Spring Composition of the Ahiak and Beverly Herds, March 2008

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ABSTRACT

From 17-20 March 2008, we conducted a fixed wing transect survey to map the late winter distribution and relative densities of caribou from the Ahiak and Beverly herds. Most of the caribou were observed above treeline north and northeast of Whitefish Lake, NWT. Below treeline, caribou were dispersed at low to medium densities from the NWT-SK border west and east to Thekulthili and Scott Lakes. Two isolated, high density pockets of caribou were observed southeast of Lutselk'e in the Gagnon Lake area and in the Eileen Lake area at the edge of treeline. From 24-27 March 2008, we classified 11,163 caribou from 296 groups. We observed 0.47 wolves per hour flown during the composition survey. The sex ratio of caribou was 36.7 bulls:100 cows, while the calf-cow ratio was 48.2 calves:100 cows (SE=1.7) and was higher than the mean for Beverly spring composition counts conducted in 1978-1995 (mean=39 calves:100 cows) (Williams 1995). The calf:cow ratio increased as we moved south and was 35.1 and 69.9 calves:100 cows above and below treeline, respectively. The March 2008 composition survey results indicated that over-winter calf survival for the Ahiak and Beverly herds was high; however, there is evidence to suggest that pregnancy rates and subsequent calf production were low, and that calf recruitment in March 2009 will be greatly reduced.

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INTRODUCTION

Over-winter calf survival is a secondary measure used by wildlife managers to monitor the health and abundance of barren-ground caribou herds in the NWT. The proportion of young provides a useful measure of the percent of young animals that survive to reach breeding age (annual recruitment) assuming that female mortality is small relative to calf mortality (McCullough 1994). In these situations, calf survival rates can be used as an index of recruitment and can be highly correlated with changes in population trend (Krebs et al. 1986). However, calf survival rates alone do not provide enough information upon which to predict changes in population trend. Independent assessments of population size are still required to validate demographic changes inferred by changes in calf survival rates (Caughley 1974). In late winter, prime and older bulls are often distributed and segregated from cows and younger caribou. We therefore calculate the percentage of calves and annual recruitment by measuring the ratio of calves to cows and adjusting the ratio by an assumed average sex ratio.

Calf composition counts were last conducted on the Beverly herd of barren-ground caribou in 1995, but were conducted annually from 1978-1985 (Williams 1995). As a result, we initiated a late winter composition of the Beverly and Ahiak herds in March 2008, with the objective to determine over-winter calf survival.

Recent collaring programs that were implemented to target the Beverly herd in March 2006 and July 2007 indicate that there has been considerable overlap between the Ahiak and Beverly herds during most times of the year except the calving and early post-calving periods (GNWT unpublished data). Calving ground distribution surveys on the Beverly calving grounds in 2002 and 2007 suggest a significant and rapid decline from 1994 (Johnson et al. *In prep. a*). Distribution surveys of the Ahiak calving ground in 2006, 2007, and 2008 indicate that the Ahiak herd is much larger in size than the Beverly herd (Johnson et al. *In prep. b*). It was our

assumption that the results of this composition survey would be applicable to both the Ahiak and Beverly herds.

METHODS

Systematic Transect Survey

We used an aerial systematic transect survey to delineate the distribution and relative density of caribou on late winter range at 20 km spacing. The location of collared cows in late winter was used to define the survey area (GNWT unpublished data). A Cessna 185 aircraft on skis was used to conduct the systematic transect survey in March 2008. Survey altitude was 120 m above ground level (agl), survey speed was approximately 160 km/hr, and the total strip transect width was 0.8 km (0.4 km strip width for each observer). The survey was based out of Fort Smith and a camp at the Hoarfrost River, NWT (62^{o} 51.73' N, 109^{o} 15.27' W).

