

**South Slave Region Boreal Caribou Program**  
**Progress Report: Hay River Lowlands Study Area**  
**1 April 2012 – 31 March 2013**



Photo of boreal caribou crossing highway by Terrance Campbell

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## Background

The South Slave region boreal caribou monitoring program began in 2003 to collect information on boreal caribou population demographics (adult female survival, calf recruitment and population trend), condition, and habitat selection in the Hay River Lowlands. The study area was extended south to the Cameron Hills/ Bistcho Lake area in 2004 because the small sample of collared cows showed that cows in the southern area use distinctly different areas than the collared cows north of the Cameron Hills plateau. Caribou were monitored under this program in the Cameron Hills from 2004 to 2011 and in the Hay River Lowlands area from 2003 to 2012. Information is summarized in previous progress reports (Kelly and Cox 2011).

This program contributes to the NWT Boreal Caribou Action Plan (2010-2015) (GNWT 2009) and supports the GNWT in meeting its obligations under the national Recovery Strategy for boreal caribou (Environment Canada 2012). In 2012, funding was obtained to continue monitoring boreal caribou in the Hay River Lowlands area. This is an update on this program including the deployment of 27 GPS collars onto boreal caribou cows and the spring recruitment survey that occurred in late winter 2012-13.

## Study Area

The Hay River Lowlands study area is bounded by the Hay River to the east, the Mackenzie River and Great Slave Lake to the north, the Cameron Hills to the south and approximately the Redknife Hills and 107°W to the west (Figure 1). It is approximately 23,000 km<sup>2</sup> in size and encompasses the Ka'a'gee Tu Candidate Area in the NWT Protected Areas Strategy (Figure 1). The area is comprised of two Level IV ecoregions of the Taiga Plains: the Great Slave Lowland Mid-boreal Ecoregion along the Mackenzie River, and the Tathlina Plain Mid-boreal Ecoregion (majority of the study area) (Ecosystem Classification Group 2009). Linear feature density averages 0.36 seismic lines per km<sup>2</sup> (Nagy 2011) and wildfires have burned areas across this landscape in different decades and at various intensities. This study area overlaps three “patches” of secure habitat ≥500km<sup>2</sup>, with secure habitat defined by Nagy (2011) as an area not fragmented by seismic lines or linear features (including a 400m disturbance buffer on each side) and not burned by wildfire in the past 50 years. Areas with secure habitat and large, contiguous patches of secure habitat ≥500km<sup>2</sup>, are associated with higher levels of caribou survival and reproduction than areas that have less secure habitat and fewer large patches of it (Nagy 2011). Appendix 1 shows the study area in the context of the entire NWT boreal caribou range as well as maps showing the amount of disturbance and secure habitat patches, and the wildfire history in this area.

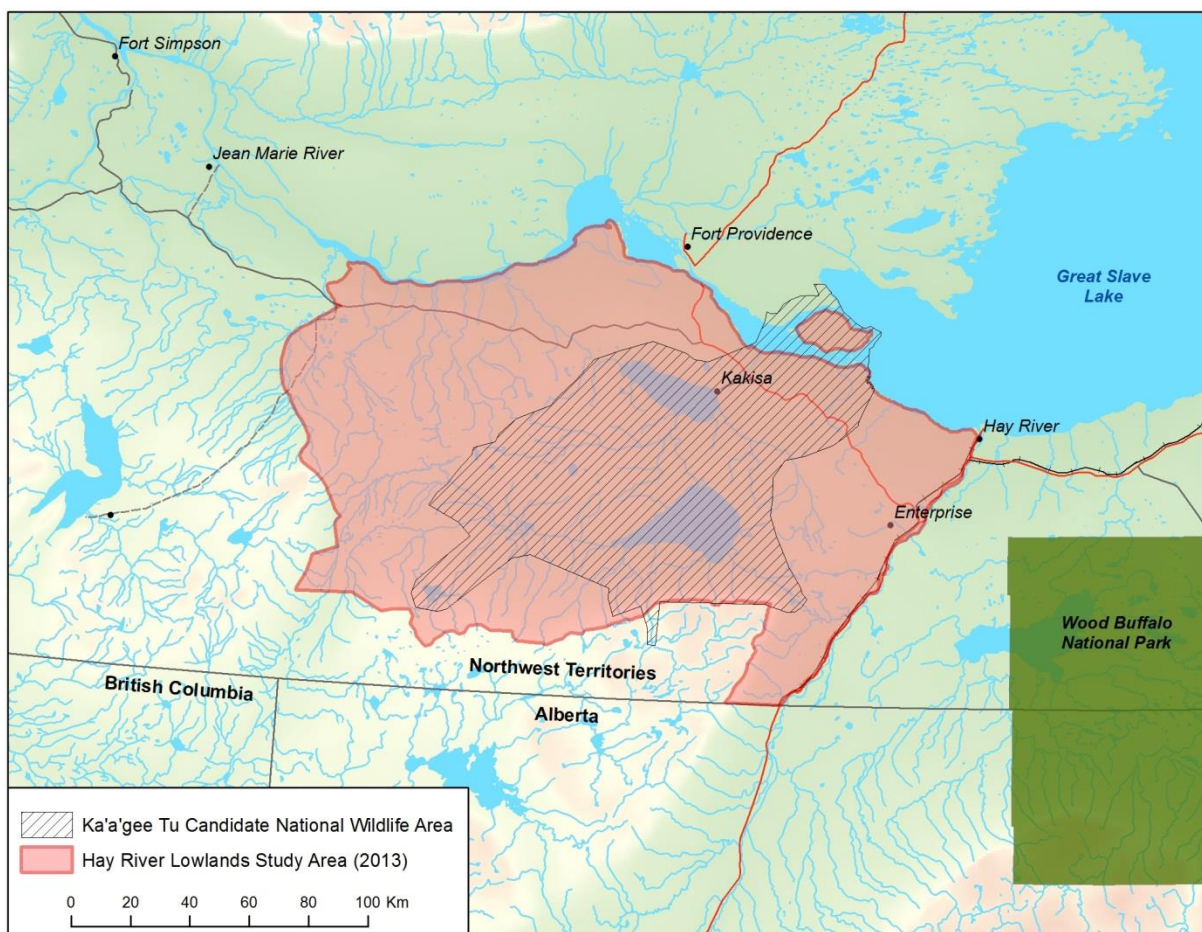


Figure 1. The South Slave region boreal caribou Hay River Lowlands study area (red), and the proposed Ka'a'gee Tu protected area (hatched). The area as shown is 22,770 km<sup>2</sup>, and is delineated by the Mackenzie and Hay Rivers (north and east) and Taiga Plain level IV ecoregion boundaries (south and west).

