2016

BC Ministry of Forests Lands and Natural Resource Operations: Boreal Moose Recruitment Survey, March 23-29, 2016

Brad A. Culling, R.P. Bio., and
Diane E. Culling, R.P. Bio.

Diversified Environmental Services
Fort St. John, British Columbia

April 2016

Boreal Moose Recruitment Survey: March 23-29, 2016

Prepared for

B.C. Ministry of Forests, Lands, and Natural Resource Operations

Fort St. John, B.C.

Prepared by

Brad A. Culling, R.P. Bio

and

Diane E. Culling, R.P. Bio

Diversified Environmental Services

Fort St. John, B.C.

April 2016

Acknowledgements

The moose recruitment survey presented in this document is a sub-component of a project initiated by the University of Northern British Columbia and the Research and Effectiveness Monitoring Board (REMB), with funding provided by the B.C. Oil and Gas Research and Innovation Society (OGRIS). Contract administration and direction was provided by Megan Watters of the B.C. Ministry of Forests, Lands, and Natural Resource Operations (FLNRO).

We, once again, benefitted from the keen wildlife spotting abilities of Eva Needlay of the Fort Nelson First Nation, who fulfilled the role of survey observer. Thanks also to Tom Henderson of Qwest Helicopters, Fort Nelson, for his expertise in aerial wildlife surveys.

Cover photo - B. Culling.

EXECUTIVE SUMMARY

The boreal ecotype of woodland caribou is listed as *Threatened* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and is on the provincial red list in British Columbia (B.C.). While boreal caribou are typically distributed at low densities in peatland habitats that allow spatial separation from other ungulate prey species, primarily moose (*Alces americanus*) and wolves (*Canis lupus*), anthropogenic changes to the landscape in recent decades have disrupted this anti-predator strategy. In 2015, the University of Northern British Columbia (UNBC) and the British Columbia Research and Effectiveness Monitoring Board (REMB) initiated a research project to assess boreal caribou survival in relation to the distribution and abundance of moose and wolves within B.C.'s boreal caribou ranges.

The project was divided into 3 study areas (*hereafter*, UNBC study areas), including 1 core habitat area (core) in each of 2 of the six major caribou ranges (the Fortune Core of the Maxhamish Range and the Clarke Core of the Snake-Sahtaneh Range), as well as the Chinchaga Resource Review Area (RRA-A) of the Chinchaga Range. The UNBC study areas represent a range of both anthropogenic disturbance and moose and wolf densities found within boreal caribou habitat in B.C. Within each study area, a sample of boreal caribou, moose, and wolves were fitted with GPS/satellite radio-collars. As a component of the project, Diversified Environmental Services (DES) conducted a late winter aerial survey of radio-collared female moose to estimate moose recruitment in the UNBC study areas.

The 2016 late winter boreal moose recruitment survey was completed by locating radio-collared female moose in each study area using a Bell 206B helicopter. Group composition, calf status, activity, habitat type, and UTM coordinates were recorded for each radio-collared moose as well as adult females associated with collared animals or incidentally observed.

All 37 radio-collared female moose active in the 3 UNBC study areas at the time of the survey were located by telemetry, including 13 collared females in the Fortune Core, 12 collared females in the Clarke Core, and 12 collared females in the Chinchaga RRA. A total of 59 moose were recorded, including moose associated with collared animals as well as 2 incidentally-observed cow/calf pairs. Of 45 adult females observed, 9 had single calves and 1 had twin calves for a total of 11 calves and an overall cow/calf ratio of 24 calves:100 cows. Although samples sizes were limited, there appeared to be

wide variation in calf survival between the 3 core habitat areas, ranging from 6.2 calves:100 cows in the Chinchaga RRA to 57.1 calves:100 cows in the Fortune Core.

Table of Contents

List of Figures

List of Appendices

1 INTRODUCTION

The boreal ecotype of woodland caribou (*hereafter*, boreal caribou) is listed as *Threatened* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2014) and is on the provincial red list in B.C. While boreal caribou are typically distributed at low densities in peatland complexes that allow spatial separation from other ungulate prey species (primarily moose) and wolves, anthropogenic changes to the landscape in recent decades have disrupted this anti-predator strategy.