Electrical tape was placed on the window to mark the outer boundary of the transect strip width on each side of the aircraft. The methodology outlined by Norton-Griffins (1978) was used to define a 0.4 km strip width on each side of the plane at an altitude of 120 m agl. Observers calibrated the outer boundary of their strip markers, while the plane flew at survey altitude on an axis perpendicular to markers that defined the distance of the strip width (0.4 km) on the ground.

The survey crew[1] consisted of the pilot, an observer seated in the back left seat, and an observer/recorder seated in the right front seat of the aircraft. Observers estimated the numbers of caribou seen both on and off transect and wherever possible also classified caribou observed. We estimated the size of larger groups by estimating blocks of caribou by the tens, 50s and 100s. Caribou were classified as cows, yearling calves, and bulls, based on body size and presence of antlers. Observers called their observations to the navigator who recorded them as

[1] Pilot: Brent Macdonald (Northwestern Air Lease); Left observer: Judy Williams; and Right observer/recorder: Deb Johnson.

well as a waypoint number along with the transect segment label. At the end of each day the waypoint files were downloaded to the laptop computer. The files were then imported into a Microsoft Excel spreadsheet and the waypoint coordinate data (number, latitude and longitude coordinates, date and time) were appended to the observation data. We used the GPS to create a track file so that transects flown could be accurately recorded (location recorded every ten seconds). The track files were downloaded to the laptop computer at the end of each flight.

A landscape-level 20 km survey grid was applied to the survey area where transects corresponded to the east-west grid lines. Observations were compiled for each 20 km transect segment to map the distribution of relative caribou densities seen during the systematic transect survey. We used the following classes to map the relative density of caribou observed on transect: low density (<1.0 caribou/km^2); medium density (1.0-9.9 caribou/km^2); and high density (≥10.0 caribou/km^2). We also summarized the number of caribou observed off transect by each 20 km transect segment using the following classes: none (no caribou observed); low (<16 caribou); medium (16-160 caribou); and high (>160 caribou). Finally, we mapped the distribution of caribou observed both on and off transect by combining the relative density of caribou on transect and the number of caribou seen off transect. We also noted wolf sightings and expressed them as a sighting rate of wolves/1,000 hours flown.

Composition Survey

We used the results of the fixed wing systematic transect survey as well as the location of collared caribou to locate and classify caribou. More effort was allocated to where the highest densities of animals were observed, however, effort was also allocated to sample across the entire distribution of caribou observed on the fixed wing transect survey. We also sampled in the vicinity of all the collared cows even if we did not see any caribou in that transect segment

during the fixed wing transect survey. A Bell 206B helicopter was used to conduct the composition survey. The survey was based out of a camp at the Hoarfrost River, NWT and an established camp at Alcantara Lake, NWT (60°58.07' N, 108° 06.97' W). The survey crew[2] consisted of the pilot, a navigator and a data recorder.

We classified small groups (<40 caribou) and/or widely dispersed groups from the air and for larger and/or aggregated groups we landed and walked to within 100-200 m of caribou and viewed them through a 45X power spotting scope. We classified caribou as we encountered them and assigned a GPS waypoint to each discrete caribou group. Cows were classified based on the presence of a darkened vulval patch. Absence of a vulval patch and presence of a penis were distinguishing characteristics for bulls. We classified prime bulls as being large-bodied with no antlers. Young bulls had smaller bodies and still had antlers. Calves were small-bodied with relatively short faces. We did not consistently classify yearlings as we suspect that classification errors between 22 and 34 months are likely. Wherever possible, we recorded cows with no antlers (probably genetically bald). We also noted wolf sightings and expressed them as a sighting rate of wolves/1,000 hours flown.

The calf:cow ratio was estimated as the total number of calves divided by the total number of adult cow and yearling females for each group classified. We calculated the mean calf:cow ratio (and variance) using Cochran's (1977) jackknife method in an Excel spreadsheet. The calculation of percent calves in the population was based on three different adult sex ratios of 60 males:100 cows, 50 bulls:100 cows, and 43 bulls:100 cows, as there was no current information on sex ratios for either the Beverly or Ahiak herds, and sex ratios observed from

[2] Pilot: Paul Rosset (Great Slave Helicopters Ltd.); Recorder: Judy Williams; Navigator: Deb Johnson.

spring composition surveys tend to under-represent the bull:cow ratio as male groups are usually segregated from cows during this time of the year. Recruitment was considered to be the percent increase in herd size from reproduction (% of calves/% of 1+ year old caribou).