### Main project objectives

This long-term monitoring program provides information to help determine if these ranges provide sustainable habitat for boreal caribou, to understand how boreal caribou respond to development and other pressures, and to make effective management decisions that will conserve boreal caribou for future generations. The long-term program objectives are to:

- Monitor population demographics: adult female survival, birth rate, ten-month calf recruitment, and finite rate of population increase (the relative change in size of population from one year to the next)
- Document seasonal range use, annual home ranges and fidelity to calving areas (whether cows use the same area to calve year after year)
- Examine boreal caribou habitat use and selection in relation to natural and human caused disturbance (e.g. wildfire, development) and landscape features (e.g. forest type)
- Monitor presence of disease and parasites

The objective for this year was to reinitiate the caribou monitoring program in the South Slave Region. To achieve this we deployed new collars and conducted a recruitment survey. Long-term program objectives are reported on in previous reports (see Kelly and Cox 2011) and results will be updated pending more information and future analyses.

### Collar deployments

Our objective is to maintain a minimum of 25 collars as of April 1 of each year, distributed across the study area, in order to calculate adult female survival. Between 2003 and 2008, 60 boreal caribou cows were collared in the Hay River Lowlands (Kelly and Cox 2011); no collars were deployed from 2009-2012 leading to fewer than 25 collared cows in the study area in 2010-2012 (Figure 2).

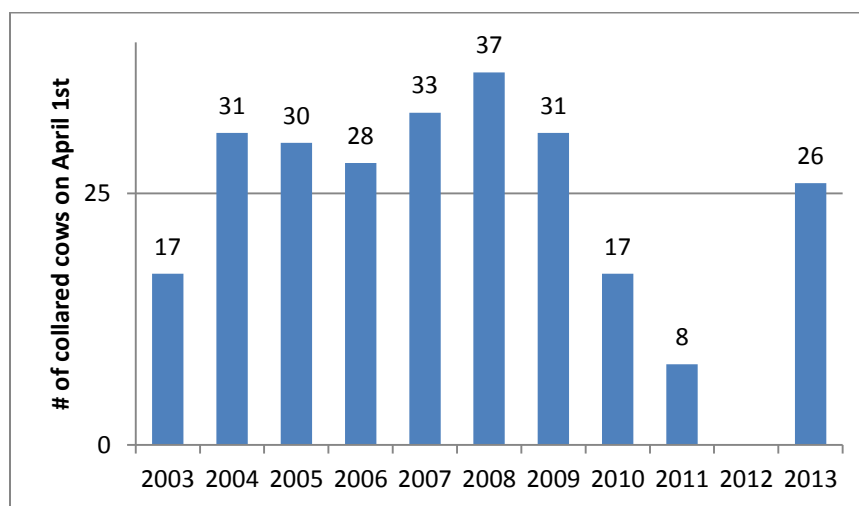


Figure 2. Number of collared cows at the beginning of each year (April 1) in the Hay River Lowlands study area, 2003-2013.

### ***Collar specifications: February 2013 deployment***

25 of the collars are Telonics model TGW-4680-3 and use the ARGOS satellite system to transmit locations. 2 collars are Telonics model TGW-4670-3 and use the Iridium satellite system to transmit locations (we were provided the Iridium collars by the company to field test them). All 27 collars collect 3 locations a day at 8 hour intervals. Locations are transmitted via satellite daily in March (to locate caribou during recruitment surveys) and every 3 days the remainder of the year. Both collar types also collect temperature and activity data 3 times per day; the Iridium collars transmit this information with location data and the ARGOS collars store it on board. All collars transmit a VHF (Very High Frequency) signal that can be relocated from the aground or air using a receiver and antennae; this is used to locate caribou for aerial surveys and to retrieve collars. All collars are scheduled to release on 15 July 2017. The VHF signal will transmit until January 2018.

### ***Reconnaissance flights and collar deployment – February 2013***

Aerial reconnaissance flights conducted February 5-6, 2013 as part of the Bison Control Area surveillance (Cox 2013 in prep.) provided information on boreal caribou track networks and animal locations in the northern portion of the study area. Additional reconnaissance flights were conducted from February 12-16, 2013 over boreal caribou late winter habitat to locate tracks and animals for the collar deployment crew (Figure 3).



