common large mammal species observed on peatland complexes. Moose calves were relatively abundant and detected on the majority of peatland complexes. Black bear were detected on approximately half of the peatland complexes, while gray wolf was relatively uncommon. Detection of predator sign that overlapped with caribou or moose during the same visit was found on a relatively high number of peatland complexes. The presence of large mammals was relatively consistent across all transect types. However, all large mammal species were present on a greater number of unburned peatland complexes than complexes that were burned in 2013.

On transects along the access roads, caribou were also relatively common, and were present on the majority of access road transects during the second and third visits. Caribou calves were present on a relatively low number of transects. Moose were the most common large mammal species observed along access road transects and were present on all transects during the second and third visits. While black bear were present on half of the access road transects, gray wolves were present on the majority. With the exception of moose, which was detected

relatively equally among visits, most large mammal species activity appeared to peak on access road transects during the second visit.

Adult caribou and adult moose sign density was greater within 2 km of the north or south access roads compared to densities greater than 2 km away. No difference was apparent in caribou calf or moose calf sign density. Black bear sign density was also greater near the roads compared to further away. No difference was apparent in gray wolf sign density.



**A Moose on an Island Near the Keeyask Site**

## **WHAT DOES IT MEAN?**

Project-affected islands appeared to support fewer large mammals (with the exception of gray wolves) compared to unaffected islands in 2015. This may indicate a loss of effective habitat due to sensory disturbance from active construction. However, the presence of caribou on Caribou Island (located just west of the Project construction site), suggests that sensory disturbance may be limited to a relatively short range around active construction areas.

Similarly, the distribution of caribou and moose on peatland complexes and access road transects suggests that sensory disturbance from the Project was limited to a relatively short range around active construction areas, or had little influence on habitat selection by these animals. Gray wolf were present on relatively few islands in lakes or peatland complexes, suggesting low densities of this species and relatively little influence on calving caribou and moose. Black bear were detected throughout islands on Stephens Lake and on complexes

throughout the Keeyask Region, which may have influenced habitat use by calving caribou and moose.

Signs of caribou and caribou calves on islands in lakes, peatland complexes, and along the access roads during all three visits indicate that caribou were present within the Keeyask Region from spring to fall, and used habitat in the region for calving and calf-rearing.

In 2015, the timing of ice breakup in Stephens Lake likely coincided with the end of the caribou calving period and beginning of the calf-rearing period. As a result, islands in lakes likely provided caribou and their calves with a physical barrier from predators.

The abundance of moose sign throughout the Keeyask Region suggests that suitable habitat is available to sustain a moose population, and this population is likely sufficient to provide predators, namely wolves, with a primary prey source.

## **WHAT WILL BE DONE NEXT?**

Trail cameras will be placed in the same locations on islands in lakes and in peatland complexes in 2016 to monitor large mammal use. Ground tracking transects and trail camera studies conducted in 2015 will be repeated in 2017.

Information from this caribou monitoring study will be provided to the Keeyask Caribou Coordination Committee (KCCC) to support the Partnership's monitoring activities and collaborate, if requested, in the development of broader common research goals and perspectives with Manitoba Hydro, Manitoba Sustainable Development and local stakeholders.

Synthesis reports will provide an integrated evaluation of Project effects on caribou distribution and abundance, the availability of suitable habitat and habitat effectiveness using results from this monitoring study, as well as relevant information from other Project monitoring programs.



# STUDY TEAM

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# 1.0 INTRODUCTION

Construction of the Keeyask Generation Project (the Project), a 695 megawatt hydroelectric generating station (GS) and associated facilities, began in July 2014. The Project is located at Gull Rapids on the lower Nelson River in northern Manitoba where Gull Lake flows into Stephens Lake, 35 km upstream of the existing Kettle GS.

The *Keeyask Generation Project Response to EIS Guidelines* (the EIS), completed in June 2012, provides a summary of predicted effects and planned mitigation for the Project. Technical supporting information for the terrestrial environment, including a description of the environmental setting, effects and mitigation, and a summary of proposed monitoring and follow-up programs is provided in the *Keeyask Generation Project Environmental Impact Statement Terrestrial Supporting Volume* (TE SV). The Keeyask Hydropower Limited Partnership (KHLP) was required to prepare a plan to monitor the effects of construction and operation of the generating station on the terrestrial environment. The *Terrestrial Effects Monitoring Plan* (TEMP) was developed for the Project. Monitoring activities for various components of the terrestrial environment were described, including the focus of this report, caribou (*Rangifer tarandus*) use of calving and rearing habitat in the Keeyask Region, during the construction and operation phases.

The ranges of three migratory caribou herds extend into the Keeyask Region: barren-ground caribou (*Rangifer tarandus groenlandicus*) from the Qamanirjuaq herd, and forest-tundra woodland caribou (*R. t. caribou*) from the Pen Islands and Cape Churchill coastal caribou herds. Small numbers of caribou from the Qamanirjuaq herd will occasionally migrate from Nunavut into the Keeyask Region in winter, although large numbers (10,000) have been recorded infrequently (KHLP 2012). Caribou from the Cape Churchill and Pen Islands herds migrate from northern Manitoba and northern Ontario into parts of the Keeyask Region in winter and return to the Hudson Bay coast in spring to calve. Larger groups of Pen Islands caribou, numbering in the hundreds, have been observed in the Keeyask Region on occasion, but there are generally fewer than about 50 individuals in a typical winter (KHLP 2012).

A fourth group of caribou occupies the Keeyask Region in spring and summer (herein referred to as summer resident caribou). This group of caribou is known to calve on the islands in Gull and Stephens lakes and in peatland complexes comprised of treed islands (*i.e.*, raised areas of land) surrounded by expansive, treeless wetlands. These habitats (hereafter referred to as calving habitat) provide a physical barrier from the surrounding habitat and provide some protection from predators such as gray wolf (*Canis lupus*) and black bear (*Ursus americanus*). Summer resident caribou likely move within and beyond the Keeyask Region, but their herd association and the extent of their core range are unknown. These caribou remain in the Keeyask Region to calve, but it is unclear whether the same individuals calve in the area in consecutive years.

The Project may affect the distribution of caribou and their use of calving habitat due to the alteration and loss of habitat, sensory disturbance, and changes to the predator community. Predicted Project effects on caribou include the loss or alteration of winter habitat, calving and rearing habitat, and a reduction in habitat intactness (*i.e.*, the degree to which habitat remains unaltered by fire and human disturbances) in the Keeyask Region. In addition to the loss of physical habitat, a loss of effective habitat due to sensory disturbance is anticipated. Noise generated by construction activity, blasting, and vehicle traffic may cause a loss of effective habitat and result in caribou temporarily avoiding otherwise suitable habitat near these disturbances. Effective habitat loss for summer resident caribou is predicted to occur within 2 km of the north and south access roads and within 4 km of the generating station site (KHLP 2012).

Caribou are particularly vulnerable to sensory disturbance during the calving period and the physical or effective loss of calving habitat could result in reduced reproduction if calving habitat becomes limited. Currently, calving habitat in the Keeyask Region typically consists of islands in lakes and peatland complexes, which comprise a relatively small proportion of available habitat on the landscape. Combined with the tendency of caribou to calve solitarily and in low densities on the landscape, the presence of undisturbed calving habitat is critical for successful reproduction (Leclerc *et al.* 2014).

Habitat alteration may also affect the vulnerability of caribou calves and calving cows to predators such as the gray wolf and black bear. Habitat alteration, including the clearing of land for trails and roads, may alter or facilitate predator movement and can increase predation risk (James and Stuart-Smith 2000). Habitat alteration may also result in an increase of alternative prey, such as moose, which may result in more predators within the region and could affect caribou mortality and reproduction (James *et al.* 2004; Peters *et al.* 2012).

As part of the TEMP, ground tracking surveys were conducted to determine if caribou distribution and relative abundance changed near the Project due to sensory disturbance or to changes in the predator community. The distribution and relative abundance of moose, gray wolf, and black bear were also documented to estimate the amount of alternative prey and predators. The timing of ice breakup on Stephens Lake was also monitored using trail cameras as it has the potential to affect the use of islands in lakes by calving caribou.

Sensory disturbance data from audio recorders, and vehicle, manpower, and blasting data were not available at the time of writing this report. Only generalized findings are reported here.

## 2.0 METHODS

### 2.1 SURVEY METHODS

Three different types of ground tracking transects were used to gather information on the use of islands in lakes, peatland complexes, and habitat near the north and south access roads by caribou and other large mammals, including moose, gray wolves, and black bears. Moose were also included in the survey as they are a potential attractant for wolves that could opportunistically prey on caribou. Gray wolves and black bear were included as these species are common predators of adult caribou and calves and can affect habitat use. Islands in lakes and peatland complexes were surveyed as these habitats are known to support caribou during the sensitive calving and calf-rearing period. Habitat along the north and south access roads was surveyed to determine the impacts of traffic disturbance on caribou and other large mammals.

Islands within Gull and Stephens lakes (islands in lakes) greater than 5 ha in size and having more than 5% tree cover were selected for the tracking transect study. Islands in lakes that were larger than 300 ha were divided into 150 ha sampling units. Islands were then separated into different classes based on size, distance to disturbance, and habitat characteristics. Tracking transects varied in length according to island size. In general, transects were shaped like a “Z” across islands to maximize sign detection. A total of 127 transects on 121 islands were surveyed in Stephens and Gull lakes in 2015, totalling 125.5 km. Typically, one transect was established on each island (Photos 2.1-1 and 2.1-2). However, four of the largest islands were separated into 150 ha units, which were each designated a transect (Map 2.1-1).

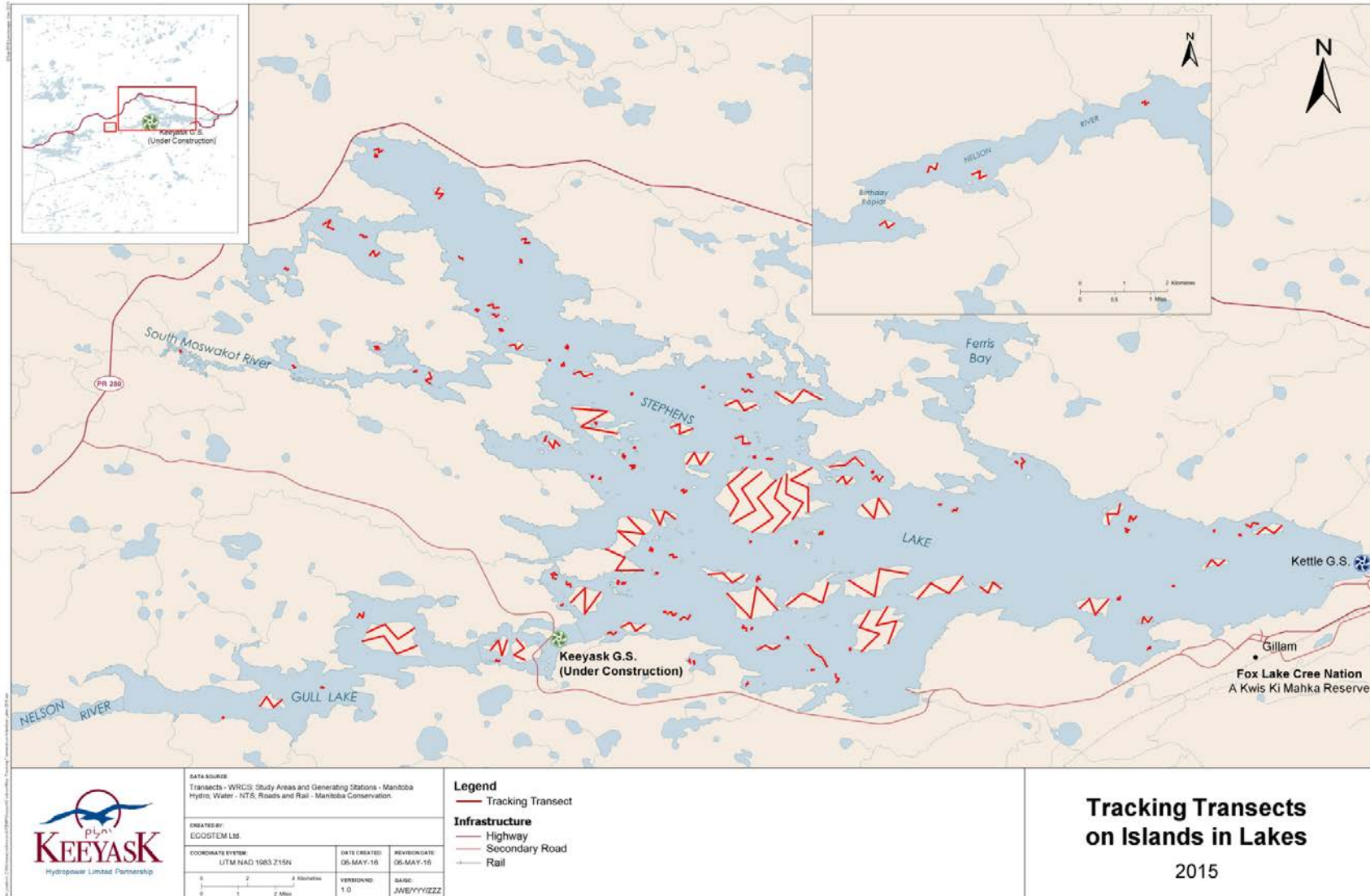




**Photo 2.1-1: Moose Walking along Tracking Transect near Trail Camera**



**Photo 2.1-2: Crew Looking at Moose Sign on Transect**



Map 2.1-1: Tracking Transects on Islands in Gull and Stephens Lakes Surveyed in 2015



Peatland complex tracking transects were established on “islands” in peatland complexes as the peatland complex matrix is not usually suitable for tracking (*i.e.*, wet bog). Tracking transects were developed on individual islands of upland habitat within each peatland complex. Peatland complexes, and their associated transects were selected on the landscape based on their distance to a disturbance source and if they were affected by the large forest fire that occurred in the area in 2013.

Transects were developed on three different types of peatland complexes based on the presence of disturbance sources: Project-affected peatland complexes, reference complexes, and randomly selected complexes. Project-affected peatland complexes were selected to be within 4 km of the access roads, 6 km of the generating station site, and located where disturbance was generated only from these features. For each Project-affected peatland complex, a reference peatland complex that was similar in size, contained similar habitat characteristics, but was not affected by sensory disturbance, was selected. Reference peatland complexes were greater than 4 km from the access roads and greater than 6 km from the generating station. Random peatland complexes were selected randomly from undisturbed areas to act as a reference for natural variability.

Peatland complexes were selected to be within areas burned by the forest fires in 2013 and outside the area burned in 2013 (Table 2.1-1). Similar to islands in lakes, tracking transects in peatland complexes were “Z” shaped and varied in length, depending on island size. A total of 189 transects were surveyed within 32 peatland complexes, totalling 102.9 km. The number of transects within each peatland complex ranged from 1 to 20, and the total length of transects ranged in complexes from 229 m to 12.3 km (Map 2.1-2).