RESULTS

Systematic Transect Survey

From 17-20 March 2008, we flew 20 hours on survey and eight hours off survey (Figure 1). Weather conditions were ideal with clear skies and calm winds, but cold temperatures. We encountered the odd period of light snow along the southern transects, but we were still able to see shadows and therefore, these areas were not re-flown.

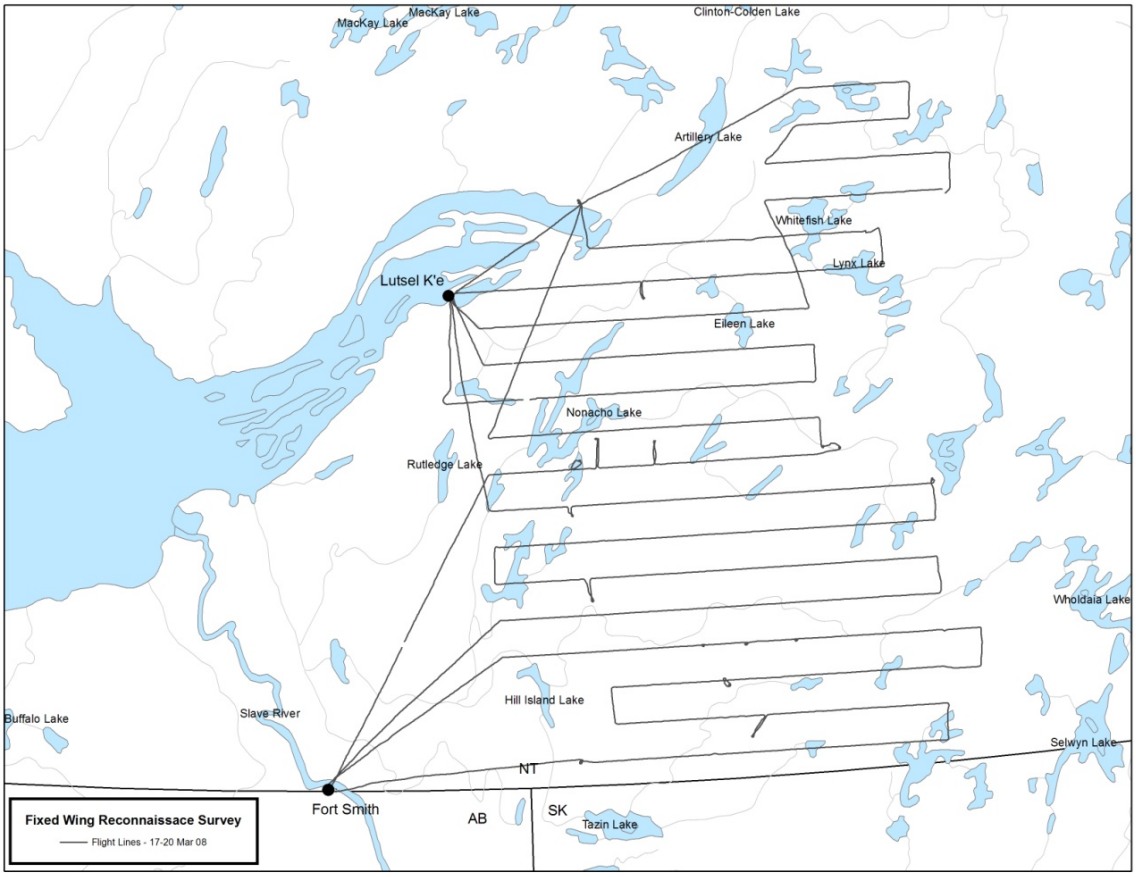

Figure 1: Flight lines flown during the fixed wing transect survey, 17-20 March 2008.