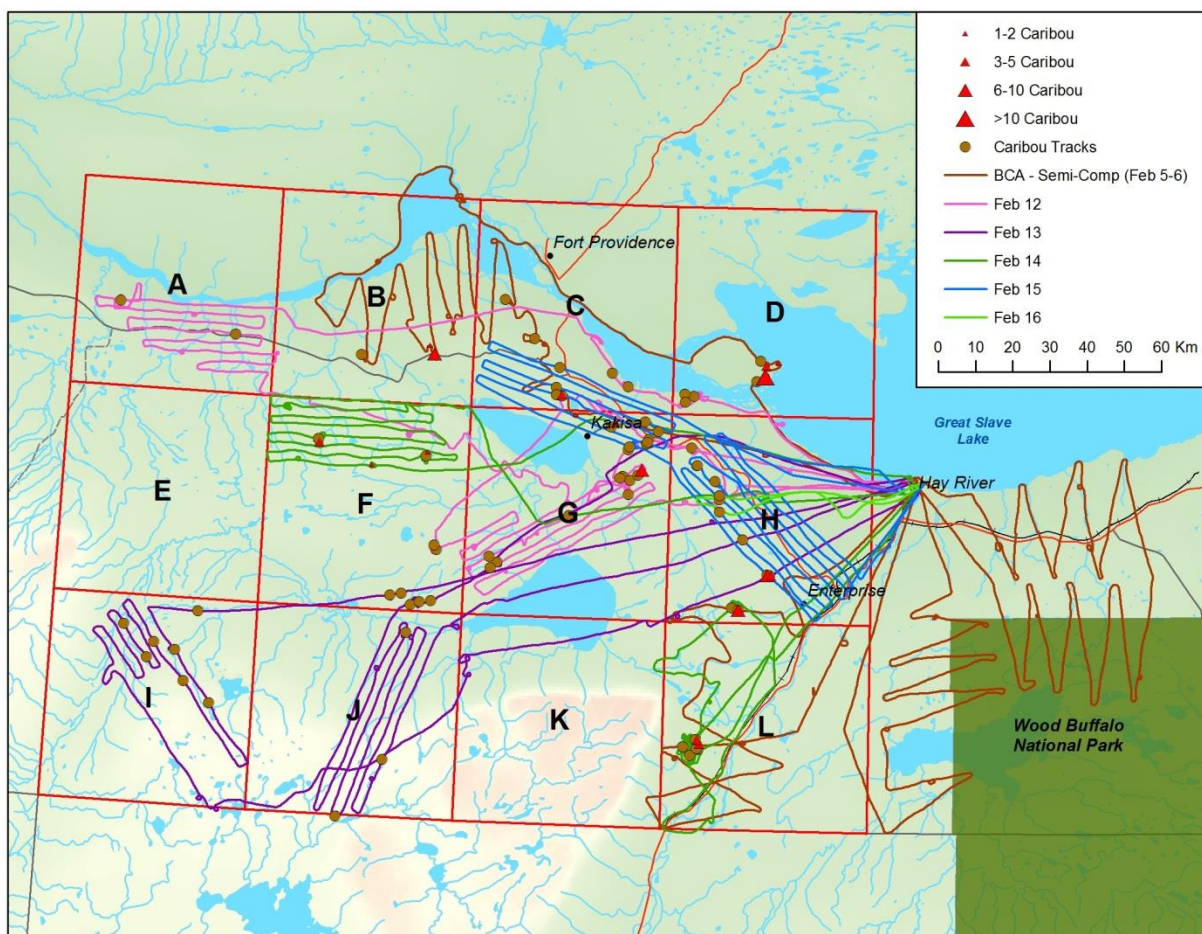


Figure 3. Flight lines and observations of boreal caribou and boreal caribou tracks documented prior to collar deployment in the Hay River Lowlands study area, February 2013.

### Deployment

We used a grid system (Figure 4) and attempted to collar at least 2 cows within each grid cell A-L (excluding K) to achieve distribution across the area. We excluded the grid cell K (Figure 4) as that area, downslope from the Cameron Hills, contains a lot of deciduous habitat more suited for moose than boreal caribou. We did not deploy collars in cell I and J due to habitat (a mix of deciduous and conifer forests) and lack of observed caribou. Fixed wing reconnaissance flights had located old tracks but had not observed any caribou in that area and we did not want to spend time searching a very remote area with the helicopter. Cows disperse widely prior to calving and we expect that over time, the collared cows will disperse throughout the study area.

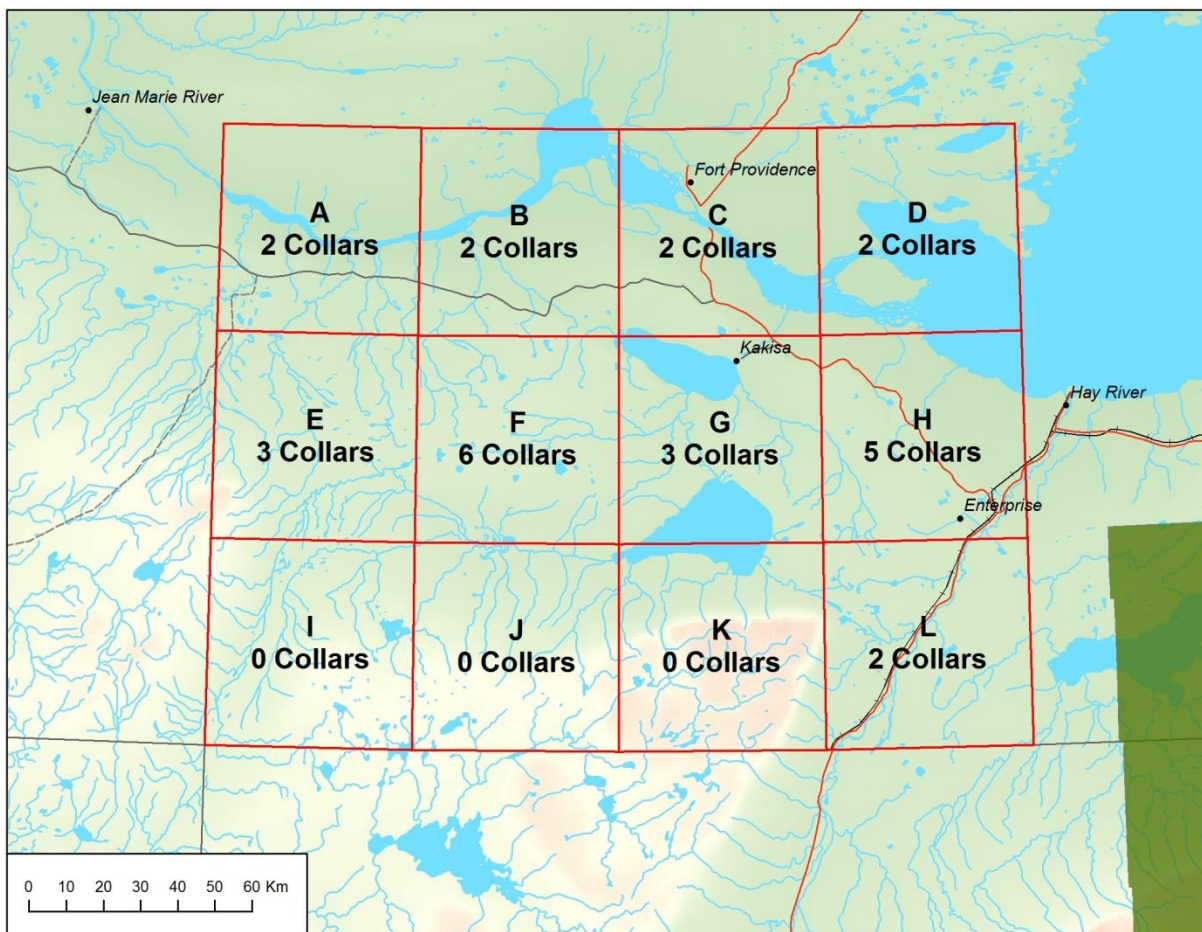


Figure 4. Location of deployment of 27 GPS collars on boreal caribou cows distributed across the Hay River Lowlands study area. All collars were deployed south of the Mackenzie River (including Big Island) and west of the Hay River.

The collars were deployed over a 5-day period (February 13-17, 2013). There were no capture related mortalities. The condition of the collared cows varied from skinny to very fat. Most cows were in good shape for the time of year. Two of the 27 cows collared had rubbed hair off their flanks with small patches showing skin. We observed winter ticks on one of these cows (Figure 5). Other noted abnormalities were a tumor or growth on the udder of cow #315 and abnormally developed sexual genitalia on cow #310.