In 2015, UNBC initiated a research project to assess boreal caribou survival in relation to the distribution and abundance of moose and wolves within portions of 3 of B.C.'s boreal caribou ranges (UNBC study areas), representing a range of anthropogenic disturbance and moose and wolf densities (Gillingham and Mumma 2015, Mumma and Gillingham 2016). Within each study area, a sample of boreal caribou, moose, and wolves were fitted with GPS/satellite radio-collars. As a component of the project, Diversified Environmental Services (DES) conducted a late winter aerial survey of radio-collared female moose to estimate moose recruitment in the UNBC study areas.

2 METHODS

2.1 Study Area

The 2016 moose recruitment survey was conducted within the 3 areas selected for study by the UNBC project assessing caribou survival in relation to distribution and abundance of moose and wolves, including the Fortune Core of the Maxhamish Range, the Clarke Core of the Snake-Sahtaneh Range, and the Chinchaga RRA (Fig 1). The Chinchaga Range lies within the Boreal Plains (BOP) ecoprovince, while the remaining B.C. boreal caribou ranges are within the Taiga Plains (TAP) ecoprovince. All ranges are encompassed by the Boreal White and Black Spruce (BWBS) biogeoclimatic zone and consist of a mosaic of sparsely treed peatlands, black spruce forests and deciduous and mixedwood uplands.