**Table 2.1-1: Number of Peatland Complexes, Transects, and Transect Length (km) Surveyed in 2015**

Complex Type	No. of Complexes	No. of Transects	Length of Transects (km)
Project-affected (Burned in 2013)	3	15	7.6
Project-affected (Not burned in 2013)	8	27	15.3
Reference (Burned in 2013)	4	10	7.2
Reference (Not burned in 2013)	8	53	26.8
Random (Burned in 2013)	4	20	11.2
Random (Not burned in 2013)	5	64	34.8
<b>Total</b>	<b>32</b>	<b>189</b>	<b>102.9</b>



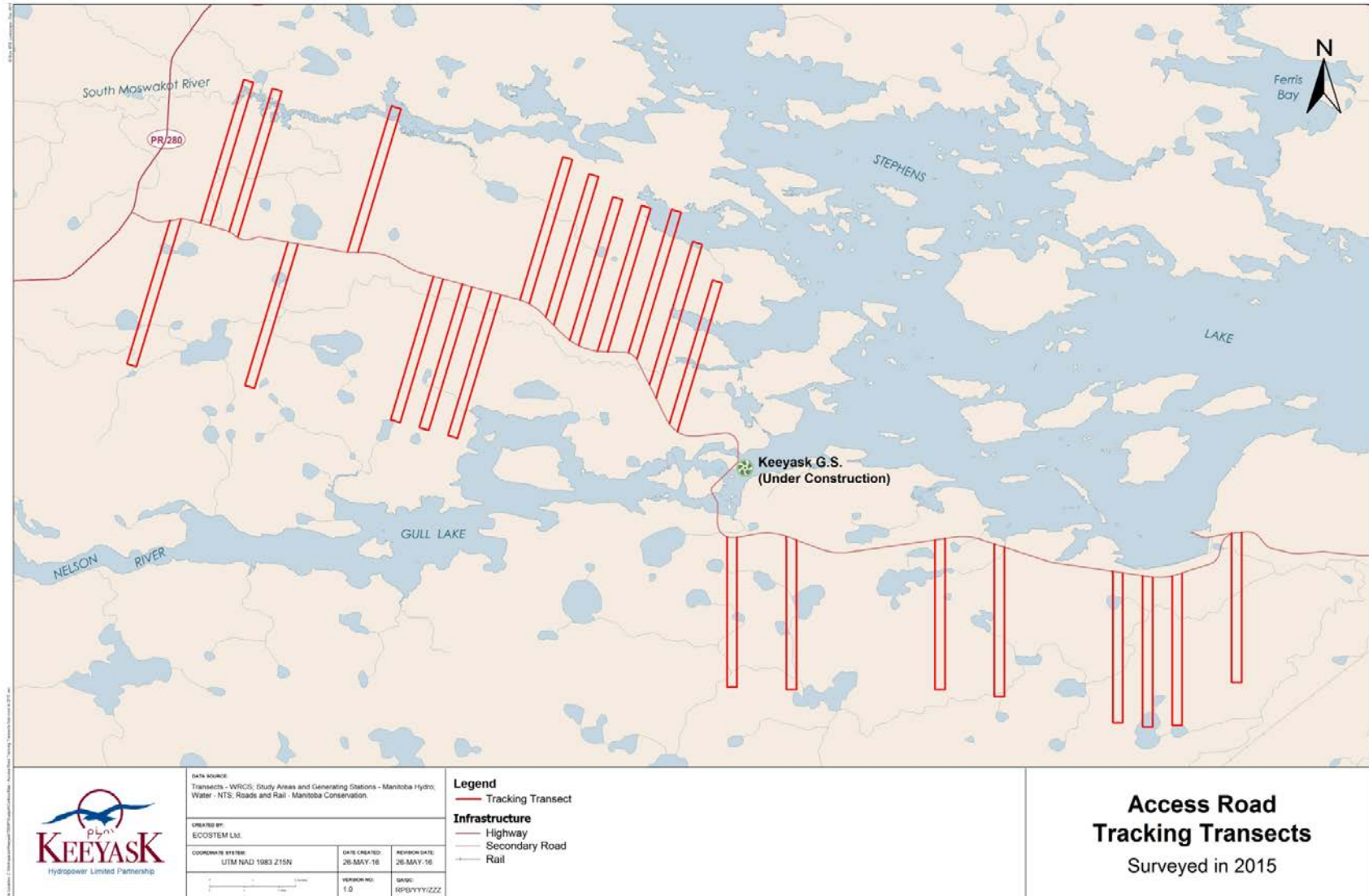


Access road tracking transects were selected randomly along the north and south access roads. These transects were “U” shaped, and were placed perpendicular to the north and south access roads. Transects were developed to be 10.3 km long, consisting of two 5-km long portions separated by 333 m. Actual transect lengths varied due to terrain (Table 2.1-2). Two transects (N39 and N40) were noticeably shorter due to the intersection with areas under active construction.

A total of 18 access road transects were surveyed. Seven transects were located along the north side of the north access road, six were on the south side of the north access road, and five were located on the south side of the south access road (Map 2.1-3).

**Table 2.1-2: Access Road Tracking Transect Lengths Surveyed in 2015**

<b>Transect</b>	<b>Length (km)</b>
<b>N23</b>	12.1
<b>N24</b>	10.8
<b>N34</b>	12.4
<b>N36</b>	10.5
<b>N38</b>	10.2
<b>N39</b>	8.0
<b>N40</b>	5.9
<b>S1</b>	11.7
<b>S10</b>	10.4
<b>S15</b>	10.8
<b>S16</b>	12.0
<b>S18</b>	12.5
<b>S42</b>	13.1
<b>S46</b>	14.2
<b>S51</b>	12.8
<b>S52</b>	13.0
<b>S53</b>	12.4
<b>S8</b>	12.4



Map 2.1-3: Access Road Tracking Transects Surveyed in 2015

All tracking transects (including the island in lake, peatland complex, and access road areas) were visited three times in 2015 to coincide with caribou calving and calf-rearing periods. The initial visit was conducted in April, prior to cow arrival to ensure animals were not disturbed during calving. The second visit was conducted in July, to coincide with the late calving and early calf-rearing period. The third visit was conducted in September, to coincide with the mid to late calf-rearing period. Dates for the start and end of visits to each transect type are shown in Table 2.1-3.

**Table 2.1-3: Start and End Dates of Survey Visits for Different Tracking Transect Types**

Transect Type	Visit 1			Visit 2			Visit 3		
	Start Date	End Date	No. Days <sup>1</sup>	Start Date	End Date	No. Days	Start Date	End Date	No. Days
<b>Island in Lake</b>	Mar. 30	Apr. 24	26	Jul. 11	Aug. 13	33	Sep. 9	Sep. 25	16
<b>Peatland Complex</b>	Apr. 14	Apr. 27	13	Jul. 10	Aug. 13	34	Sep. 18	Sep. 30	12
<b>Access Road</b>	Apr. 1	Apr. 25	24	Jul. 10	Aug. 13	34	Sep. 16	Sep. 28	12

<sup>1</sup> Signs only visible from the last major snowfall.

During the initial visit to tracking transects, biodegradable thread was strung approximately 75 cm above ground level and anchored to tall vegetation (*i.e.*, trees or shrubs) roughly every 20 m (Searing 1981; Demarchi and Searing 1997). Thread was used to ensure that surveying consistency occurred along the same line and to increase sign detectability. Breaks in the thread helped identify animal movements and reduced the possibility of double counting sign during subsequent site visits. All species sign visible up to a distance of 1 m on either side of the transect were recorded, including tracks, trails, droppings, beds, browse or feeding sites, and visual observations. The specific locations of sign were recorded using Global Positioning System (GPS) units. During the second and third visits, potential large mammal activity was identified by breaks in the thread along each transect. Thread breaks observed during the second visit were repaired to allow for re-evaluation on the third visit. The locations of all breaks were recorded with a GPS unit. Sign such as tracks and scat were used to identify the species responsible for each thread break, where possible.

In addition to tracking transects, a Reconyx™ PM35C31 trail camera was placed on each lake island transect and on one transect within each peatland complex during the initial visit. A trail camera was deployed on islands in locations where caribou activity would more likely be detected (*i.e.*, heavily used game trails, large openings). Batteries and memory cards were exchanged during the second visit, and the cameras were removed during the third visit.

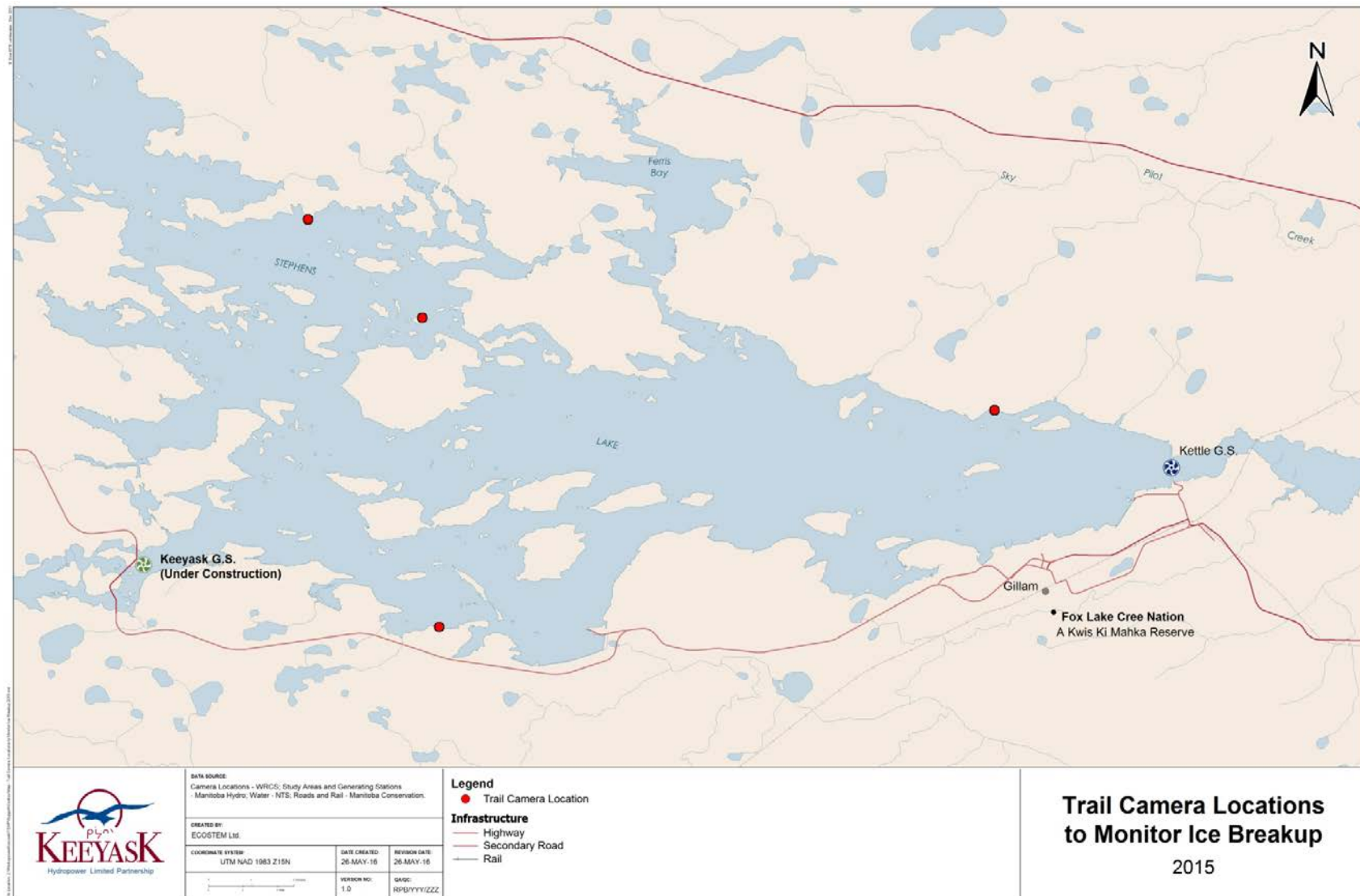
Photographs were reviewed following removal of memory cards, and the species, number, and sex of photographed animals was determined.

### **2.1.1 TIMING OF ICE BREAKUP**

Four trail cameras were placed on the shores of Stephens Lake on April 13, 2015 to monitor the timing of ice breakup (Map 2.1-4). The trail cameras were set to take a picture of the lake every four hours during daylight hours.

Ice coverage was estimated at 25% increments in each photograph from each camera. Ice breakup was defined as the date when all four cameras indicated less than 25% ice coverage in view.





Map 2.1-4: Location of Trail Cameras to Monitor Ice Breakup in Stephens Lake in 2015

## 2.1.2 DATA ANALYSIS

Ground tracking transect data from lake islands and peatland complexes were examined separately, as well as combined with trail camera data to increase the probability of sign detection. When combined with trail camera data, only tracking data from the second and third visits were used due to signs being variable in age from the first visit (depended on last snowfall), and due to the first visit occurring prior to the caribou calving season.

Using the combined tracking transect and trail camera data (combined presence), the presence/absence of caribou, caribou calves, moose, moose calves, black bear, and gray wolf were examined for each lake island and peatland complex and a general distribution of use was determined. Combined presence included islands in lakes and peatland complexes where animals were detected by tracking transects, trail cameras, or by both methods. Combined tracking transect and trail camera data were also used to compare the presence of caribou and other large mammals between islands near active construction sites/borrow areas, subject to sensory disturbance (Project-affected islands), to islands further away, not subject to sensory disturbance (unaffected islands). Project-affected islands were within 2 km of borrow sources and infrastructure or within 4 km of the proposed powerhouse (KHLP 2015). Unaffected islands were located outside of these areas. A total of 33 transects on 31 islands were classified as Project-affected and the remaining 94 transects on 90 islands were unaffected.

Additionally, for peatland complex transects, the presence/absence of large mammals on the different types of transects (burned/unburned, Project-affected, reference, random), was examined and the general distribution of use was determined.

The tracking transect and trail camera data were also used to indicate the number of islands in lakes and peatland complexes that contained signs of caribou or moose as well as predators during the same visit. The presence of both caribou or moose and predator signs provided a qualitative explanation of predator influence on calving and calf-rearing ungulates.

The presence/absence of large mammals was examined for access road transects and track density (signs/km) was calculated using the distance surveyed during the first visit in April. Track density was used to describe the general use of access road transects by the different species of large mammals. Track density was not calculated for islands in lakes or peatland complexes due to the large variability in size and transect length.

Sign density along access road transects was also used to compare sign density of caribou and other large mammals between areas near the north and south access roads, subject to sensory disturbance (Project-affected), to areas further away, not subject to sensory disturbance (unaffected). The portion of the access road transects within 2 km of the north or south access road was considered to be Project-affected and unaffected areas were outside of this area (KHLP 2015).