Figure 5. Photos of cow #306 showing winter ticks and signs of hair rubbing on sides.

### ***Snow conditions***

There was more snow than average in 2012-2013: AANDC snow surveys indicated end of season snow water equivalent (SWE) levels to be 141% of average (1982-2013) at the Kakisa River station and 160% of average (and highest recorded value, 1982-2013) at the Hay River station ([http://nwt-tno.inac-ainc.gc.ca/wrd/table\\_e.asp?region=4](http://nwt-tno.inac-ainc.gc.ca/wrd/table_e.asp?region=4)). Snow depth at deployment locations was ~50-70cm in open areas and ~80-100 cm in sheltered areas. In the Trout River area, between Highway 1 and the Mackenzie River, the snow was 85 cm deep with an ice layer 3-4mm thick at 70cm (Figure 6b). The snow had not yet crystallized into sugar snow at any of the deployment locations though sugar snow was reported in the Dehcho during the previous week (Larter and Allaire 2013).



Figure 6. Photos of (a) caribou released after collaring; (b) snow with ice layer in Trout River area north of Highway 1.

### **Population demographics**

#### ***Pregnancy rates***

Based on the level of progesterone in blood serum from the collared cows, 22 of the 27 caribou (82%) were pregnant. Four of the not-pregnant cows were estimated to be young (3 were estimated at 3 years old and 1 was estimated to be 3-5). Although we know that boreal caribou in the NWT can have calves as early as 2 years old (e.g. Larter and Allaire 2013) the young age of these caribou may have

contributed to their reproductive status. The remaining non-pregnant cow was older (estimated age 6-8), but had abnormally developed external sexual genitalia that may have prevented pregnancy.

### ***Adult female survival***

Adult female survival rates are calculated annually based on the collared female cows in each study area. Collars are tracked via GPS and assigned a status (alive, dead, or censored) each month. “Censored” means the collar failed or released as scheduled. Since the collars were deployed in February 2013 we will be able to calculate the first year of survival of these cows in April 2014 (using the annual period of April 1, 2013 to March 31, 2014). Adult female survival is calculated based on Pollock et al.’s (1989) staggered-entry modification of Kaplan and Meier’s (1958) survivorship model.

### ***Calf production (birth rate)***

The movements of GPS collars show that boreal caribou cows travel long distances just before the calving season. Cow movement rates decrease significantly a day or two before calving, the cow moves very little on the calving date, and movement rates are low on the days following calving. From this pattern we can determine the date and location of calving events by GPS-collared cows. There were no GPS-collared cows in the study area in spring 2012 so calving dates have not been estimated for this progress report. For the cows that were collared in February 2013, calf production and calving dates will be determined based on their movement rates in May 2013 and included in the 2013-14 progress report.

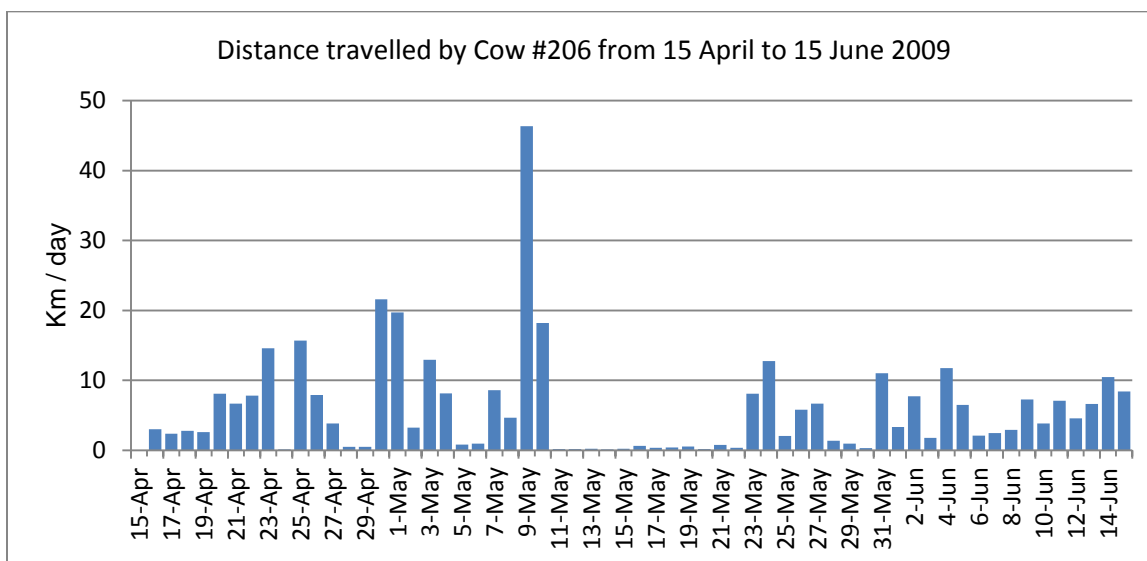


Figure 8. An example of the movement pattern of GPS-collared cows indicative of calving; in this case cow #206 calved on or near May 11, 2009.

### ***Calf recruitment survey - March 2013***

Calf recruitment is based on late winter composition surveys in February or March, when calves are 9 or 10 months old (most calves are born in May). A helicopter is used to count and classify all the cows, bulls and calves associated with collared cows (and any other caribou groups observed). Caribou are classified as calves or adults based on their size and body shape. Adults are sexed based on the presence of a black vulva patch (females) or lack of vulva patch (males) (Figure 7). Recruitment is expressed as the ratio of calves per 100 adult cows. It is assumed that these 10-month old calves are recruited into the adult population. Recruitment is calculated using the means of ratio calculation



described in Krebs (1989), assuming a 50:50 sex ratio for unknown adults. The mean calf: cow ratio is calculated based on all caribou observed during the survey.