We counted a total of 351 adult caribou on transect and 739 adult caribou off transect during the fixed wing survey. During the ferry flights to and from the survey area we observed an additional 1,697 adult caribou. Most caribou were observed above treeline north and northeast of Whitefish Lake (Figure 2 to Figure 4). Another two high density pockets of caribou

were observed near Eileen Lake on the edge of treeline and southeast of Lutselk'e in the Gagnon Lake area. Below treeline, caribou were observed at low to medium density and were located just north of the NWT-SK border, roughly bounded to the west and east by Thekulthili Lake and Scott Lakes.

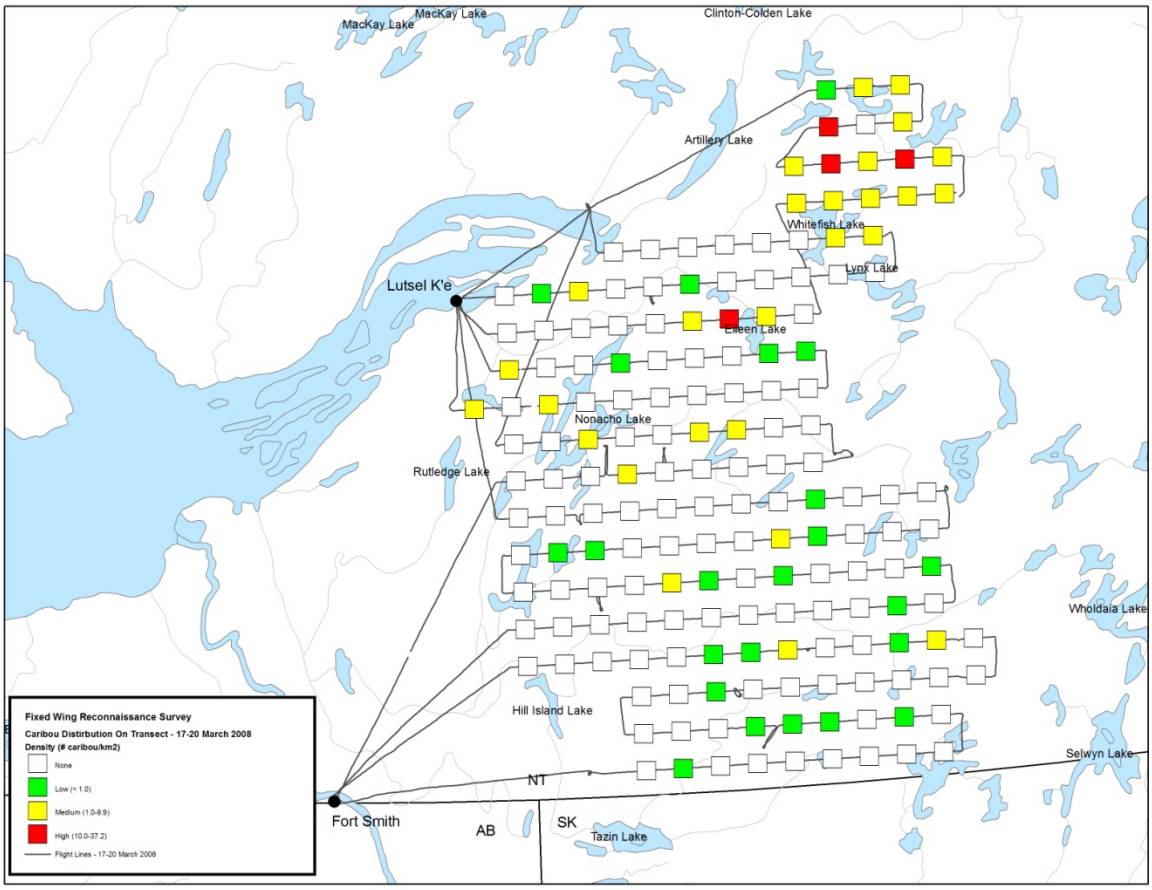

Figure 2: Distribution of adult caribou observed on transect, 17-20 March 2008. Clear boxes indicate no caribou; green are low densities (<1.0 caribou/km^2); yellow are medium densities (1.0-9.9 caribou/km^2); and red are high (10.0-37.2 caribou/km^2).