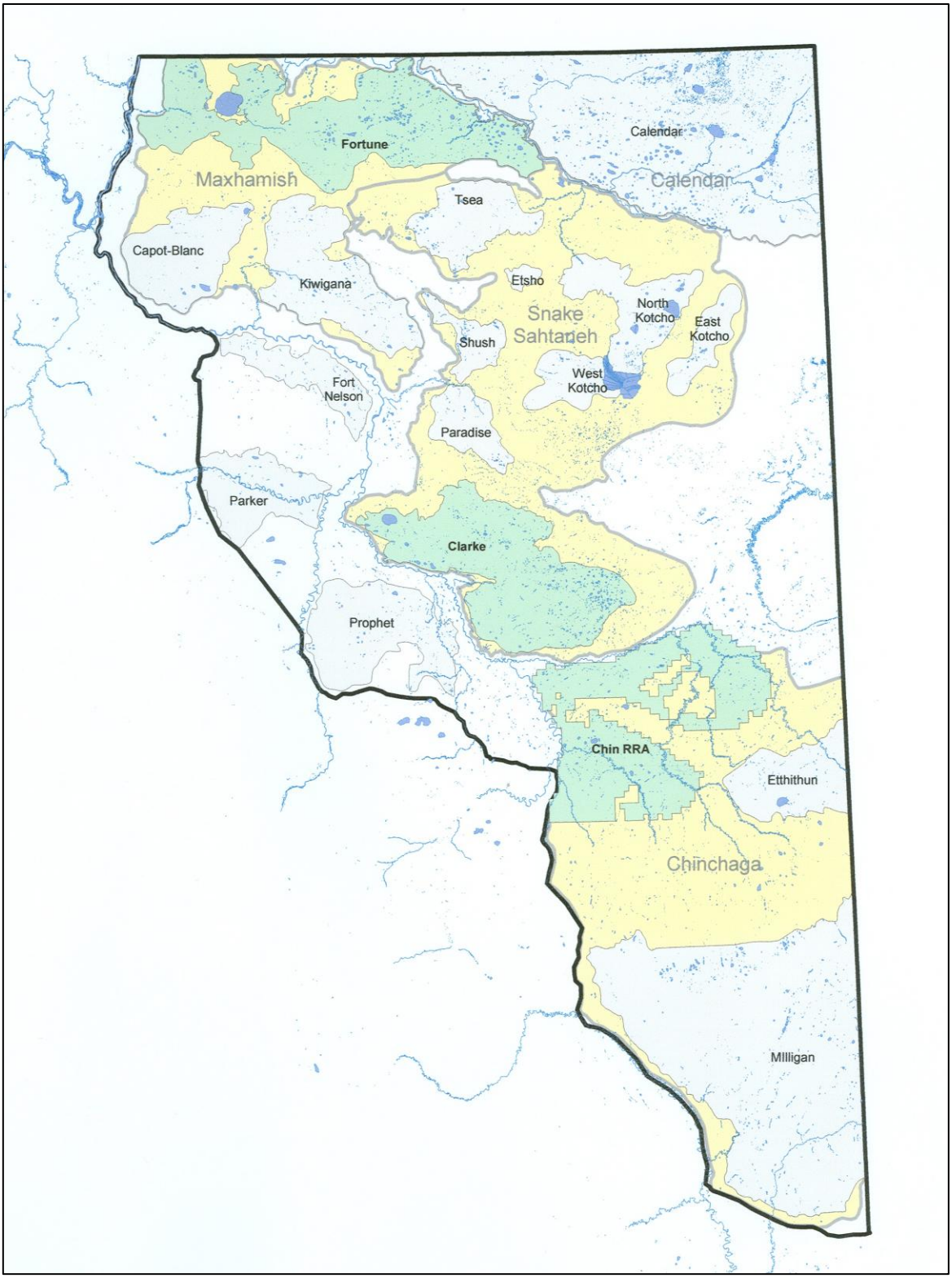

Figure 1. Location of Fortune, Clarke, and Chinchaga RRA UNBC moose study areas within British Columbia's boreal caribou ranges.

2.2 Late Winter Recruitment Survey

In late winter 2015 and mid winter 2016, approximately 20 GPS collars were deployed on adult female and male moose in each of the 3 UNBC study areas.

Recruitment surveys were conducted in late March to estimate calf recruitment to 10 months of age. The 2016 late winter boreal moose recruitment survey was completed by locating each radio-collared female moose in each study area using a Bell 206B helicopter equipped with one outward–facing telemetry antennae on each side. The survey crew consisted of a pilot and 3 observers, with the front-seat observer acting as navigator and one rear-seat observer acting as recorder. To maximize telemetry search efficiency, the most recent satellite data location for each moose was entered as a GPS waypoint and search start point. The moose recruitment survey was conducted concurrently with the 2016 late winter boreal caribou recruitment survey which involved locating female collared caribou in the same core habitats using the same methodology. All uncollared moose incidentally observed while locating collared moose and caribou were classified by age and sex and recorded. For each female moose located, either by telemetry or observed incidentally, group composition, calf status, activity, habitat type, and UTM coordinates were recorded. All observations of caribou recorded during the concurrent survey are reported under separate cover.

3 RESULTS AND DISCUSSION

The 2016 late winter boreal moose recruitment survey was conducted concurrently with the 2016 late winter boreal caribou recruitment survey. At the time of the March 2016 survey, the active collar sample for the UNBC study areas consisted of 18 moose in the Fortune Core (13F, 5M), 19 moose in the Clarke Core (12F, 7M), and 18 moose in the Chinchaga RRA (12F, 6 M). In contrast to early and mid-winter, when moose are typically found in more open habitats, sightability was reduced during the March survey as moose were using habitats with heavier canopy cover as a result of late winter snow conditions and daytime warming; incidental observations of uncollared animals was low.

The survey was completed on March 23, March 28, and March 29 for the Clarke Core, Chinchaga RRA, and the Fortune Core, respectively. Helicopter search effort expended to locate female moose was

incremental to that expended to concurrently locate radio-collared boreal caribou and estimated to total 7.7 hrs.

Daily weather conditions were fair throughout the survey. Daytime temperatures varied considerably both between and within individual survey days, from a low of -13°C on the morning of March 23 to +12°C on the afternoon of March 29. There was 100% snow cover throughout the survey, with snow depths ranging from 26-50 cm. Unseasonably warm temperatures occurred toward the end of March, which resulted in rapidly diminishing snow depths. Consolidated snow conditions resulting from frequent freeze-thaw cycles, coupled with the high daytime temperatures during the survey, resulted in the observation of relatively few unmarked moose.

We located all 37 radio-collared female moose active at the time of the survey, including 13 collared females in Fortune, 12 collared females in Clarke, and 12 collared females in the Chinchaga RRA (Fig 2). We recorded a total of 59 moose (45 adult females, 3 adult males, 11 calves), including moose associated with collared animals as well as one incidentally observed cow/calf pair in Fortune and one incidentally-observed cow/calf pair in Clarke. Mean group size was 1.5 ± 0.8 SD (range 1-5). Of 45 adult females observed, 9 had single calves and 1 had twin calves. Overall recruitment to 10 months was 24 calves:100 cows. Although samples sizes for the individual study areas were limited, there appeared to be wide variation in calf survival on a north-south gradient, ranging from 6 calves:100 cows in the Chinchaga RRA to 13 calves:100 cows in Clarke, to 57 calves:100 cows in Fortune. Results of the survey are presented in Appendix I.