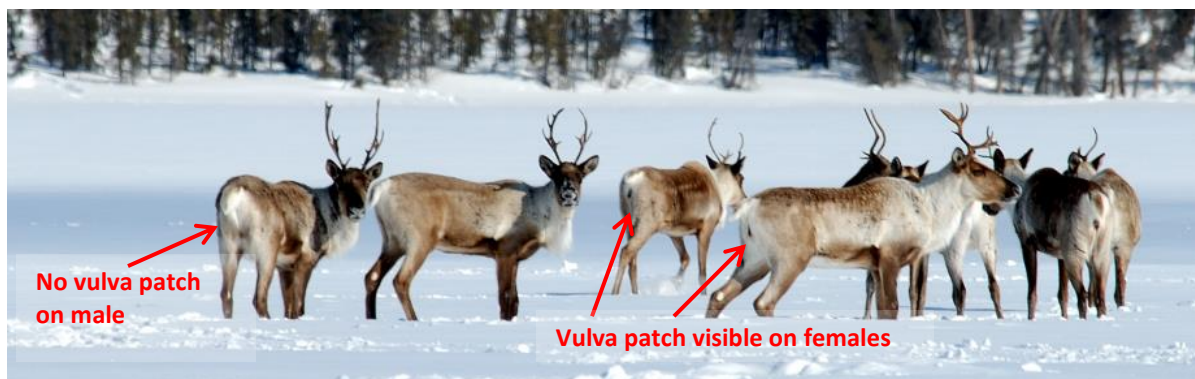


Figure 7. Photo showing a key characteristic used to classify female (vulva patch visible) and male (no vulva patch) boreal caribou. Photo © J. Nagy.

The calf recruitment survey was conducted March 6-7, 2013. Approximately 9 hours were flown in a B-206 helicopter (Figure 8). 167 caribou in 34 groups were classified, including 9 groups that did not contain a collared cow. Group size ranged from 1 to 12 animals (Figure 9). More than half of the groups observed were  $\leq 4$  caribou. This is in contrast to the Dehcho caribou study area (see Appendix 2, Figure 1) where group sizes observed in March 2013 were larger than average, including 10 groups of  $\geq 10$  caribou (Larter and Allaire 2013). The Hay River Lowlands is adjacent to the Dehcho boreal caribou study area and some collars have moved between the two areas. An additional 2 groups of caribou containing South Slave region (SSR) collared cows were classified during the Dehcho composition survey and these groups were included in the results (and two Dehcho collars were relocated during the SSR survey).

The mean calf: cow ratio was 27:100 (SE 5.1). This is the second highest recruitment rate observed in the 9 surveys that have been done in this area since 2004 (Table 1).

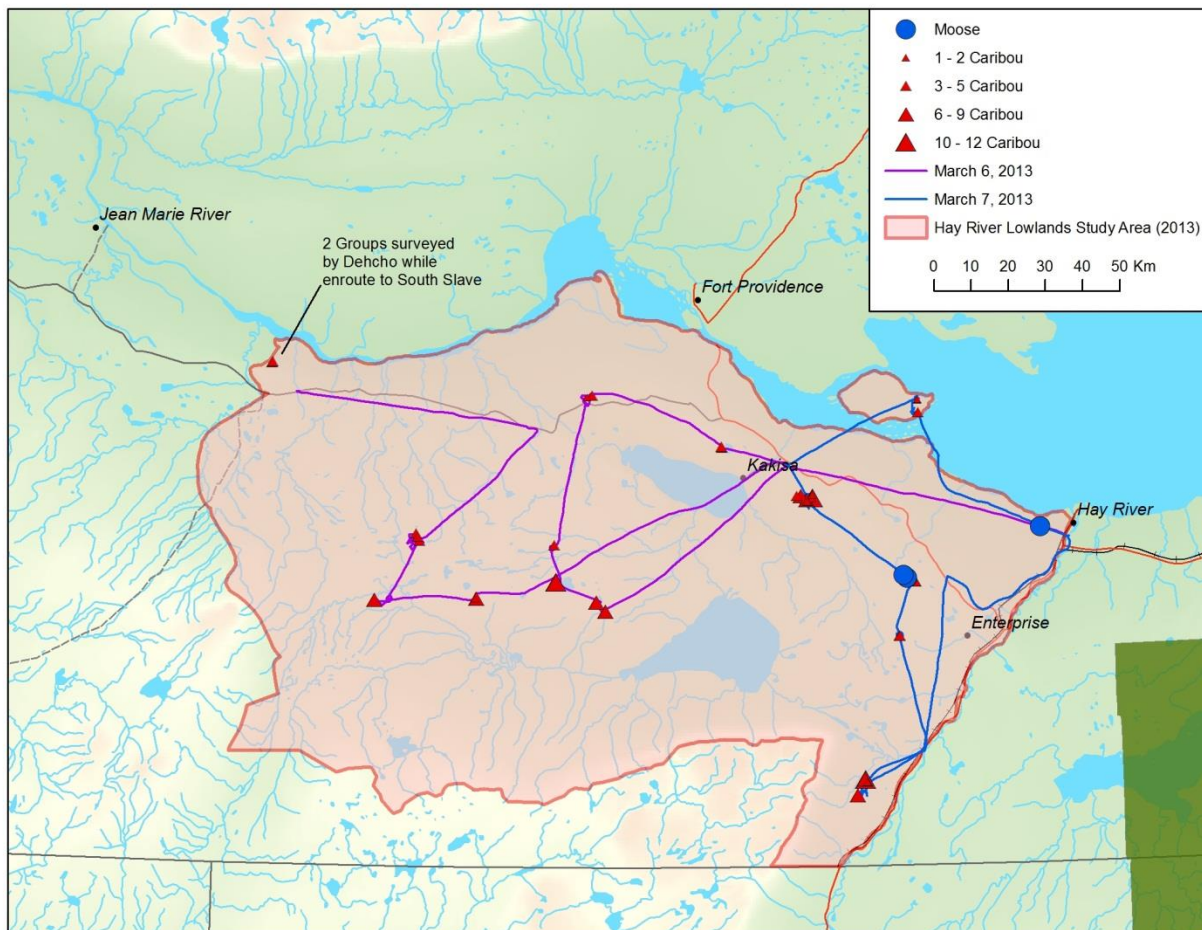


Figure 8. Flight lines and location of caribou groups that were classified during the Hay River Lowlands calf recruitment survey March 6-7, 2013. 167 caribou in 34 groups were classified; the calf: cow ratio was 27:100.