## 3.0 RESULTS

### 3.1 ISLANDS IN LAKES

Results for each individual transect on islands in lakes are presented in Appendix 1.

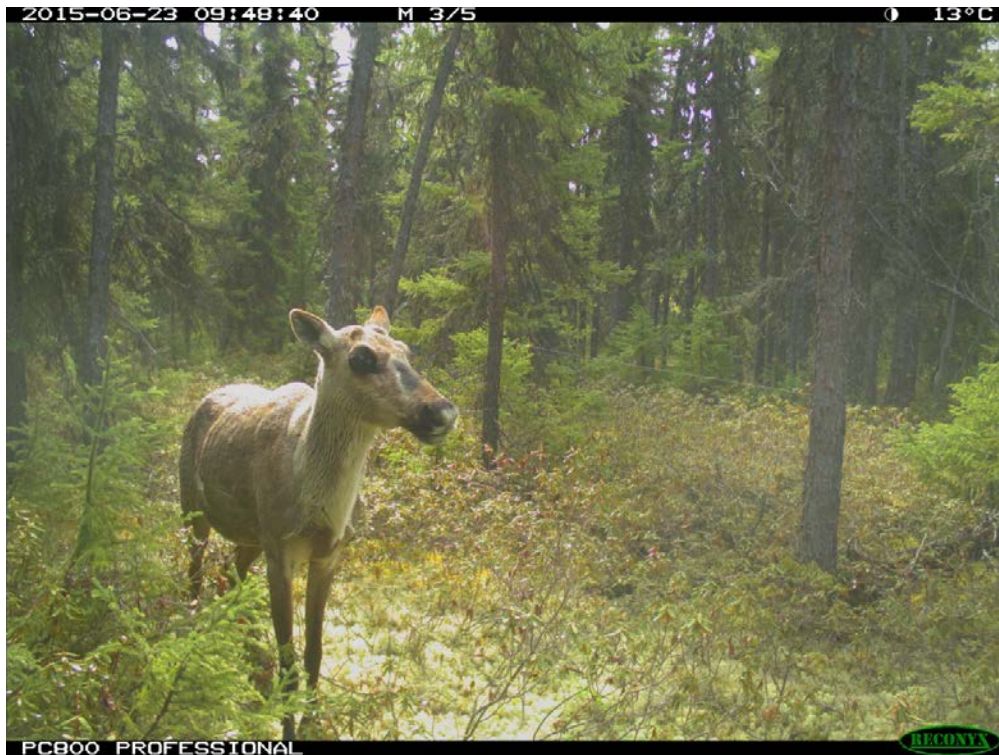
Ground tracking transects indicated that caribou were relatively common on islands in lakes and were the second most common species observed during the second and third visit. Moose were present on the greatest number of islands in lakes on the second and third visits. Moose calves were more common on islands compared to caribou calves. Although gray wolf sign was present on the greatest number of islands in lakes during the first visit, overall gray wolf and black bear were the least common species observed (Table 3.1-1).

**Table 3.1-1: Number of Islands in Lakes Occupied in 2015 from Tracking Transect Data**

Species	Visit 1 (Mar. 30-Apr. 24)	Visit 2 (Jul. 11-Aug. 13)	Visit 3 (Sep. 9-Sep. 25)	Visits 2 & 3 Combined	All Visits Combined
<b>Caribou</b>	2	56	43	69	70
<b>Caribou Calf</b>	0	11	14	18	18
<b>Moose</b>	8	94	80	103	103
<b>Moose Calf</b>	2	32	21	39	39
<b>Unknown Ungulate</b>	1	29	12	34	35
<b>Black Bear</b>	0	8	4	11	11
<b>Gray Wolf</b>	12	2	3	4	16

Caribou were the second most common species observed on trail cameras, while moose were the most common. The first caribou calf was photographed on May 25, 2015 and the first moose calf was photographed on June 3, 2015. Island use by caribou and moose appeared to peak in summer, with reduced use by September (Photos 3.1-1 to 3.1-6). Relatively few predators (gray wolf and black bear) were captured on trail cameras (Table 3.1-2).





**Photo 3.1-1: Caribou Captured on Trail Camera**



**Photo 3.1-2: Bull Moose Captured on Trail Camera**





Photo 3.1-3: Caribou Bull Captured on Trail Camera



Photo 3.1-4: Caribou Cow and Calf Captured on Trail Camera





Photo 3.1-5: Moose Cow Captured on Trail Camera



Photo 3.1-6: Moose Calf Captured on Trail Camera

**Table 3.1-2: Number of Islands in Lakes Occupied Monthly in 2015 from Trail Camera Data**

Species	March <sup>1</sup>	April	May	June	July	August	September
<b>Caribou</b>	0	1	2	8	8	12	3
<b>Moose</b>	0	1	5	33	23	14	5
<b>Black Bear</b>	0	0	2	1	0	4	2
<b>Gray Wolf</b>	0	0	0	1	0	0	0

<sup>1</sup> Only includes March 30 and 31, 2015.

Based on the combined tracking transect and trail camera data, caribou were the second most common large mammal observed. Moose were detected on the greatest number of islands in lakes. Caribou calves were also less common compared to moose calves. Black bears were present on a relatively low number of islands and gray wolves were relatively uncommon on islands in lakes (Table 3.1-3).

**Table 3.1-3: Number of Islands in Lakes Occupied in 2015 from Combined Tracking Transect and Trail Camera Data**

Species	Camera Presence	Tracking Presence <sup>1</sup>	Combined Presence
<b>Caribou</b>	16	69	71
<b>Caribou Calf</b>	6	18	19
<b>Moose</b>	49	103	106
<b>Moose Calf</b>	19	39	46
<b>Unknown Ungulate</b>	0	34	34
<b>Black Bear</b>	6	11	15
<b>Gray Wolf</b>	1	4	4

<sup>1</sup> Tracking transect data only includes visits 2 and 3.

The distribution of caribou, moose, and moose calves on islands in lakes was widespread throughout Stephens Lake and no pattern of use was apparent (Map 3.1-1 and Map 3.1-2). Project-affected islands appeared to support fewer caribou and caribou calves, compared to unaffected islands (Table 3.1-4; Map 3.1-1). Similar results were found for moose, moose calves, and black bear. Gray wolf were present on a greater proportion of project-affected islands, but the number of islands occupied was relatively small. Black bear and gray wolf presence on islands in lakes was limited to relatively few islands, which were distributed throughout Stephens Lake (Map 3.1-3).

**Table 3.1-4: Number and Percent of Project-affected and Unaffected Islands Occupied in 2015 from Combined Tracking Transect and Trail Camera Data <sup>1</sup>**

Species	Project-Affected Islands		Unaffected Islands	
	No. Islands with Presence	Percent of Islands with Presence	No. Islands with Presence	Percent of Islands with Presence
Caribou	3	9	68	77
Caribou Calf	2	6	17	19
Moose	18	55	88	100
Moose Calf	9	27	37	42
Black Bear	2	6	13	15
Gray Wolf	3	9	1	1

<sup>1</sup> Tracking transect data only includes visits 2 and 3.

The presence of caribou and a predator, either black bear or gray wolf (Photo 3.1-7), detected during the same visits was observed on eight unique islands from the second and third visits (Table 3.1-5; Map 3.1-4). Signs of moose and a predator detected on the same visits were observed on 13 unique islands from the second and third visits (Table 3.1-5; Map 3.1-5).

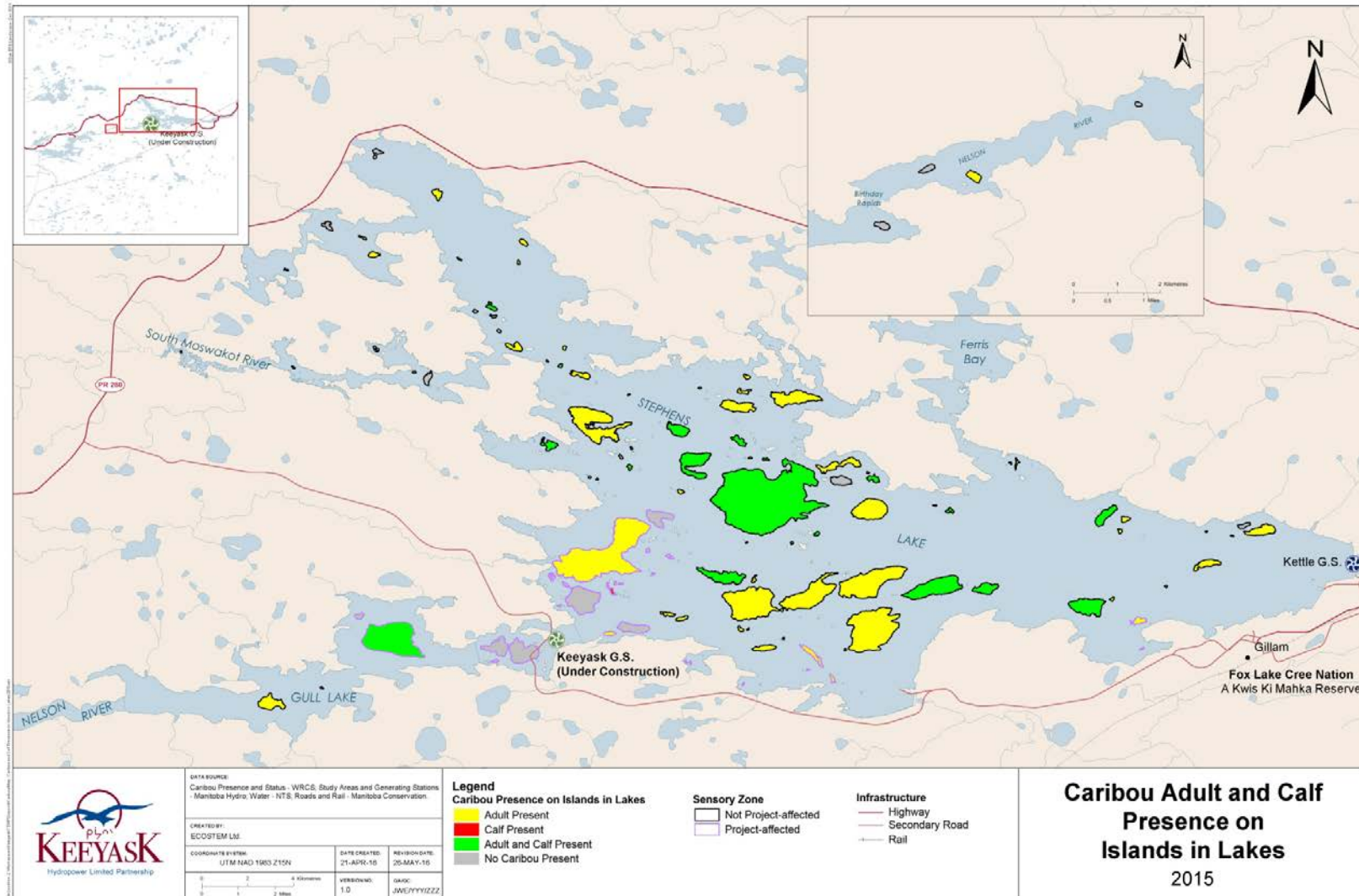
**Table 3.1-5: Number of Islands Containing Predator Sign and Caribou or Moose Sign During the Same Visit**