Of the 12 collared female moose active in the Chinchaga RRA at the time of the March recruitment survey, 11 had been collared 2.5 months earlier, in January 2016. At the time of capture in January, 4 of the 12 females had calves at heel; only one of these 4 was accompanied by a calf at the time of the March survey. Of the 13 collared female moose active in the Fortune core at the time of the March recruitment survey, 5 had been collared 2.5 months earlier in January 2016. At the time of capture in January, 4 of the 5 females had calves at heel. At the time of the March survey, one of the 5 females appeared to have lost her calf with the remaining 4 still accompanied by calves. Neither of the 2 females captured and collared in the Clarke core in January 2016 had calves at heel in January or March.

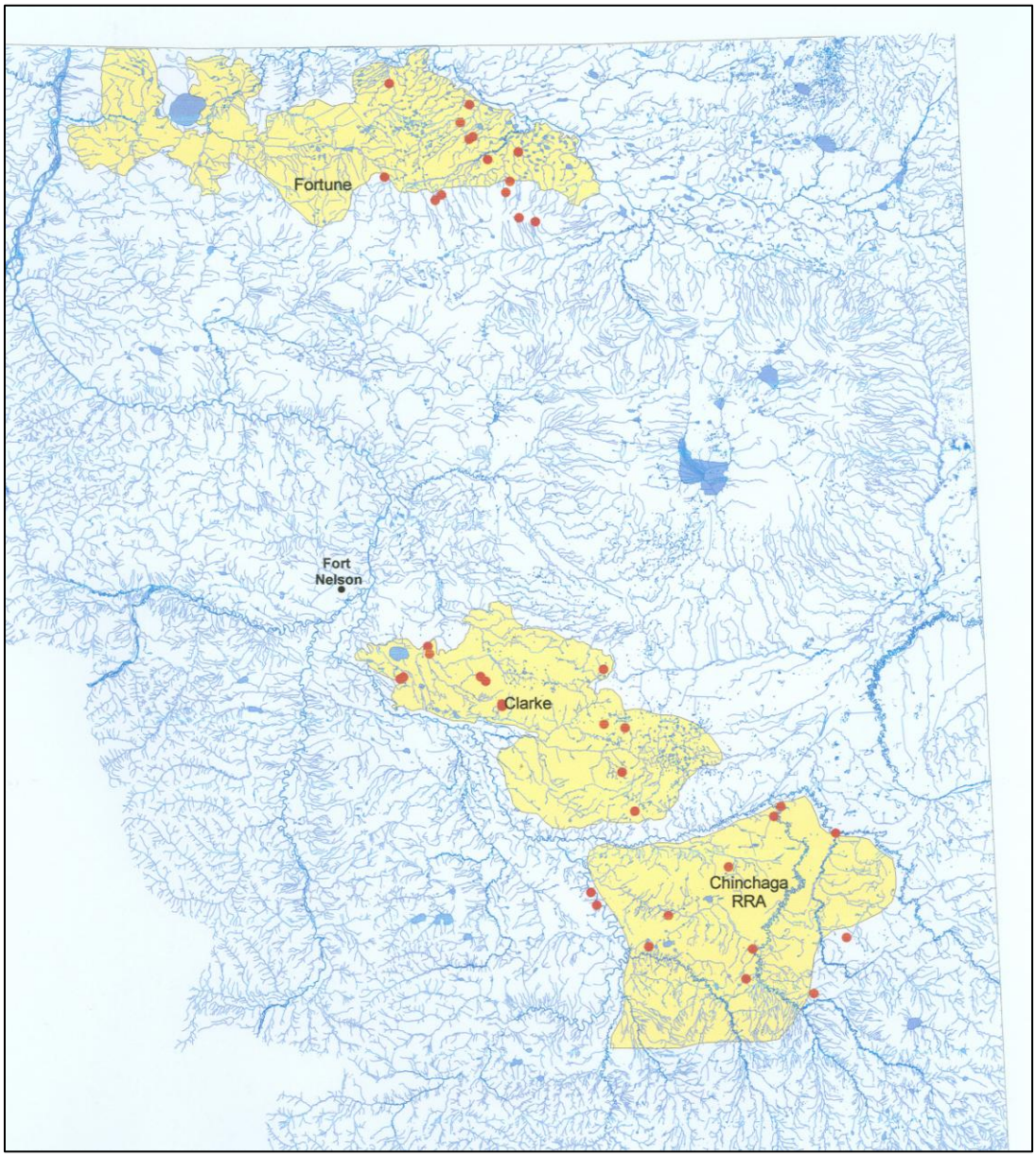

Figure 2. Location of collared female moose observations within the UNBC Fortune, Clarke, and Chinchaga RRA moose study areas; March 23-29, 2016.