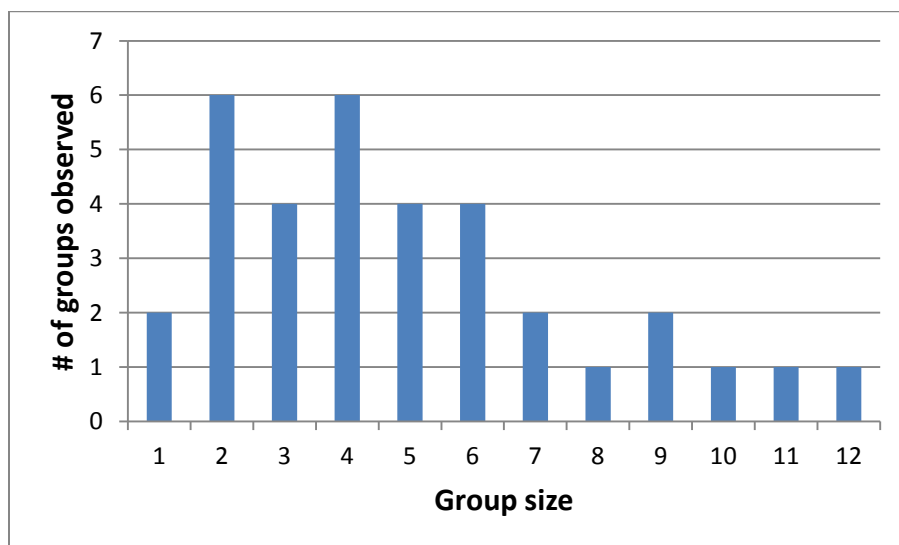


Figure 9. Distribution of group size of boreal caribou observed during the 2013 spring recruitment survey.

Table 1. Recruitment ratios from late winter composition surveys of boreal caribou in the Hay River Lowlands, NT study area, 2004-2013.

April to March	Year	mean calf: cow ratio	SE	CV	n	N
2003-2004	2004	0.18	0.03	0.17	33	221
2004-2005	2005	0.22	0.03	0.15	46	353
2005-2006	2006	0.18	0.03	0.15	44	310
2006-2007	2007	0.16	0.03	0.20	33	213
2007-2008	2008	0.22	0.04	0.16	38	261
2008-2009	2009	0.19	0.03	0.18	38	240
2009-2010	2010	0.50	0.06	0.12	19	177
2010-2011	2011	0.25	0.06	0.23	22	130
2011-2012	2012	No survey				
<b>2012-2013</b>	<b>2013</b>	<b>0.27</b>	<b>0.05</b>	<b>0.19</b>	<b>34</b>	<b>167</b>

n is the number of groups classified;

N is the total number of caribou classified during the survey.

### Habitat use and movement patterns

The area of use by each collared cow from collar deployment (Feb 13-17) to March 31, 2013 is shown as a 100% minimum convex polygon (MCPs), which is a line drawn around all of the location points from one collar (Figure 10). There was more snow than the 1982-2013 average throughout the study area, as noted previously. Caribou moved very little during this late winter period; thus these polygons largely reflect collar deployment locations.



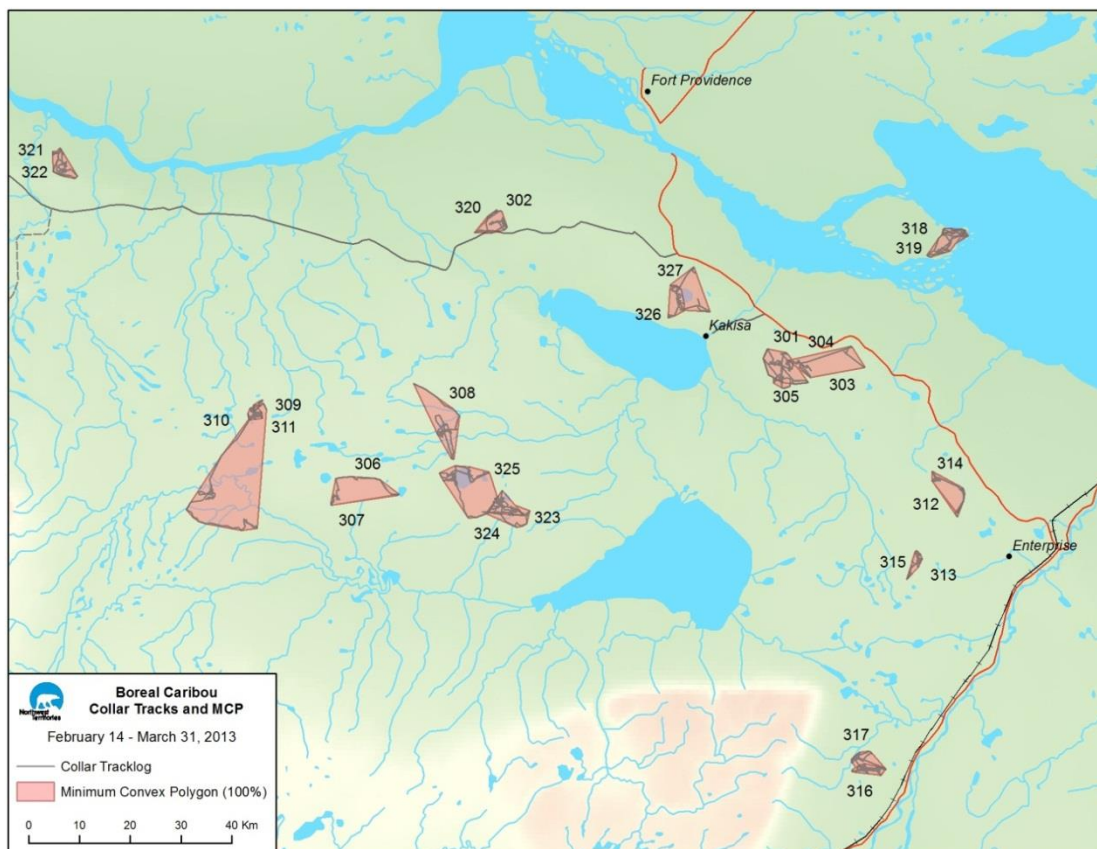


Figure 10. Areas used by GPS-collared boreal caribou from mid-February (when collars were deployed) to March 31, 2013 in the Hay River Lowlands, NT. Range use areas are mapped as 100% minimum convex polygons (MCPs).

## Budget

### Actual program costs 2012-13

Collar purchase and shipping	\$83,633
Collar satellite data acquisition	\$5,141
Contract services (aircraft, and collar deployment)	\$67,763
Travel and accommodation expenses	\$6,978
Supplies	\$213
<b>Total</b>	<b>\$163,728</b>

## Acknowledgements

We continue to value the ongoing support for the boreal caribou program from past and current Chiefs, Presidents and Councils of K'a'agee Tu First Nation, K'atlodeeche First Nation, Hay River Métis Council, NWT Métis Nation, and the Fort Providence Resource Management Board.

We also appreciate the assistance of several people who helped with the collar deployment or surveys.