Species	Visit 2	Visit 3	Visits 2 & 3
			Combined
Caribou	6	3	8
Moose	8	7	13

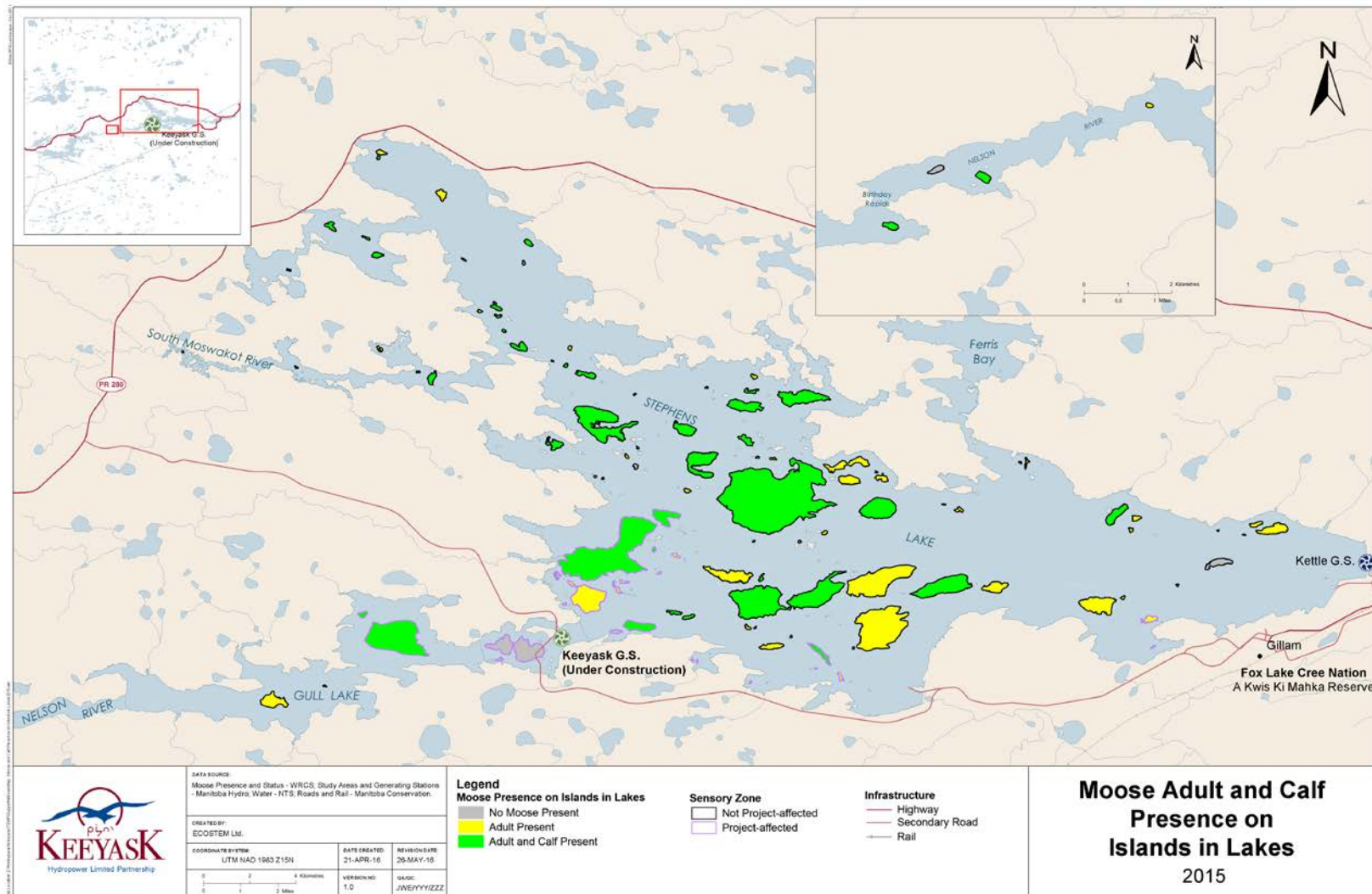


Photo 3.1-7: Gray Wolf on Island in Stephens Lake

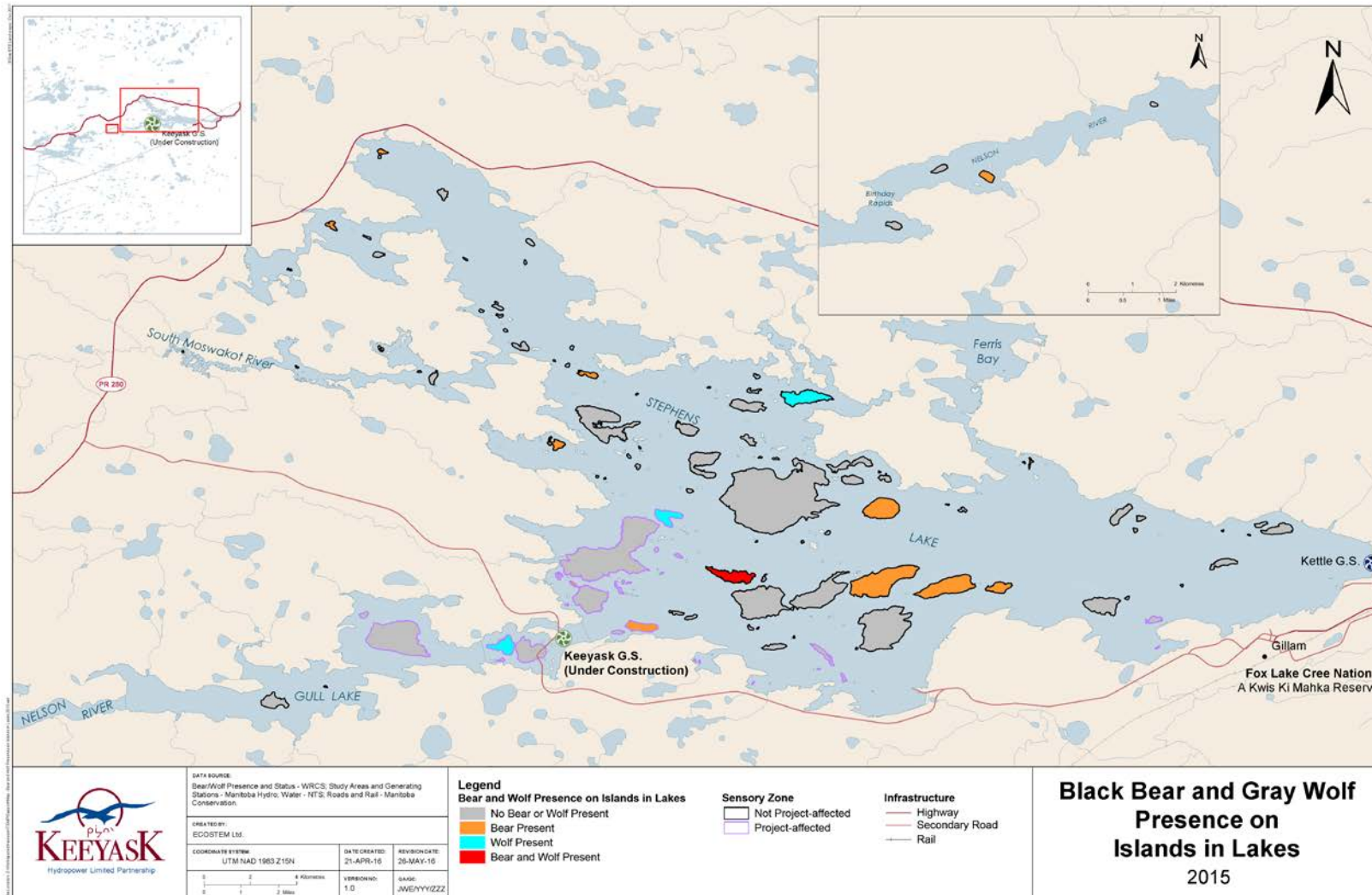




Map 3.1-1: Caribou Adult and Calf Presence on Islands in Lakes from Combined Tracking Transect and Trail Camera Data in 2015

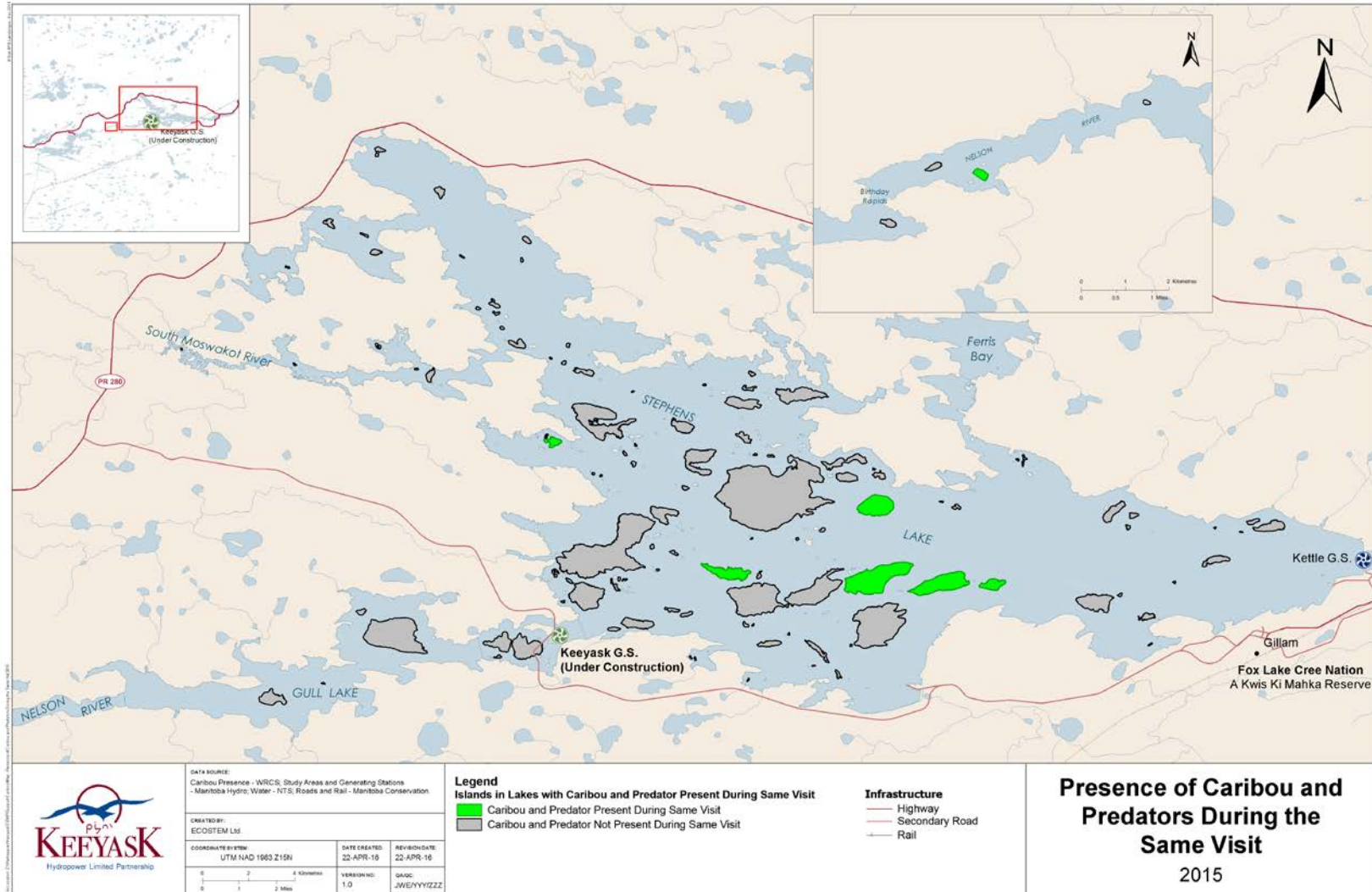


**Map 3.1-2: Moose Adult and Calf Presence on Islands in Lakes from Combined Tracking Transect and Trail Camera Data in 2015**

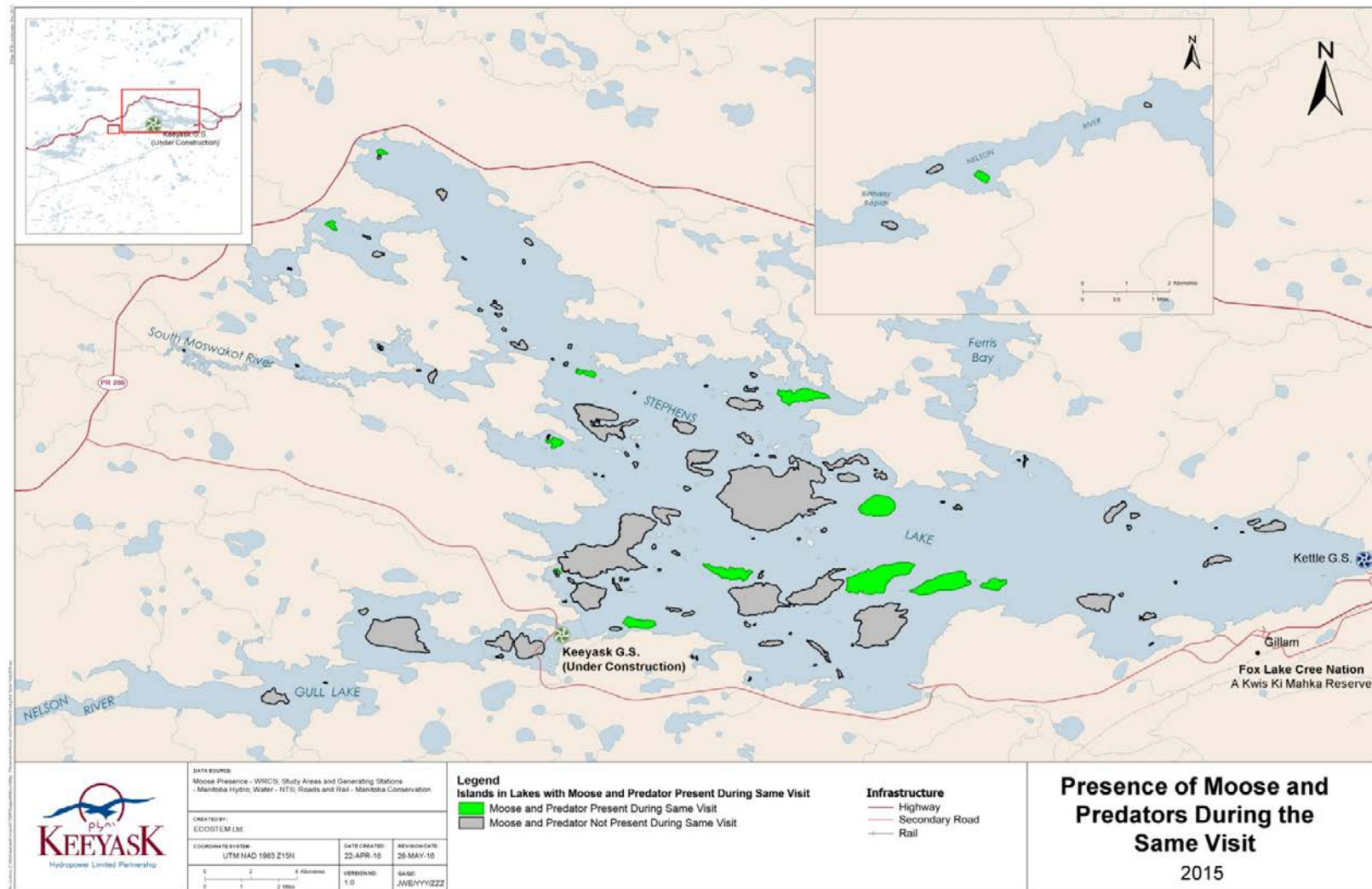


Map 3.1-3: Black Bear and Gray Wolf Presence on Islands in Lakes from Combined Tracking Transect and Trail Camera Data in 2015





Map 3.1-4: Islands in Lakes where Presence of Caribou and a Predator was Detected During the Same Visit in 2015



**Map 3.1-5: Presence of Moose and a Predator Detected on Islands in Lakes During the Same Visit in 2015**



## 3.2 PEATLAND COMPLEXES

Results for each individual peatland complex transect are presented in Appendix 2.

Ground tracking transect data indicated that caribou were the second most common large mammal species on peatland complexes during the second and third visits, and were present on relatively few complexes during the first visit. Caribou calves were present on relatively few complexes during all visits.

Moose were present on the greatest number of peatland complexes during all visits. Moose calves were present on a greater number of complexes than caribou calves. Moose calves were present on the greatest number of complexes during the second visit, and were present on relatively few during the first and third visits.

No black bears were detected on complexes during the first visit and relatively few were present during the second and third visits. Gray wolves were present on relatively few complexes during all visits (Table 3.2-1).

**Table 3.2-1: Number of Peatland Complexes Occupied in 2015 from Tracking Transect Data**

Species	Visit 1 (Apr. 14-Apr. 27)	Visit 2 (Jul. 10-Aug.13)	Visit 3 (Sep. 18-Sep. 30)	Visits 2 & 3 Combined	All Visits Combined
<b>Caribou</b>	4	23	17	25	25
<b>Caribou Calf</b>	1	6	3	6	6
<b>Moose</b>	14	30	31	32	32
<b>Moose Calf</b>	2	19	11	20	20
<b>Unknown Ungulate</b>	0	11	7	15	15
<b>Unknown Ungulate Calf</b>	0	1	0	1	1
<b>Black Bear</b>	0	7	6	12	12
<b>Gray Wolf</b>	4	3	1	3	7

Trail cameras within peatland complexes detected relatively few large mammals. A low number of caribou were detected. Moose were the most common species observed and the majority were photographed in spring. Trail cameras also detected a relatively low number of black bear. No gray wolves were photographed (Table 3.2-2).



**Photo 3.2-1: Black Bear in Peatland Complex**

**Table 3.2-2: Number of Peatland Complexes Occupied Monthly in 2015 from Trail Camera Data**

Species	April	May	June	July	August	September
<b>Caribou</b>	0	2	3	0	3	0
<b>Caribou Calf</b>	0	0	1	0	0	0
<b>Moose</b>	0	5	4	1	1	0
<b>Moose Calf</b>	0	0	2	0	0	0
<b>Black Bear</b>	0	2	1	1	0	0
<b>Gray Wolf</b>	0	0	0	0	0	0

Based on combined data from tracking transects and trail cameras, caribou were the second most common large mammal species detected on peatland complexes. Caribou calves were detected on a relatively low number of peatland complexes, while moose calves were much more common and detected on a relatively high number of peatland complexes. Adult moose were the most common large mammal species observed and were detected on all peatland complexes. Black bears were detected on nearly half of the peatland complexes, while gray wolves were relatively uncommon (Table 3.2-3).