3.1 Incidental Observations

Incidental wildlife observations made during the March 2016 moose recruitment survey included one lynx scavenging the remains of a dead collared moose (ID 15-5641) in the Chinchaga RRA (UTM 10.621145.6433084) and 3 members the collared Elleh wolf pack in the Clarke core. All caribou observations recorded concurrently with the boreal moose survey are reported in Culling and Culling 2016.

REFERENCES

COSEWIC. 2014. COSEWIC assessment and status report on the Caribou Rangifer tarandus, Newfoundland population, Atlantic-Gaspésie population and Boreal population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxiii+128 pp.

Culling, D.E., and B.A. Culling. 2016. B.C. Boreal Caribou Implementation Plan: Year IV (2015-2016) Field Activities Progress Report. Prep. for BC Oil and Gas Research and Innovation Society, Victoria, B.C.

Gillingham, M., and M. Mumma. 2015. Assessing caribou survival in relation to the distribution and abundance of moose and wolves: progress report, September 2015. Prepared for the BC Oil and Gas Research and Innovation Society (BC OGRIS). Univ. of Northern British Columbia, Prince George, B.C.. 15 pp.

Mumma, M., and M. Gillingham. 2016. Assessing caribou survival in relation to the distribution and abundance of moose and wolves: annual report, March 2016. Prepared for the BC Oil and Gas Research and Innovation Society (BC OGRIS). Univ. of Northern British Columbia, Prince George, B.C..

RIC (Resources Inventory Committee). 2002.Aerial-based inventory methods for selected ungulates: bison, mountain goat, mountain sheep, moose, elk, deer and caribou. Standards for Components of British Columbia's Biodiversity No. 32, Vers. 2. Resources Inventory Branch, Ministry of Environment, Lands and Parks, Victoria, B.C..

Appendix I. Late winter boreal moose recruitment survey results, March 23-29, 2016, northeastern British Columbia.