Dallas Phillips and Cheyenne Paulette (ENR Fort Smith), Edward Landry (ENR Fort Providence), and Pat Martel (Katl'odeeche First Nation) assisted Karl Cox with the reconnaissance surveys in early February; Darcy King was the pilot (C-185 aircraft JHM, Landa Aviation). The collar deployment crew was Brad Culling (net gunner), Diane Culling (animal handler) of Diversified Environmental Services, pilot Mike Koloff (Quest Helicopters B-206 GNMB) and Allicia Kelly. The spring recruitment survey crew was Allicia Kelly, Danny Allaire (ENR Dehcho Region) and pilot Daryl Ressler (Great Slave Helicopters B-206 FGSD). Thank you to ENR Hay River staff including Jerry Hordal and Dean McMeekin for assistance with transportation, fuel caching and fuel drum pick up, and use of the forestry helibase. Thanks also to Nicole McCutchen who reviewed this report and to Nic Larter and John Nagy for many helpful discussions about boreal caribou in the NWT.

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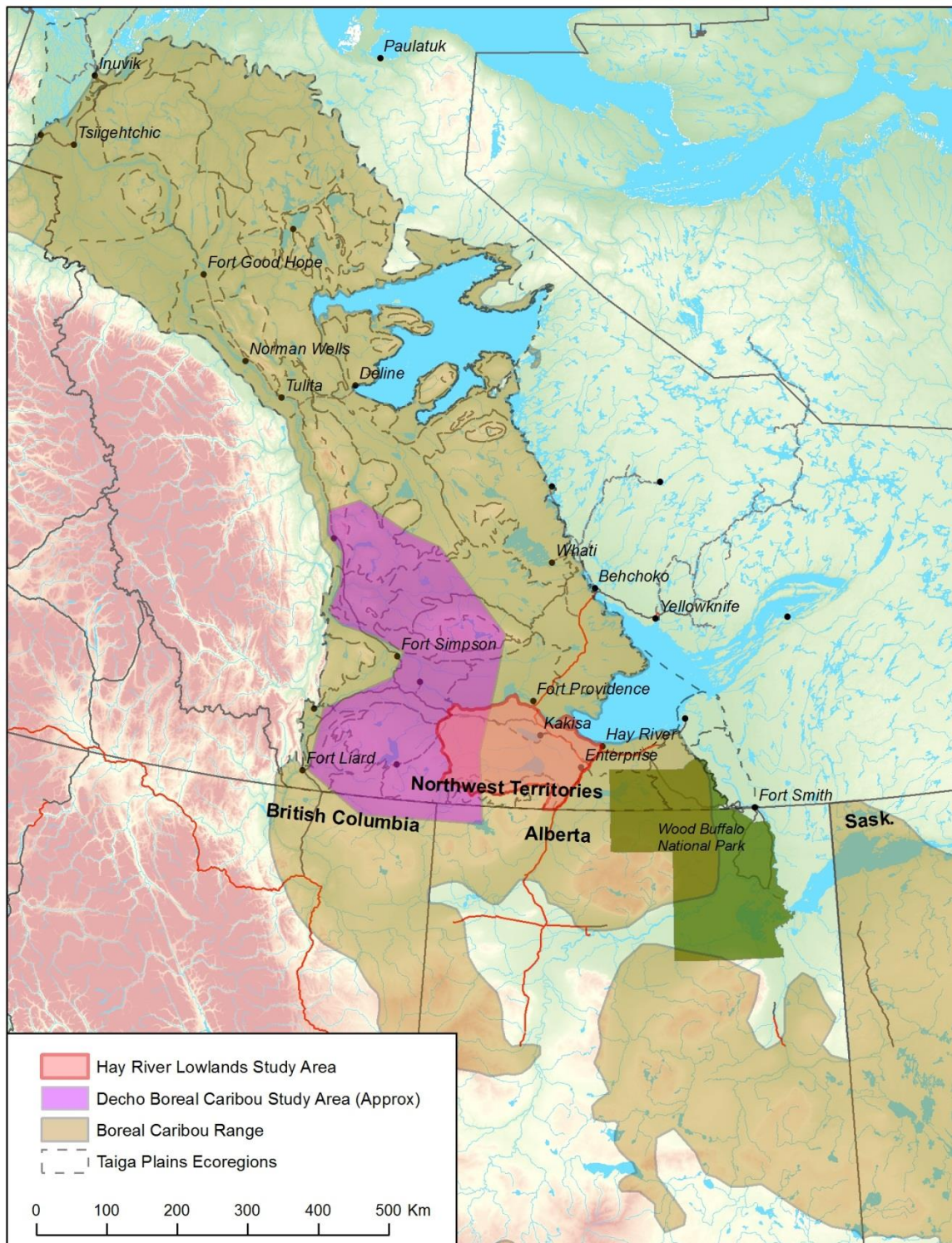
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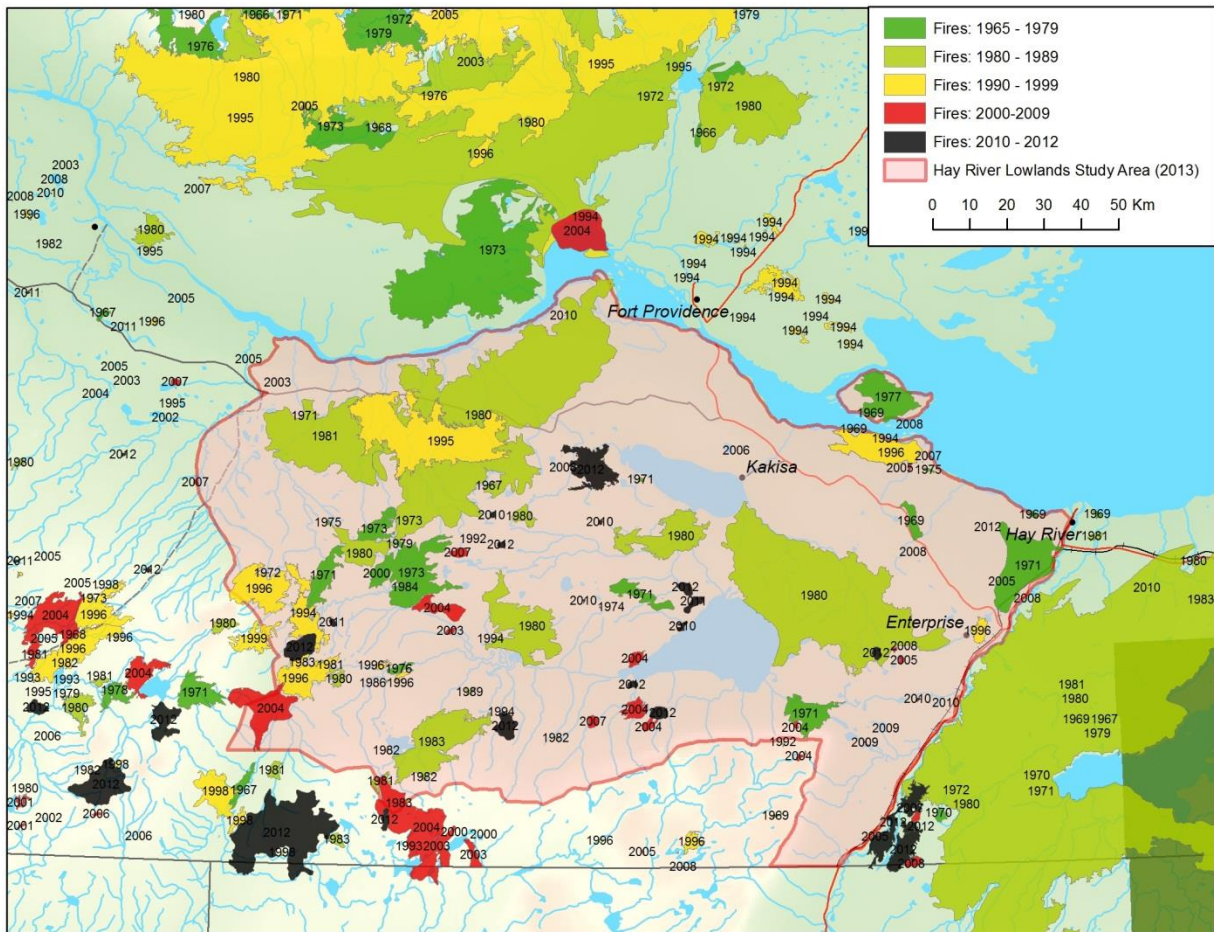
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Appendix 1: Additional maps of the study area.