**Table 3.2-3: Number of Peatland Complexes Occupied in 2015 from Combined Tracking Transect and Trail Camera Data**

<b>Species</b>	<b>Camera Presence</b>	<b>Tracking Presence<sup>1</sup></b>	<b>Combined Presence</b>
<b>Caribou</b>	4	24	24
<b>Caribou Calf</b>	1	6	7
<b>Moose</b>	8	32	32
<b>Moose Calf</b>	2	20	21
<b>Unknown Ungulate</b>	0	16	16
<b>Unknown Ungulate Calf</b>	0	1	1
<b>Black Bear</b>	3	12	15
<b>Gray Wolf</b>	0	3	3

<sup>1</sup> Tracking transect data only includes visits 2 and 3.

The combined data also indicate that the presence of large mammals was relatively consistent across transect types (Project-affected, reference, random). However, all large mammal species were present on a greater number of unburned peatland complexes than complexes that were burned in 2013 (Table 3.2-4, Table 3.2-5, Map 3.2-1 -Map 3.2-5). Overall, there was a 24% difference in the total number of peatland complexes occupied by large mammals that were burned and unburned.

Table 3.2-4: Number of Peatland Complexes Occupied by Large Mammals in 2015 by Complex Type (Disturbance Source) and Forest Fire Influence

		Caribou			Moose			Caribou Calf			Moose Calf			Black Bear			Gray Wolf		
Complex Type	Burned in 2013?																		
		Camera	Tracking <sup>1</sup>	Combined	Camera	Tracking <sup>1</sup>	Combined	Camera	Tracking <sup>1</sup>	Combined	Camera	Tracking <sup>1</sup>	Combined	Camera	Tracking <sup>1</sup>	Combined	Camera	Tracking <sup>1</sup>	Combined
Project-affected	Yes	0	1	1	0	3	3	0	0	0	0	0	0	0	1	1	0	1	1
	No	1	6	7	2	8	8	0	1	1	1	7	7	1	3	4	0	0	0
Reference	Yes	0	2	2	1	4	4	0	0	0	0	0	0	0	0	0	0	1	1
	No	1	8	9	4	8	8	0	3	3	0	9	9	1	4	5	0	3	3
Random	Yes	0	3	3	1	4	4	0	0	0	1	0	1	1	1	1	0	0	0
	No	2	5	7	0	5	5	1	2	3	0	7	7	0	3	3	0	2	2

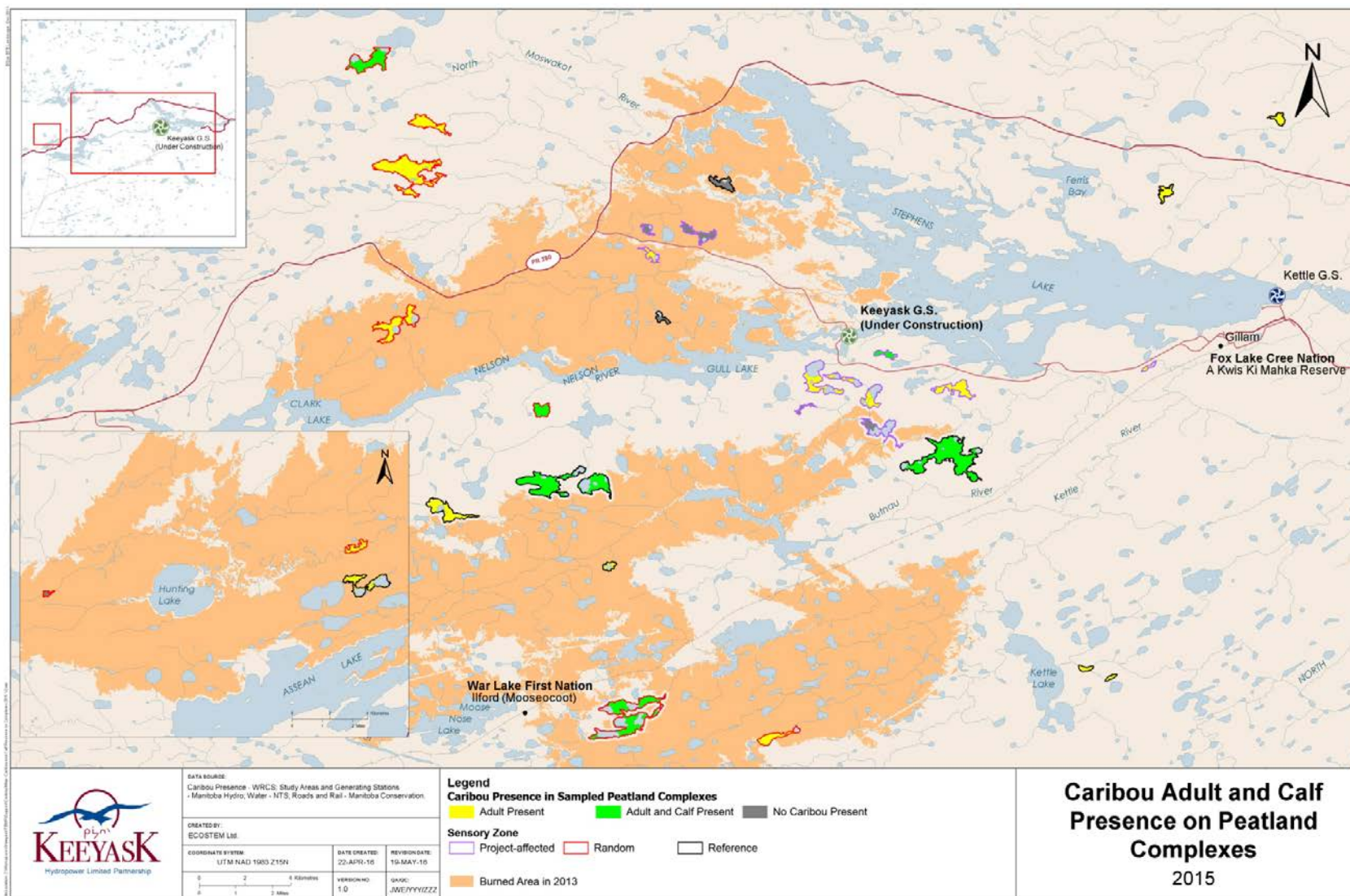
1 Tracking transect data only includes visits 2 and 3.

The presence of caribou and a predator, either black bear or gray wolf, was detected on nine unique peatland complexes from the second and third visits (Table 3.2-5; Map 3.2-4). Signs of moose and a predator were detected on 13 unique peatland complexes from the second and third visits (Table 3.2-5; Map 3.2-5).

**Table 3.2-5: Number of Peatland Complexes Containing Caribou or Moose Sign and a Predator Sign During the Same Visit**

Species	Visit 2	Visit 3	Visits 2 & 3
			Combined
Caribou	6	4	9
Moose	8	7	13

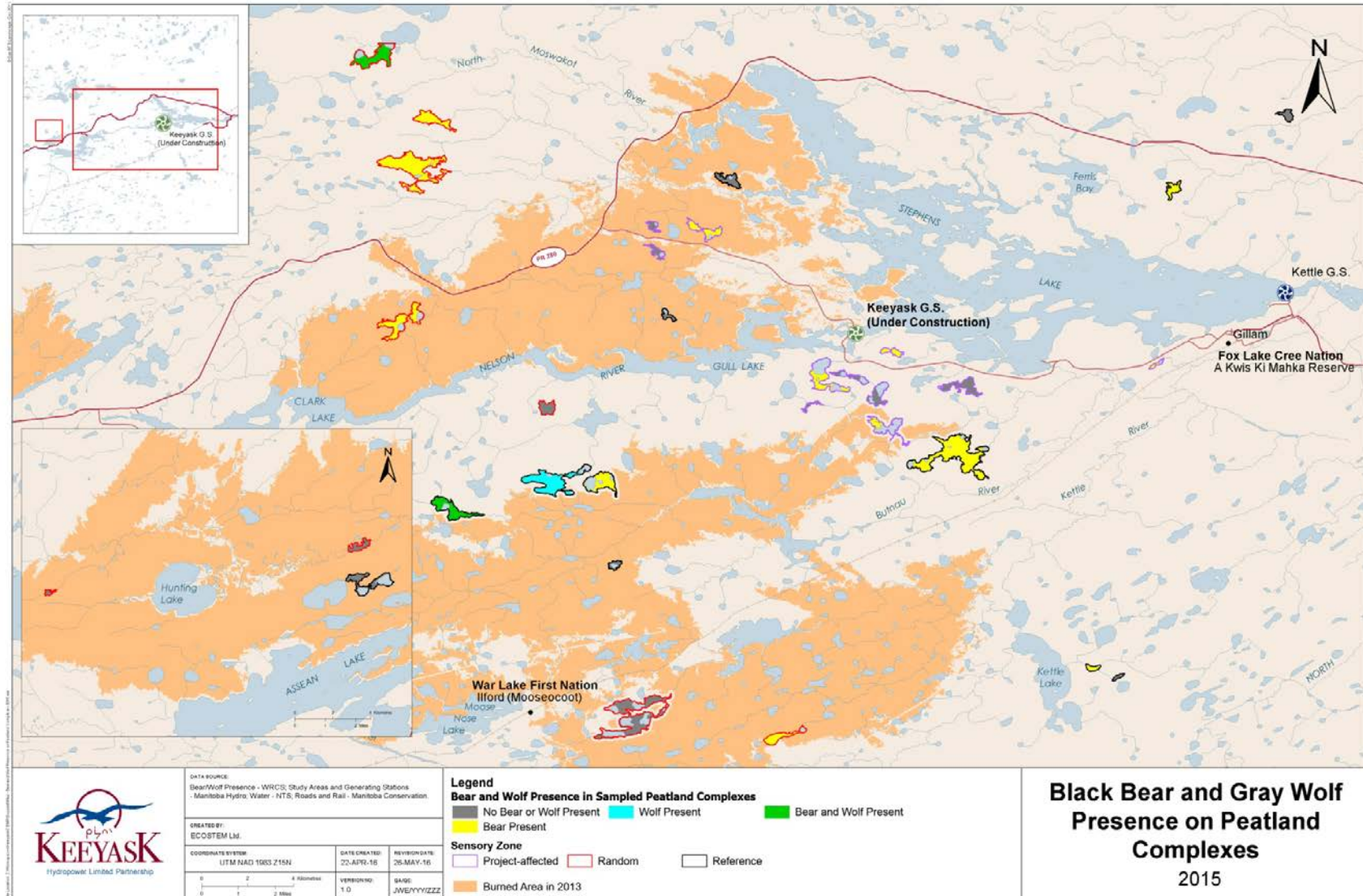




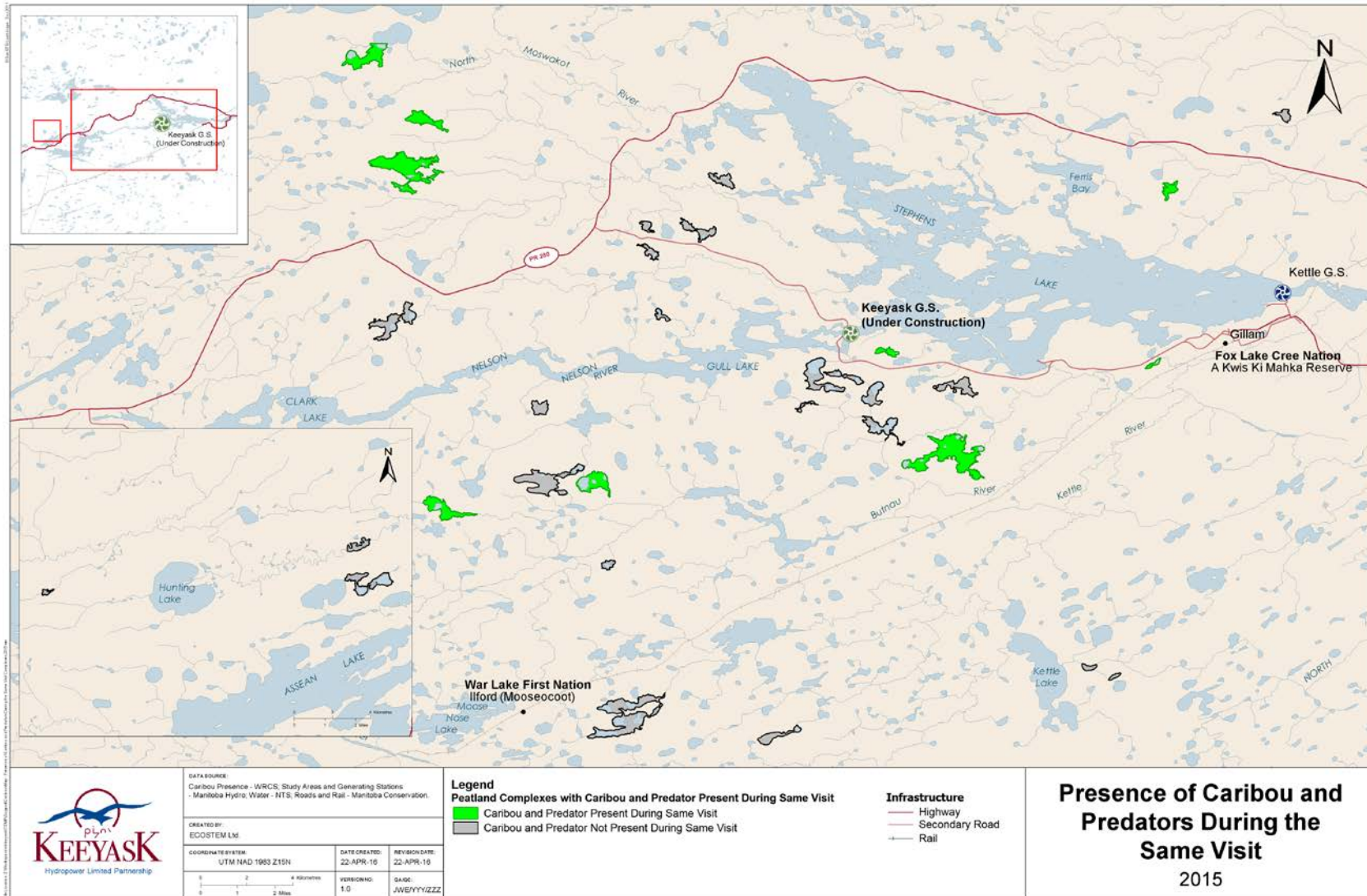
**Map 3.2-1: Caribou Adult and Calf Presence on Peatland Complexes using Tracking Transect and Trail Camera Data in 2015**