WLH ID	Sex	Survey Date	Study Area	Easting	Northing	Calf at Heel Jan 2016 Capture	Calf at Heel March 2016	Activity	Habitat	Group Size	Adult Females	Adult Males	Calves	Photos	Comments
15-5593	F	23-Mar-16	Clarke	540501	6507375	n/a	Y	ST	Spruce-birch forest	2	1	0	1	Y	forest adjacent to open riparian willow
15-5591	F	23-Mar-16	Clarke	540929	6505570	n/a	N	ST	Spruce-alder scrub	1	1	0	0	Y	adjacent to open shrub/willow
15-5594	F	23-Mar-16	Clarke	534690	6500025	n/a	N	ST	Mixedwood scrub	1	1	0	0	N	
15-5592	F	23-Mar-16	Clarke	533878	6499561	n/a	N	ST	Black spruce forest	1	1	0	0	N	
15-5642	F	23-Mar-16	Clarke	587822	6487794	0	N	RN	Black spruce bog	1	1	0	0	N	
15-5601	F	23-Mar-16	Clarke	582823	6488720	n/a	N	RU	Black spruce bog	2	2	0	0	N	
15-5604	F	23-Mar-16	Clarke	587100	6477115	n/a	N	ST	Black spruce-tamarack forest	1	1	0	0	Y	adjacent to open shrub/willow
15-5603	F	23-Mar-16	Clarke	590152	6467774	n/a	N	ST	Black spruce bog	2	2	0	0	N	
15-5602	F	23-Mar-16	Clarke	582708	6501917	n/a	N	BD	Black spruce bog	1	1	0	0	N	
IO-1	F	24-Mar-16	Clarke	558288	6493009	n/a	Y	ST	Open shrub/willow	2	1	0	1	N	Incidental observation of uncollared moose
15-5597	F	24-Mar-16	Clarke	558272	6493589	0	N	BD	Tamarack-black spruce forest	1	1	0	0	Y	recaptured January 2016 to replace collar
15-5608	F	24-Mar-16	Clarke	554412	6499085	n/a	N	ST	Black spruce-birch scrub	1	1	0	0	N	
15-5596	F	24-Mar-16	Clarke	553166	6500192	n/a	N	ST	Birch/alder scrub	1	1	0	0	Y	
15-5645	F	28-Mar-16	Chin RRA	623557	6466517	0	N	WK	Mature white spruce	1	1	0	0	N	Kahntah River riparian
15-5646	F	28-Mar-16	Chin RRA	625211	6468870	0	N	WK	Mature aspen-white spruce	1	1	0	0	Y	
15-5647	F	28-Mar-16	Chin RRA	638444	6462456	0	N	WK	Mature aspen-balsam poplar	1	1	0	0	N	
15-5648	F	28-Mar-16	Chin RRA	640945	6437305	1	N	BD/ST	Mature white spruce	2	1	1	0	N	Cow standing, bull bedded
15-5640	F	28-Mar-16	Chin RRA	618428	6434598	0	N	BD	Mature aspen-balsam poplar	2	1	1	0	N	
15-7224	F	28-Mar-16	Chin RRA	616829	6427393	1	N	BD	Mature birch	2	2	0	0	N	
15-5649	F	28-Mar-16	Chin RRA	579587	6448262	0	N	ST	Mature white spruce	1	1	0	0	N	Sikanni River riparian
15-5635	F	28-Mar-16	Chin RRA	580964	6445178	0	N	ST	Open willow/balsam poplar	1	1	0	0	Y	Sikanni River riparian
15-5625	F	28-Mar-16	Chin RRA	593485	6435217	n/a	N	ST	Aspen-white spruce	5	4	1	0	N	Collared bull in group
15-5636	F	28-Mar-16	Chin RRA	598144	6442631	0	N	ST	Aspen-white spruce	1	1	0	0	N	
15-5643	F	28-Mar-16	Chin RRA	612658	6454259	1	N	ST	Tamarack-black spruce	1	1	0	0	N	
15-7225	F	28-Mar-16	Chin RRA	633087	6423899	1	Y	ST	Spruce/Birch/tam scrub	2	1	0	1	N	
15-5612	F	29-Mar-16	Fortune	531649	6642964	n/a	N	WA	Aspen-white spruce	1	1	0	0	N	
15-5623	F	29-Mar-16	Fortune	550826	6637882	n/a	Y	RU	White spruce-aspen	2	1	0	1	N	
15-5611	F	29-Mar-16	Fortune	548639	6633630	n/a	Y	RU	Black spruce bog	2	1	0	1	Y	
15-5615	F	29-Mar-16	Fortune	551652	6630186	1	Y	RU	Black spruce forest	2	1	0	1	N	recaptured January 2016 to replace collar
15-5617	F	29-Mar-16	Fortune	550775	6629578	n/a	Y	RU	White spruce forest	2	1	0	1	N	
IO-2	F	29-Mar-16	Fortune	562711	6610662	n/a	Y	ST	Open shrub-willow	2	1	0	1	N	Incidental observation of uncollared moose
15-5621	F	29-Mar-16	Fortune	566642	6609713	n/a	N	RU	Sparse black spruce forest	1	1	0	0	N	
15-5632	F	29-Mar-16	Fortune	559539	6616760	0	N	RU	Black spruce bog	1	1	0	0	N	
15-5620	F	29-Mar-16	Fortune	560565	6619377	2	Y (2)	WK	Black spruce forest	3	1	0	2	Y	recaptured January 2016 to replace collar
15-5618	F	29-Mar-16	Fortune	562561	6626532	n/a	N	RU	Black spruce bog	1	1	0	0	N	Moderate tick-related hair loss
15-7226	F	29-Mar-16	Fortune	555229	6624729	1	N	ST	Mature white spruce forest	1	1	0	0	N	
15-5613	F	29-Mar-16	Fortune	530433	6620418	n/a	N	ST	White spruce-aspen	1	1	0	0	N	Mature aspen immediately adjacent to mature
15-5634	F	29-Mar-16	Fortune	544093	6616161	1	N	RU	Mature birch/spruce forest	1	1	0	0	N	
15-5624	F	29-Mar-16	Fortune	542604	6614869	n/a	Y	ST	Black spruce forest	2	1	0	1	N	