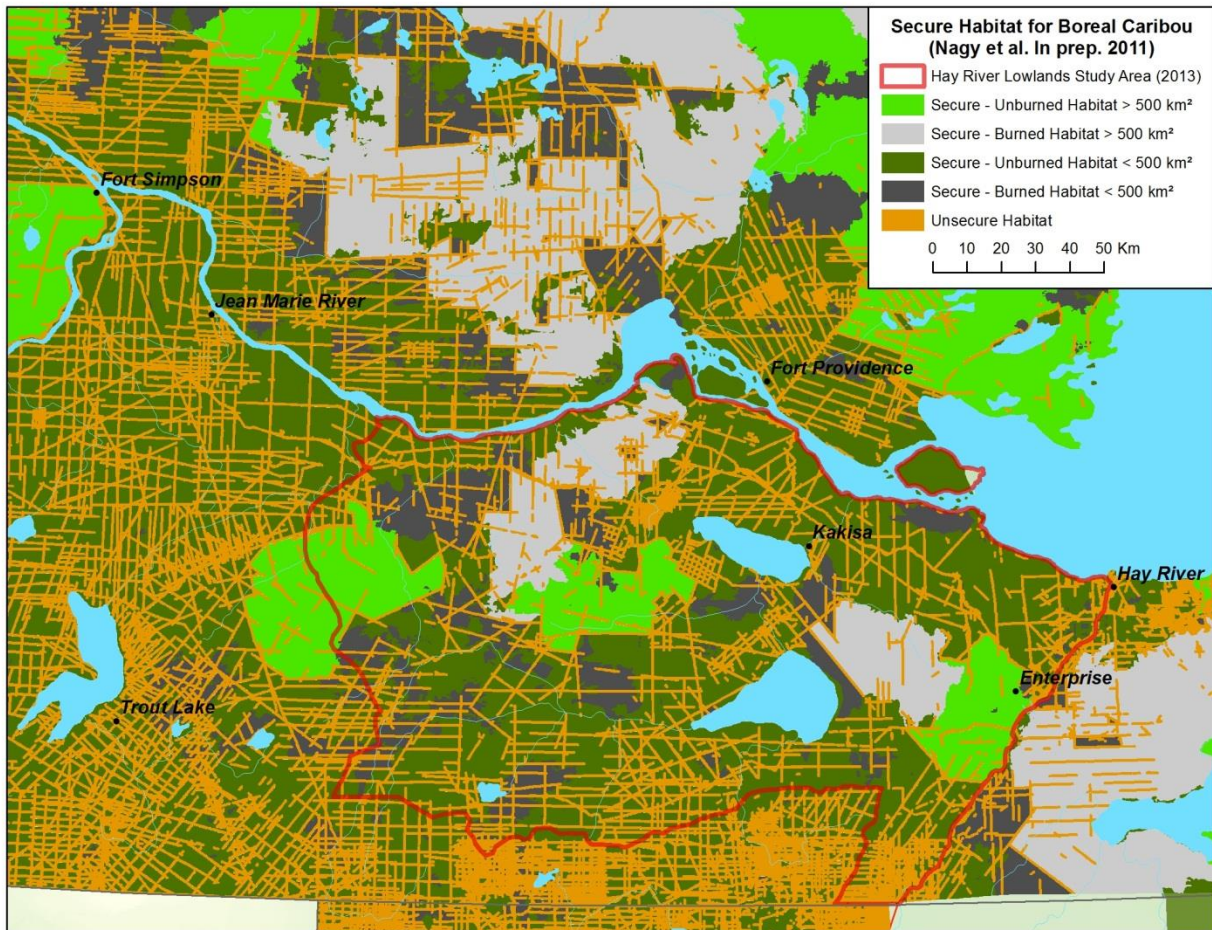


Appendix 1, Figure 1. The Hay River Lowlands (red) and Decho (purple) boreal caribou study areas within woodland boreal caribou range (brown) in the NWT. Dashed lines indicate Level IV ecoregions of the Taiga Plains (Ecosystem Classification Group 2009).





Appendix 1, Figure 2. Map of wildfire history by decade in and around the Hay River Lowlands study area.



Appendix 1, Figure 3. Map showing disturbed habitat (orange- linear feature disturbance; grey-wildfire disturbance), secure habitat (dark green) and patches of secure habitat  $\geq 500$  km<sup>2</sup> (light green) in and around the Hay River Lowlands study area.