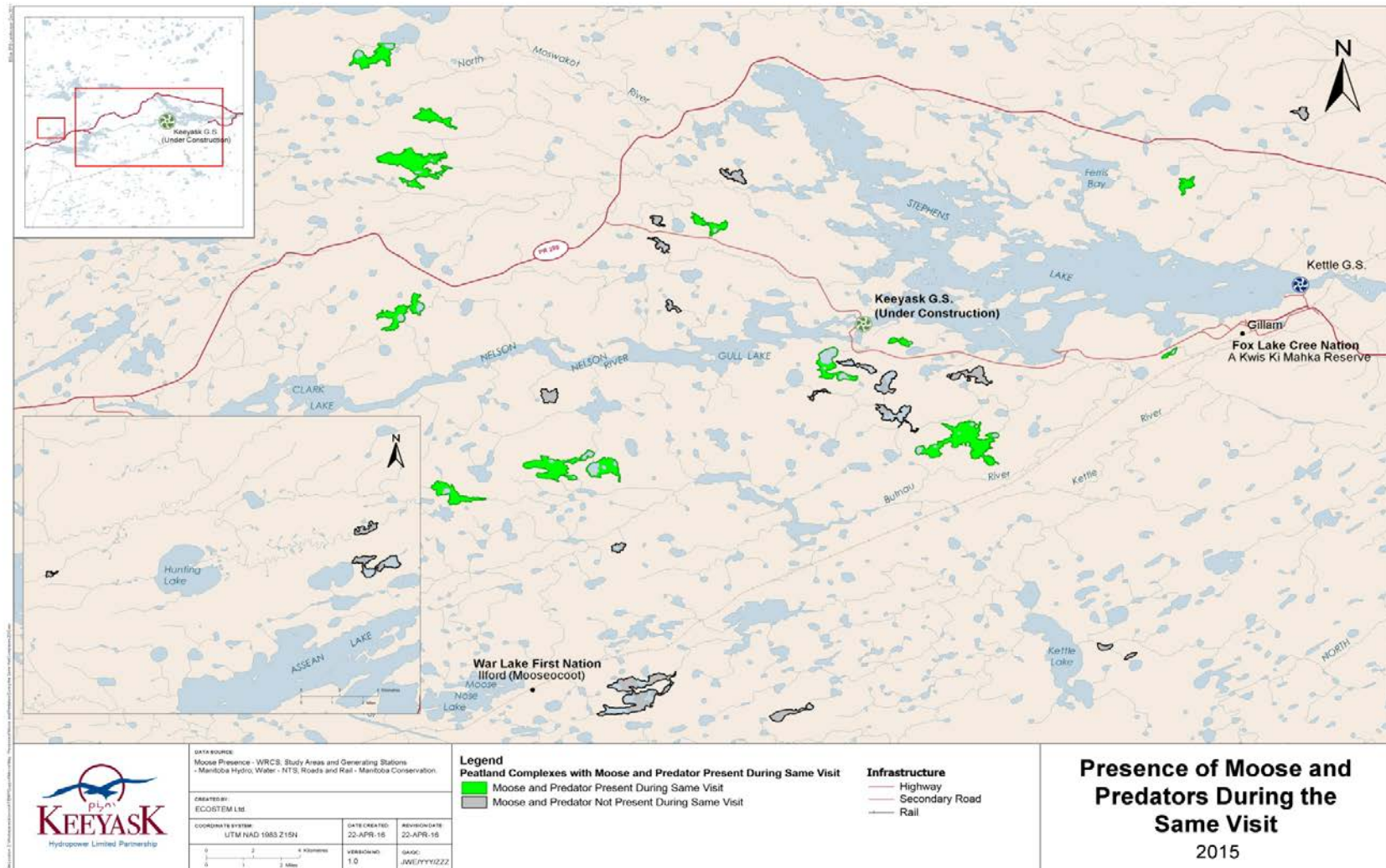


Map 3.2-3: Black Bear and Gray Wolf Presence on Peatland Complexes using Tracking Transect and Trail Camera Data in 2015



Map 3.2-4: Presence of Caribou and a Predator Detected in Peatland Complexes During the Same Visit in 2015





Map 3.2-5: Presence of Moose and a Predator Detected in Peatland Complexes During the Same Visit in 2015

### 3.3 ACCESS ROAD TRANSECTS

Detailed results for each individual access road transect are presented in Appendix 3.

The majority of access road transects were occupied by caribou during the second and third visits, while caribou calves occupied a relatively low number of access road transects. Moose were the most common large mammal species observed during all visits. Moose and moose calves were present on all access road transects during the second and third visits. When the second and third visits were combined, black bear were present on half of the access road transects and gray wolf were present on the majority of transects. With the exception of moose, which were detected relatively equally among visits, most large mammal species' presence appeared to peak on access road transects during the second visit (Table 3.3-1).

**Table 3.3-1: Number of Access Road Tracking Transects Occupied in 2015**

Species	Visit 1 (Apr. 1-Apr. 25)	Visit 2 (Jul. 10-Aug. 13)	Visit 3 (Sep. 16-Sep. 28)	Visit 2 & 3 Combined	All Visits Combined
<b>Caribou</b>	7	15	14	17	17
<b>Caribou Calf</b>	3	5	1	5	7
<b>Moose</b>	16	18	18	18	18
<b>Moose Calf</b>	6	17	13	18	18
<b>Unknown Ungulate</b>	1	9	6	12	13
<b>Black Bear</b>	1	6	3	9	10
<b>Gray Wolf</b>	9	10	5	12	15

Caribou had the second highest sign density across the access road transects, while moose had the greatest sign density. Caribou calves were also less common than moose calves. Black bear sign were found in relatively low densities across the transects, while gray wolf sign were slightly higher (Table 3.3-2).

**Table 3.3-2: Mammal Sign Density Along Access Road Transects in 2015**

Species	Visit 1		Visit 2		Visit 3		Visits 2 & 3	
	No. of Signs	Sign/km	No. of Signs	Sign/km	No. of Signs	Sign/km	No. of Signs	Sign/km
<b>Caribou</b>	32	0.16	146	0.71	132	0.64	278	1.35
<b>Caribou Calf</b>	3	0.01	6	0.03	1	<0.01	7	0.03
<b>Moose</b>	304	1.48	1,390	6.77	1,396	6.80	2,786	13.58
<b>Moose Calf</b>	22	0.11	89	0.43	73	0.36	162	0.79
<b>Unknown Ungulate</b>	1	<0.01	49	0.24	21	0.10	70	0.34
<b>Black Bear</b>	1	<0.01	13	0.06	6	0.03	19	0.09
<b>Gray Wolf</b>	16	0.08	14	0.07	5	0.02	19	0.09

Tracking transect data from the second and third visits combined indicated that adult caribou and adult moose sign density was greater within 2 km of the north or south access roads compared to densities greater than 2 km away. No difference was apparent in caribou calf or moose calf sign density. Black bear sign density was also greater near the roads compared to further away. No difference was apparent in gray wolf sign density (Table 3.3-3).

**Table 3.3-3: Mammal Sign Density (Signs/km) Within 2 km and Greater than 2 km From Access Roads in 2015**

Species	Visit 1 (signs/km)		Visit 2 (signs/km)		Visit 3 (signs/km)		Visits 2 & 3 Combined (signs/km)		All Visits Combined (signs/km)	
	≤ 2 km	> 2 km	≤ 2 km	> 2 km	≤ 2 km	> 2 km	≤ 2 km	> 2 km	≤ 2 km	> 2 km
Caribou	0.24	0.11	1.08	0.51	0.58	0.68	0.83	0.59	0.63	0.43
Caribou Calf	0.03	0.01	0.06	0.03	0.01	0.00	0.01	0.01	0.03	0.01
Moose	2.43	0.97	9.01	5.56	6.53	6.95	7.77	6.26	5.99	4.49
Moose Calf	0.26	0.04	0.71	0.53	0.44	0.57	0.55	0.55	0.47	0.38
Unknown Ungulate	0.01	0.00	0.32	0.20	0.19	0.05	0.26	0.12	0.18	0.08
Black Bear	0.01	0.00	0.14	0.02	0.01	0.04	0.08	0.03	0.06	0.02
Gray Wolf	0.10	0.07	0.08	0.06	0.01	0.03	0.05	0.05	0.06	0.05



### 3.4 TIMING OF ICE BREAKUP

The percentage of ice cover remained consistent from camera installation in mid-April to approximately mid-May (Table 3.4-1). From approximately mid-May on, the ice cover appeared to decrease rapidly, and Stephens Lake was free of ice at the end of May or the beginning of June, depending on the location (Photos 3.5-1 and 3.5-2).

**Table 3.4-1: Timing of Ice Breakup on Stephens Lake in 2015**

% Ice Cover	Camera 1	Camera 2	Camera 3	Camera 4
100	Apr. 13-May. 11	Apr. 13-May. 11	Apr. 13-May. 12	Apr. 13-May. 9
75	May. 12-May. 25	May. 12-May. 27	May. 13-May. 20	May. 10-May. 24
50	May. 26-Jun. 1	May. 28-May. 31	May. 21-May. 23	May. 25
25	Jun. 2	Jun. 2	May. 24-Jun. 1	May. 25
0	Jun. 3	Jun. 3	Jun. 2	May. 26



**Photo 3.4-1: Ice Cover at 100% on Stephens Lake - May 5, 2015**



Photo 3.4-2: Ice Cover at 75% on Stephens Lake - May 19, 2015. Note Otter in Foreground



Photo 3.4-3: Ice Cover at 50% on Stephens Lake - May 28, 2015



Photo 3.4-4: Ice Cover at 0% on Stephens Lake - June 3, 2015

## 4.0 SUMMARY AND CONCLUSIONS

Caribou, moose, and their calves were relatively common on islands in lakes in 2015 and their presence was detected on islands throughout Stephens Lake and Gull Lake. Project-affected islands, which have been used during the pre-construction period by adult caribou and calves (WRCS 2016), appeared to support fewer large mammals (with the exception of gray wolves) in 2015. This may indicate a loss of effective habitat due to sensory disturbance from active construction and support the predictions made in the EIS. However, the number of islands considered Project-affected was limited and other factors, including island size, distance to the mainland, water velocity were not considered here and results are qualitative. The presence of a caribou cow and calf on Caribou Island, which is located just west of the construction site in Gull Lake, and was also burned in 2013, suggest that sensory disturbance may be limited to a relatively short range around active construction areas.

Black bear and gray wolf were present on relatively few islands in lakes. The extent of predator influence is unknown throughout the Keeyask Region; however, the relatively small number of islands that contained an overlap of predators with caribou or moose suggests that it may be relatively small.

The specific timing of summer resident caribou calving in the area is unknown, but likely occurs from May 1 to June 15. This is based on data collected on calving caribou in Stephens Lake from 2010-2014 and from other studies on boreal woodland caribou at roughly the same latitude (Rettie and Messier 2001; Ferguson and Elkie 2004). From 2010-2014, the earliest photographs of caribou calves from islands in Stephens Lake ranged from June 7 to July 12. In 2015, the timing of ice breakup in Stephens Lake (end of May to early June, depending on location) likely coincided with the end of the caribou calving period and beginning of the calf-rearing period, based on the timing of the first caribou calf photograph (captured on May 25, 2015). As a result, islands in lakes likely provided caribou and their calves with a physical barrier from predators during the calf-rearing period.

Moose and caribou were also relatively common on peatland complex transects in 2015 and were detected on complexes throughout the Keeyask Region. Peatland complexes affected by fire appeared to support fewer large mammals than unburned complexes, with a relatively large percent difference in large mammal presence on burned and unburned peatland complexes. However, the apparent lack of difference in large mammal presence among transect types suggests that sensory disturbance was limited to a relatively short range around active Project construction areas, or had little influence on the use of peatland complexes by caribou and moose. Gray wolves were present on relatively few peatland complexes, but black bear was found on complexes throughout the Keeyask Region, possibly influencing habitat use by caribou and moose. Although the extent of predator influence is unknown, the relatively large number of peatland complexes that contained an overlap of a predator with caribou or moose suggests that it may be relatively high. Future monitoring will continue to explore the influence of predators on calving caribou and moose in the Keeyask Region.



Caribou and other large mammal species appeared to be more abundant closer to the north and south access roads than further away, suggesting disturbance was not impacting habitat use. These results were not anticipated and may be influenced by other variables, such as habitat type and past fire influence, which were not considered in the analyses to date.

Moose sign was observed along the access road transects in relatively high densities in comparison to caribou. This suggests that habitat in the region is suitable to sustain a moose population, and this population is sufficient to provide predators, namely wolves, with an alternative prey source to caribou. Gray wolf was present on a relatively high number of the access road transects, but did not appear to be abundant based on the relatively low sign densities observed. Caribou appeared to be widely distributed but not abundant along access road transects. Signs of caribou and caribou calves from all three visits indicate that caribou were present within the Keeyask Region from spring to fall.

As predicted in the EIS, sensory disturbance from Project construction activities may have reduced the use of islands in lakes by caribou and other species of large mammals as predicted. However, sensory disturbance did not appear to impact habitat use within peatland complexes or along the access roads. These findings were not anticipated, and may have been influenced by other factors such as habitat and past forest fires, which were not examined in this document. Future surveys will provide a more robust dataset, which can be analysed using multiple variables and provide a more thorough understanding of the factors affecting habitat use.

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## APPENDIX A: ISLAND IN LAKE TRACKING TRANSECT RESULTS

**Table A-1: Number of Large Mammal Signs Detected During each Visit on Lake Island in Lake Tracking Transects in 2015**

Species	Transect	Visit 1	Visit 2	Visit 3	Total
<b>Black Bear</b>	KI122003	0	1	0	1
	KI124035	0	1	0	1
	KI124037	0	1	0	1
	KI124041	0	4	0	4
	KI124046	0	2	0	2
	KI124063	0	1	0	1
	KI124075	0	1	2	3
	KI124082	0	0	2	2
	KI124117	0	0	1	1
	KI124164	0	0	1	1
	KI124196	0	1	0	1
	Total	0	12	6	18
<b>Gray Wolf</b>	KI124003	1	0	0	1
	KI124010	3	0	0	3
	KI124044	1	0	0	1
	KI124045	2	0	0	2
	KI124046	1	0	0	1
	KI124050	1	0	0	1
	KI124063	2	0	0	2
	KI124089	2	0	0	2
	KI124090	0	0	1	1
	KI124128	0	0	1	1
	KI124145	1	0	0	1
	KI124186 004	1	0	0	1
	KI124193	0	1	0	1
	KI124196	0	1	1	2
	KI126016	2	0	0	2
	KI126017	1	0	0	1
	Total	18	2	3	23
<b>Caribou</b>	KI122003	0	5	0	5
	KI123005	0	12	1	13
	KI123012	0	48	1	49
	KI123012 001	0	1	0	1
	KI124003	0	0	1	1
	KI124010	0	7	0	7

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KI124013	0	1	0	1
	KI124016	0	9	3	12
	KI124018	0	0	2	2
	KI124020	0	5	0	5
	KI124022	0	9	18	27
	KI124024	0	27	94	121
	KI124029	0	2	1	3
	KI124030	0	1	0	1
	KI124037	0	11	14	25
	KI124038	0	2	0	2
	KI124040	0	0	4	4
	KI124043	0	6	6	12
	KI124044	0	1	0	1
	KI124045	0	1	3	4
	KI124046	0	18	3	21
	KI124050	0	5	1	6
	KI124052	0	1	0	1
	KI124055	0	6	0	6
	KI124056	0	11	0	11
	KI124058	0	26	6	32
	KI124063	0	12	1	13
	KI124065	0	5	0	5
	KI124066	0	1	1	2
	KI124066 001	0	2	6	8
	KI124069	0	0	1	1
	KI124070	0	1	0	1
	KI124072	0	0	10	10
	KI124075	0	7	5	12
	KI124080	0	0	1	1
	KI124082	0	3	5	8
	KI124086	0	1	5	6
	KI124089	0	18	5	23
	KI124091	0	7	1	8
	KI124092	0	5	1	6
	KI124096	0	0	3	3
	KI124102	0	0	1	1
	KI124105	0	0	3	3
	KI124115	0	21	0	21
	KI124117	2	7	0	9
	KI124120	0	3	5	8
	KI124124	1	0	0	1



Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KI124125	0	1	0	1
	KI124128	0	25	0	25
	KI124136	0	4	11	15
	KI124141	0	2	0	2
	KI124145	0	9	3	12
	KI124147	0	2	12	14
	KI124151	0	1	5	6
	KI124152	0	0	1	1
	KI124158	0	6	0	6
	KI124167	0	1	0	1
	KI124170	0	3	2	5
	KI124173	0	44	11	55
	KI124176	0	4	0	4
	KI124180	0	0	34	34
	KI124180 001	0	6	3	9
	KI124182	0	10	29	39
	KI124186	0	31	39	70
	KI124186 001	0	3	3	6
	KI124186 002	0	24	11	35
	KI124186 003	0	3	2	5
	KI124186 004	0	2	2	4
	KI124196	0	19	28	47
	KI124205 001	0	1	0	1
	KI124210	0	19	17	36
	KI124212	0	12	48	60
	KI124214	0	17	0	17
	KI124217	0	1	1	2
	Total	3	558	474	1035
Caribou Calf	KI123012	0	1	1	2
	KI124022	0	2	2	4
	KI124024	0	3	1	4
	KI124037	0	1	0	1
	KI124046	0	2	1	3
	KI124056	0	2	0	2
	KI124058	0	0	2	2
	KI124082	0	0	1	1
	KI124091	0	2	0	2
	KI124096	0	0	1	1
	KI124136	0	2	1	3
	KI124152	0	0	1	1
	KI124173	0	0	2	2

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KI124176	0	1	0	1
	KI124186	0	2	1	3
	KI124186 002	0	3	1	4
	KI124196	0	2	1	3
	KI124210	0	0	1	1
	KI124212	0	0	7	7
	Total	0	23	24	47
Moose	KI122003	0	1	3	4
	KI122005	1	3	1	5
	KI122006	0	6	0	6
	KI123005	0	50	6	56
	KI123010	0	15	4	19
	KI123012	0	19	67	86
	KI123012 001	0	38	37	75
	KI124003	0	11	3	14
	KI124004	0	2	0	2
	KI124005	0	4	0	4
	KI124007	0	1	0	1
	KI124009	0	1	0	1
	KI124013	0	3	2	5
	KI124015	0	1	1	2
	KI124016	0	4	6	10
	KI124017	0	10	3	13
	KI124018	0	17	3	20
	KI124019	0	1	0	1
	KI124020	0	0	6	6
	KI124022	0	4	1	5
	KI124024	0	2	7	9
	KI124026	0	1	1	2
	KI124029	0	2	0	2
	KI124035	0	8	13	21
	KI124037	0	11	6	17
	KI124038	0	5	2	7
	KI124040	0	16	0	16
	KI124041	0	1	0	1
	KI124042	0	5	3	8
	KI124043	0	5	3	8
	KI124044	0	10	6	16
	KI124046	1	26	12	39
	KI124047	0	22	30	52
	KI124050	0	0	2	2

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KI124052	0	1	1	2
	KI124053	0	4	5	9
	KI124055	0	1	1	2
	KI124056	0	6	8	14
	KI124057	0	4	7	11
	KI124058	0	4	0	4
	KI124060	0	7	6	13
	KI124063	0	9	5	14
	KI124065	0	8	23	31
	KI124066	0	1	3	4
	KI124066 001	0	5	0	5
	KI124072	0	7	2	9
	KI124075	0	15	13	28
	KI124079	0	0	1	1
	KI124080	0	3	0	3
	KI124082	0	26	54	80
	KI124083	0	1	0	1
	KI124088	0	5	3	8
	KI124089	0	0	1	1
	KI124090	0	4	3	7
	KI124091	0	2	2	4
	KI124092	20	42	120	182
	KI124092 001	13	51	210	274
	KI124094	0	1	1	2
	KI124096	0	5	10	15
	KI124102	0	15	7	22
	KI124103	0	4	5	9
	KI124105	0	4	1	5
	KI124111	1	34	9	44
	KI124115	0	40	86	126
	KI124117	0	16	12	28
	KI124120	0	0	3	3
	KI124124	0	17	6	23
	KI124125	0	2	0	2
	KI124128	0	5	55	60
	KI124129	0	0	1	1
	KI124133	0	3	9	12
	KI124136	0	2	0	2
	KI124145	0	6	6	12
	KI124146	0	2	3	5
	KI124147	0	10	1	11

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KI124152	5	3	2	10
	KI124153	0	4	2	6
	KI124155	1	1	3	5
	KI124156	0	4	0	4
	KI124158	0	4	13	17
	KI124162	0	1	0	1
	KI124164	0	17	35	52
	KI124165	0	0	2	2
	KI124166	0	3	0	3
	KI124167	0	5	0	5
	KI124170	0	5	0	5
	KI124173	0	2	2	4
	KI124178	0	0	1	1
	KI124180	1	0	26	27
	KI124180 001	0	18	6	24
	KI124181	0	6	0	6
	KI124182	0	15	3	18
	KI124186	0	11	5	16
	KI124186 001	2	2	42	46
	KI124186 002	1	15	56	72
	KI124186 003	6	26	12	44
	KI124186 004	9	43	26	78
	KI124192	0	23	7	30
	KI124193	0	15	45	60
	KI124194	0	3	2	5
	KI124196	0	15	5	20
	KI124202	0	1	0	1
	KI124205	0	2	0	2
	KI124205 001	0	5	5	10
	KI124209	0	1	2	3
	KI124210	0	14	35	49
	KI124212	0	15	5	20
	KI124214	0	0	1	1
	KI124217	0	4	2	6
	KI124227	0	8	0	8
	KI126020	0	4	0	4
	Total	61	972	1256	2289
Moose Calf	KI122006	0	1	0	1
	KI123010	0	0	4	4
	KI123012	0	2	0	2
	KI124022	0	2	0	2



Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KI124035	0	3	0	3
	KI124038	0	2	0	2
	KI124042	0	2	0	2
	KI124044	0	0	2	2
	KI124046	0	1	1	2
	KI124047	0	3	0	3
	KI124057	0	2	0	2
	KI124060	0	2	1	3
	KI124063	0	1	1	2
	KI124065	0	0	2	2
	KI124072	0	2	0	2
	KI124082	0	3	5	8
	KI124088	0	1	0	1
	KI124092	0	0	1	1
	KI124092 001	1	0	4	5
	KI124096	0	1	1	2
	KI124102	0	2	1	3
	KI124115	0	8	19	27
	KI124117	0	3	2	5
	KI124128	0	0	7	7
	KI124133	0	0	1	1
	KI124146	0	0	1	1
	KI124147	0	1	0	1
	KI124153	0	1	0	1
	KI124156	0	1	0	1
	KI124164	0	1	0	1
	KI124170	0	1	0	1
	KI124180	0	0	2	2
	KI124180 001	0	4	0	4
	KI124181	0	1	0	1
	KI124182	0	2	2	4
	KI124186 001	0	0	3	3
	KI124186 002	0	1	1	2
	KI124186 003	1	0	1	2
	KI124186 004	1	3	0	4
	KI124192	0	1	2	3
	KI124193	0	2	5	7
	KI124205	0	2	0	2
	KI124210	0	2	3	5
	KI124217	0	1	0	1
	Total	3	65	72	140

Species	Transect	Visit 1	Visit 2	Visit 3	Total
Unknown Ungulate	KI122003	0	1	0	1
	KI123012 001	0	2	0	2
	KI124003	0	1	3	4
	KI124005	0	1	0	1
	KI124010	0	1	0	1
	KI124013	0	1	0	1
	KI124015	0	2	0	2
	KI124016	0	1	0	1
	KI124019	0	1	1	2
	KI124022	0	9	3	12
	KI124024	0	4	0	4
	KI124030	0	1	0	1
	KI124037	0	7	0	7
	KI124040	1	0	0	1
	KI124046	0	7	0	7
	KI124050	0	0	1	1
	KI124075	0	4	1	5
	KI124082	0	5	0	5
	KI124096	0	1	0	1
	KI124105	0	1	0	1
	KI124115	0	3	0	3
	KI124124	0	2	0	2
	KI124133	0	2	0	2
	KI124136	0	2	0	2
	KI124147	0	0	1	1
	KI124156	0	0	1	1
	KI124164	0	1	0	1
	KI124165	0	0	1	1
	KI124166	0	1	0	1
	KI124170	0	2	0	2
	KI124180	0	0	9	9
	KI124180 001	0	10	0	10
	KI124182	0	3	4	7
	KI124186	0	7	8	15
	KI124186 002	0	16	0	16
	KI124196	0	0	1	1
	KI124212	0	1	0	1
	Total	1	100	34	135
Unknown Ungulate Calf	KI124165	0	0	1	1
	Total	0	0	1	1

## APPENDIX B: PEATLAND COMPLEX TRACKING TRANSECT RESULTS

**Table B-1: Number of Large Mammal Signs Detected During each Visit on Peatland Complex Tracking Transects in 2015**

Species	Transect	Visit 1	Visit 2	Visit 3	Total
<b>Black Bear</b>	KV022003	0	2	0	2
	KV022011	0	1	0	1
	KV036001	0	0	1	1
	KV036006	0	0	1	1
	KV037003	0	1	0	1
	KV038002	0	2	0	2
	KV038017	0	0	2	2
	KV039001	0	0	1	1
	KV044007	0	0	1	1
	KV044008	0	0	1	1
	KV050008	0	1	0	1
	KV058009	0	0	1	1
	KV061001	0	1	0	1
	KV069004	0	0	2	2
	KV094006	0	1	0	1
	KV107005	0	1	0	1
	Total	0	10	10	20
<b>Caribou</b>	KV022001	0	1	0	1
	KV022002	0	4	2	6
	KV022003	0	4	0	4
	KV022004	0	1	1	2
	KV022006	0	1	0	1
	KV022007	0	0	3	3
	KV022008	0	0	2	2
	KV022009	0	2	0	2
	KV022011	0	0	1	1
	KV022012	0	2	1	3
	KV022015	0	5	0	5
	KV023001	0	7	1	8
	KV023002	0	3	1	4
	KV036003	0	2	0	2
	KV036006	0	1	0	1
	KV036012	0	3	0	3

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV036014	0	1	0	1
	KV037003	0	5	0	5
	KV037004	0	1	0	1
	KV038006	0	5	1	6
	KV038008	0	0	1	1
	KV038010	0	0	1	1
	KV038011	0	3	0	3
	KV038015	0	0	1	1
	KV038016	0	0	1	1
	KV039001	0	2	1	3
	KV044003	0	0	1	1
	KV044004	0	0	2	2
	KV044007	0	0	1	1
	KV044008	0	0	2	2
	KV044010	0	0	1	1
	KV047002	0	0	2	2
	KV047003	0	2	1	3
	KV047005	0	0	1	1
	KV050001	0	0	1	1
	KV050002	0	1	0	1
	KV050004	0	1	0	1
	KV050006	0	1	0	1
	KV050007	0	1	8	9
	KV050008	0	1	0	1
	KV058001	0	3	0	3
	KV058004	0	0	1	1
	KV058005	0	2	1	3
	KV058009	0	7	1	8
	KV058010	0	0	3	3
	KV058012	0	4	4	8
	KV058013	0	0	2	2
	KV058014	0	1	0	1
	KV061002	0	2	0	2
	KV061003	0	6	0	6
	KV063001	0	0	4	4
	KV063002	0	0	1	1
	KV063003	0	1	0	1
	KV063005	0	0	1	1
	KV066002	0	3	2	5



Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV066003	0	1	1	2
	KV069001	0	1	0	1
	KV097001	1	3	0	4
	KV097003	1	0	0	1
	KV097004	0	0	2	2
	KV097005	0	1	1	2
	KV097007	0	1	6	7
	KV097008	0	7	0	7
	KV097009	0	4	3	7
	KV097010	0	0	2	2
	KV097011	0	3	0	3
	KV097012	0	2	2	4
	KV101001	1	1	0	2
	KV101003	0	1	0	1
	KV101004	2	1	0	3
	KV101005	3	1	0	4
	KV103002	0	1	9	10
	KV103004	0	0	3	3
	KV107001	0	9	6	15
	KV107002	0	0	2	2
	KV107003	0	0	2	2
	KV107004	0	5	4	9
	KV107005	0	11	16	27
	KV107006	0	1	2	3
	KV107007	0	0	6	6
	KV107009	0	0	2	2
	KV113001	6	0	0	6
	KV113002	1	7	0	8
	KV113004	0	1	0	1
	KV113005	3	0	2	5
	KV113007	8	7	0	15
	KV113008	7	11	2	20
	KV113009	2	1	0	3
	KV113011	4	5	6	15
	KV113012	4	6	0	10
	KV113014	1	0	6	7
	KV116001	0	1	0	1
	KV120002	0	1	0	1
	KV121001	0	1	0	1

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV123001	0	1	3	4
	KV124001	1	1	5	7
	KV597000	0	0	6	6
	Total	45	186	157	388
Gray Wolf	KV022014	0	1	0	1
	KV023001	1	0	0	1
	KV050007	0	1	0	1
	KV094001	1	0	0	1
	KV097005	0	1	1	2
	KV113006	1	0	0	1
	KV597000	2	0	0	2
	Total	5	3	1	9
Moose	KV022001	0	1	0	1
	KV022003	0	3	13	16
	KV022005	0	11	1	12
	KV022006	0	0	2	2
	KV022007	0	15	0	15
	KV022008	0	10	0	10
	KV022009	1	15	3	19
	KV022010	0	9	3	12
	KV022011	0	2	9	11
	KV022012	0	8	4	12
	KV022013	0	5	2	7
	KV022014	0	12	7	19
	KV022015	0	9	4	13
	KV023001	0	4	2	6
	KV023002	0	6	1	7
	KV036001	0	8	10	18
	KV036002	0	7	9	16
	KV036003	0	24	26	50
	KV036004	0	2	6	8
	KV036005	0	8	7	15
	KV036006	1	8	1	10
	KV036007	0	12	11	23
	KV036008	0	4	4	8
	KV036009	0	3	1	4
	KV036010	0	2	5	7
	KV036011	0	11	7	18
	KV036012	0	0	3	3

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV036013	1	7	6	14
	KV036014	0	3	2	5
	KV036015	0	9	9	18
	KV036016	0	10	3	13
	KV036017	1	7	13	21
	KV037002	0	0	3	3
	KV037003	0	8	1	9
	KV037004	0	4	0	4
	KV038001	0	1	1	2
	KV038002	0	17	9	26
	KV038003	0	3	0	3
	KV038005	0	2	3	5
	KV038006	0	0	4	4
	KV038007	0	3	4	7
	KV038008	0	6	4	10
	KV038009	0	1	0	1
	KV038010	0	5	9	14
	KV038011	0	1	0	1
	KV038012	0	2	0	2
	KV038014	0	1	0	1
	KV038015	0	8	3	11
	KV038016	0	7	1	8
	KV038017	0	8	0	8
	KV038018	0	7	1	8
	KV038019	0	7	5	12
	KV038020	0	7	0	7
	KV039001	0	1	1	2
	KV044001	0	4	4	8
	KV044003	0	2	0	2
	KV044006	0	2	0	2
	KV044007	0	1	0	1
	KV044008	0	3	1	4
	KV044009	0	1	1	2
	KV044010	0	5	0	5
	KV047001	0	4	4	8
	KV047002	0	1	0	1
	KV047003	0	2	3	5
	KV047004	0	2	0	2
	KV047005	0	2	2	4

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV047006	0	6	0	6
	KV050001	0	2	0	2
	KV050002	0	1	0	1
	KV050003	0	3	2	5
	KV050006	0	1	1	2
	KV050007	0	3	0	3
	KV050008	0	2	0	2
	KV058001	0	13	1	14
	KV058002	0	2	0	2
	KV058003	0	1	0	1
	KV058004	0	9	1	10
	KV058005	0	1	1	2
	KV058006	0	2	2	4
	KV058007	0	1	8	9
	KV058009	0	9	4	13
	KV058010	0	9	1	10
	KV058011	0	1	0	1
	KV058012	0	8	0	8
	KV058013	0	6	5	11
	KV061001	0	2	1	3
	KV061002	0	0	1	1
	KV061003	0	0	4	4
	KV062001	0	5	0	5
	KV062002	0	5	0	5
	KV063001	0	6	0	6
	KV063002	1	8	1	10
	KV063003	0	8	0	8
	KV063004	0	4	2	6
	KV063005	0	4	0	4
	KV063006	1	1	2	4
	KV066001	0	3	2	5
	KV066002	0	2	1	3
	KV069002	0	11	10	21
	KV069003	0	12	4	16
	KV069004	0	7	4	11
	KV069005	0	12	17	29
	KV071001	0	0	2	2
	KV094001	3	3	3	9
	KV094002	0	28	6	34



Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV094003	4	7	0	11
	KV094004	4	4	2	10
	KV094005	2	5	10	17
	KV094006	4	2	0	6
	KV094007	8	10	4	22
	KV097001	0	6	0	6
	KV097002	0	3	10	13
	KV097003	0	1	1	2
	KV097004	0	3	0	3
	KV097005	0	8	0	8
	KV097006	0	1	2	3
	KV097007	0	1	0	1
	KV097008	0	0	4	4
	KV097009	0	3	0	3
	KV097010	0	12	4	16
	KV097011	0	0	3	3
	KV097012	0	1	3	4
	KV097013	0	3	3	6
	KV098001	0	4	1	5
	KV098002	0	8	7	15
	KV101001	2	1	4	7
	KV101002	0	1	0	1
	KV101003	0	8	4	12
	KV101004	0	2	1	3
	KV101005	0	5	10	15
	KV102001	0	4	1	5
	KV102002	1	10	4	15
	KV103001	0	0	6	6
	KV103002	4	14	26	44
	KV103003	1	1	5	7
	KV103004	0	8	3	11
	KV103005	0	1	3	4
	KV103006	1	3	12	16
	KV107001	0	5	0	5
	KV107003	0	1	1	2
	KV107004	0	4	0	4
	KV107005	0	3	2	5
	KV107006	1	2	0	3
	KV107007	4	16	0	20

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV107009	0	6	3	9
	KV113001	0	9	7	16
	KV113002	0	2	0	2
	KV113003	0	9	1	10
	KV113004	4	9	11	24
	KV113005	0	3	0	3
	KV113006	0	10	21	31
	KV113007	1	10	7	18
	KV113008	1	11	9	21
	KV113009	1	2	0	3
	KV113010	0	2	0	2
	KV113011	0	0	1	1
	KV113012	0	0	2	2
	KV113013	1	2	7	10
	KV113014	0	5	0	5
	KV116001	0	13	1	14
	KV119001	0	6	1	7
	KV119002	0	4	2	6
	KV119003	2	7	10	19
	KV119004	0	3	4	7
	KV119005	1	2	3	6
	KV119006	0	10	5	15
	KV120001	0	5	1	6
	KV120002	0	1	0	1
	KV121001	2	0	5	7
	KV122001	0	6	1	7
	KV123001	5	11	24	40
	KV124001	5	19	8	32
	KV597000	1	67	26	94
	Total	69	969	620	1658
Unknown Ungulate	KV022009	0	0	2	2
	KV022012	0	0	1	1
	KV036006	0	2	0	2
	KV036008	0	5	0	5
	KV036014	0	1	0	1
	KV036017	0	1	0	1
	KV038002	0	2	0	2
	KV038005	0	2	0	2
	KV044005	0	1	0	1

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV044008	0	0	2	2
	KV044010	0	0	1	1
	KV047002	0	1	0	1
	KV047003	0	2	0	2
	KV047005	0	1	0	1
	KV050003	0	0	1	1
	KV050007	0	2	0	2
	KV058002	0	1	0	1
	KV058009	0	3	0	3
	KV058012	0	2	0	2
	KV058014	0	1	0	1
	KV063001	0	0	1	1
	KV063002	0	1	1	2
	KV063003	0	4	0	4
	KV063004	0	0	1	1
	KV063005	0	0	1	1
	KV063006	0	0	1	1
	KV066002	0	0	2	2
	KV097009	0	1	0	1
	KV098001	0	0	1	1
	KV107009	0	0	1	1
	KV113004	0	1	0	1
	KV113007	0	1	0	1
	KV113008	0	3	0	3
	KV113009	0	2	0	2
	KV113010	0	1	0	1
	KV113011	0	1	0	1
	KV113014	0	1	0	1
	KV120001	0	3	0	3
	KV120002	0	1	0	1
	KV121001	0	2	0	2
	Total	0	49	16	65
Caribou Calf	KV022002	0	1	0	1
	KV022007	0	0	1	1
	KV058009	0	1	0	1
	KV061003	0	1	0	1
	KV097001	0	1	0	1
	KV097007	0	0	1	1
	KV107001	0	0	1	1

Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV107005	0	1	0	1
	KV113001	1	0	0	1
	KV113007	1	0	0	1
	KV113008	0	1	0	1
	KV113012	1	1	0	2
	KV113014	1	0	0	1
	Total	4	7	3	14
Moose Calf	KV022005	0	1	0	1
	KV022011	0	1	0	1
	KV022012	0	0	1	1
	KV036001	0	0	1	1
	KV036003	0	5	3	8
	KV036005	0	0	1	1
	KV036007	0	2	0	2
	KV036011	0	2	0	2
	KV036013	1	1	0	2
	KV036016	0	3	1	4
	KV037002	0	0	1	1
	KV038002	0	1	0	1
	KV038005	0	1	0	1
	KV038007	0	0	1	1
	KV038019	0	1	0	1
	KV047004	0	1	0	1
	KV047006	0	3	0	3
	KV058001	0	1	0	1
	KV058004	0	2	0	2
	KV058007	0	0	1	1
	KV058009	0	1	0	1
	KV058010	0	1	0	1
	KV058012	0	1	0	1
	KV062002	0	1	0	1
	KV069002	0	3	0	3
	KV069003	0	3	0	3
	KV069005	0	2	0	2
	KV094001	0	1	0	1
	KV094002	0	2	1	3
	KV094003	0	2	0	2
	KV094005	0	1	0	1
	KV094006	1	0	0	1



Species	Transect	Visit 1	Visit 2	Visit 3	Total
	KV094007	0	1	0	1
	KV097001	0	1	0	1
	KV097002	0	0	1	1
	KV097005	0	1	0	1
	KV097010	0	1	0	1
	KV098001	0	1	0	1
	KV098002	0	1	1	2
	KV101003	0	1	0	1
	KV101004	0	1	0	1
	KV102001	0	1	0	1
	KV102002	0	3	1	4
	KV103002	0	2	2	4
	KV103004	0	2	0	2
	KV103006	0	1	1	2
	KV107007	0	2	0	2
	KV113001	0	3	0	3
	KV113004	0	4	0	4
	KV113005	0	1	0	1
	KV113006	0	1	0	1
	KV113007	0	2	1	3
	KV113008	0	3	1	4
	KV113013	0	0	2	2
	KV113014	0	1	0	1
	KV119001	0	2	0	2
	KV119002	0	1	0	1
	KV119003	0	3	0	3
	KV119004	0	1	0	1
	KV119006	0	3	0	3
	KV123001	0	1	0	1
	KV124001	0	2	0	2
	KV597000	0	1	0	1
	Total	2	91	21	114
<b>Unknown Ungulate Calf</b>	KV097009	0	1	0	1
	Total	0	1	0	1

## APPENDIX C: ACCESS ROAD TRACKING TRANSECT RESULTS

Table C-1: Number of Large Mammal Signs Detected During each Visit from Access Road Tracking Transects in 2015

Species	Transect	Visit 1	Visit 2	Visit 3	Total	Route Length (km)
		No. of Signs	No. of Signs	No. of Signs	No. of Signs	
Black Bear	N34	0	0	1	1	12.4
	N38	0	0	4	4	10.2
	N40	0	4	1	5	5.9
	S15	0	1	0	1	10.8
	S16	0	2	0	2	12
	S42	0	1	0	1	13.1
	S51	1	0	0	1	12.8
	S53	0	3	0	3	12.4
	S8	0	2	0	2	12.4
	Total	1	13	6	20	102.0
Gray Wolf	N23	0	2	0	2	12.1
	N24	1	0	0	1	10.8
	N34	2	0	0	2	12.4
	N38	1	0	2	3	10.2
	N39	1	0	0	1	8
	N40	0	3	0	3	5.9
	S1	1	0	1	2	11.7
	S10	0	2	0	2	10.4
	S15	3	1	1	5	10.8
	S16	2	1	1	4	12
	S18	3	1	0	4	12.5
	S46	0	1	0	1	14.2
	S51	0	1	0	1	12.8
	S53	2	1	0	3	12.4
	S8	0	1	0	1	12.4
	Total	16	14	5	35	168.6
Caribou	N23	2	9	2	13	12.1
	N24	0	7	1	8	10.8
	N34	0	2	0	2	12.4
	N36	0	5	1	6	10.5
	N38	4	0	8	12	10.2
	N40	0	2	3	5	5.9

Species	Transect	Visit 1	Visit 2	Visit 3	Total	Route Length (km)
		No. of Signs	No. of Signs	No. of Signs	No. of Signs	
	S1	0	38	23	61	11.7
	S10	0	9	6	15	10.4
	S15	0	12	13	25	10.8
	S16	0	16	6	22	12
	S18	5	2	34	41	12.5
	S42	0	4	0	4	13.1
	S46	1	4	0	5	14.2
	S51	11	0	2	13	12.8
	S52	2	12	6	20	13
	S53	7	8	2	17	12.4
	S8	0	16	25	41	12.4
	Total	32	146	132	310	197.2
Moose	N23	6	75	96	177	12.1
	N24	11	56	55	122	10.8
	N34	22	94	86	202	12.4
	N36	62	83	87	232	10.5
	N38	12	121	76	209	10.2
	N39	7	62	137	206	8
	N40	0	99	34	133	5.9
	S1	3	18	8	29	11.7
	S10	1	63	92	156	10.4
	S15	0	101	50	151	10.8
	S16	6	16	107	129	12
	S18	15	51	56	122	12.5
	S42	38	29	80	147	13.1
	S46	38	129	136	303	14.2
	S51	42	106	72	220	12.8
	S52	23	169	95	287	13
	S53	17	99	94	210	12.4
	S8	1	19	35	55	12.4
	Total	304	1390	1396	3090	205.2
Unknown Ungulate	N23	0	10	0	10	12.1
	N24	0	0	2	2	10.8
	N34	0	3	2	5	12.4
	N36	0	0	1	1	10.5
	N38	0	1	0	1	10.2
	N40	1	0	0	1	5.9
	S1	0	10	0	10	11.7
	S10	0	7	0	7	10.4

Species	Transect	Visit 1	Visit 2	Visit 3	Total	Route Length (km)
		No. of Signs	No. of Signs	No. of Signs	No. of Signs	
	S15	0	0	7	7	10.8
	S42	0	10	0	10	13.1
	S52	0	1	1	2	13
	S53	0	5	0	5	12.4
	S8	0	2	8	10	12.4
	Total	1	49	21	71	145.7
Caribou Calf	N34	0	1	0	1	12.4
	N36	0	1	1	2	10.5
	S1	0	2	0	2	11.7
	S10	0	1	0	1	10.4
	S51	1	0	0	1	12.8
	S52	1	0	0	1	13
	S53	1	1	0	2	12.4
	Total	3	6	1	10	83.2
Moose Calf	N23	0	3	7	10	12.1
	N24	0	6	7	13	10.8
	N34	1	8	8	17	12.4
	N36	0	10	5	15	10.5
	N38	1	6	3	10	10.2
	N39	1	8	1	10	8
	N40	0	5	0	5	5.9
	S1	0	0	2	2	11.7
	S10	0	1	0	1	10.4
	S15	0	9	2	11	10.8
	S16	0	3	0	3	12
	S18	0	4	1	5	12.5
	S42	10	2	0	12	13.1
	S46	0	6	11	17	14.2
	S51	8	9	5	22	12.8
	S52	1	5	14	20	13
	S53	0	3	7	10	12.4
	S8	0	1	0	1	12.4
	Total	22	89	73	184	205.2



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