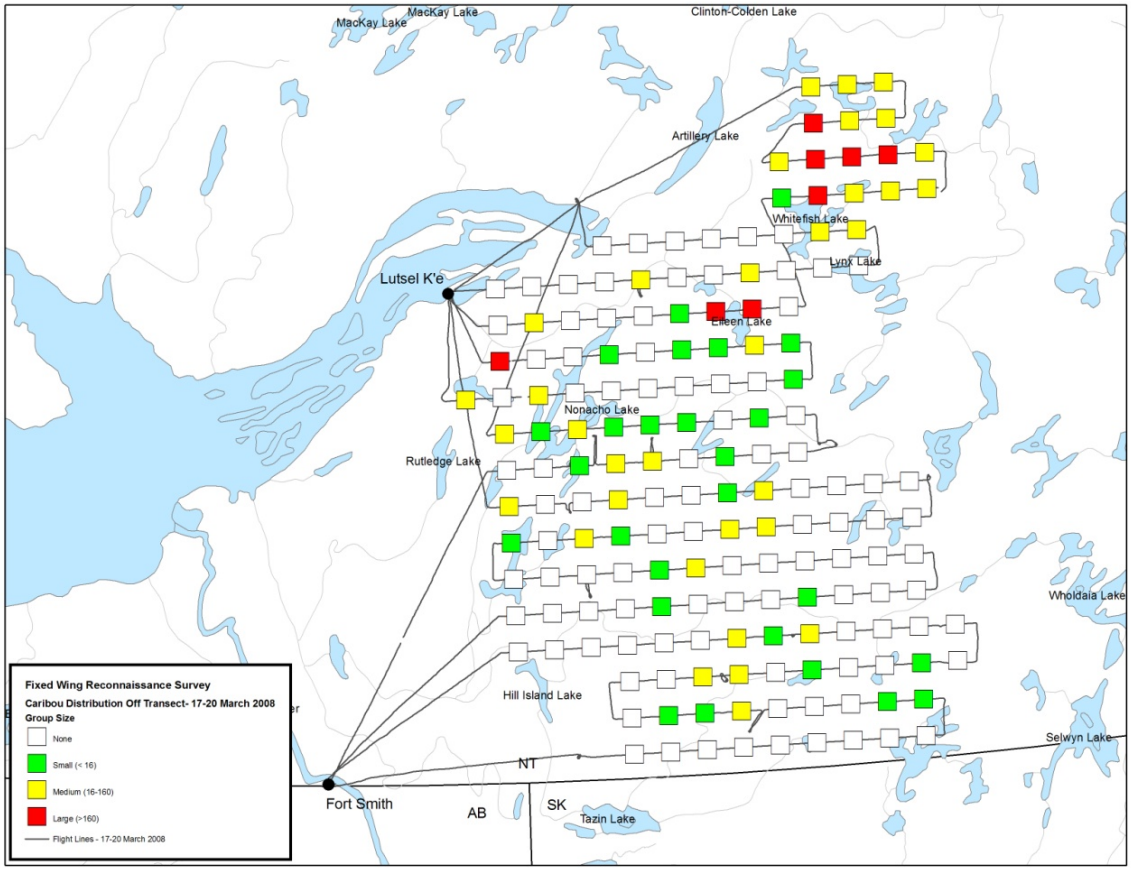

Figure 3: Distribution of adult caribou observed off transect, 17-20 March 2008. Group sizes indicated in this figure are as follows: clear (none); green are small groups (<16 caribou); yellow are medium (16-160 caribou); and red are large groups (>160 caribou).

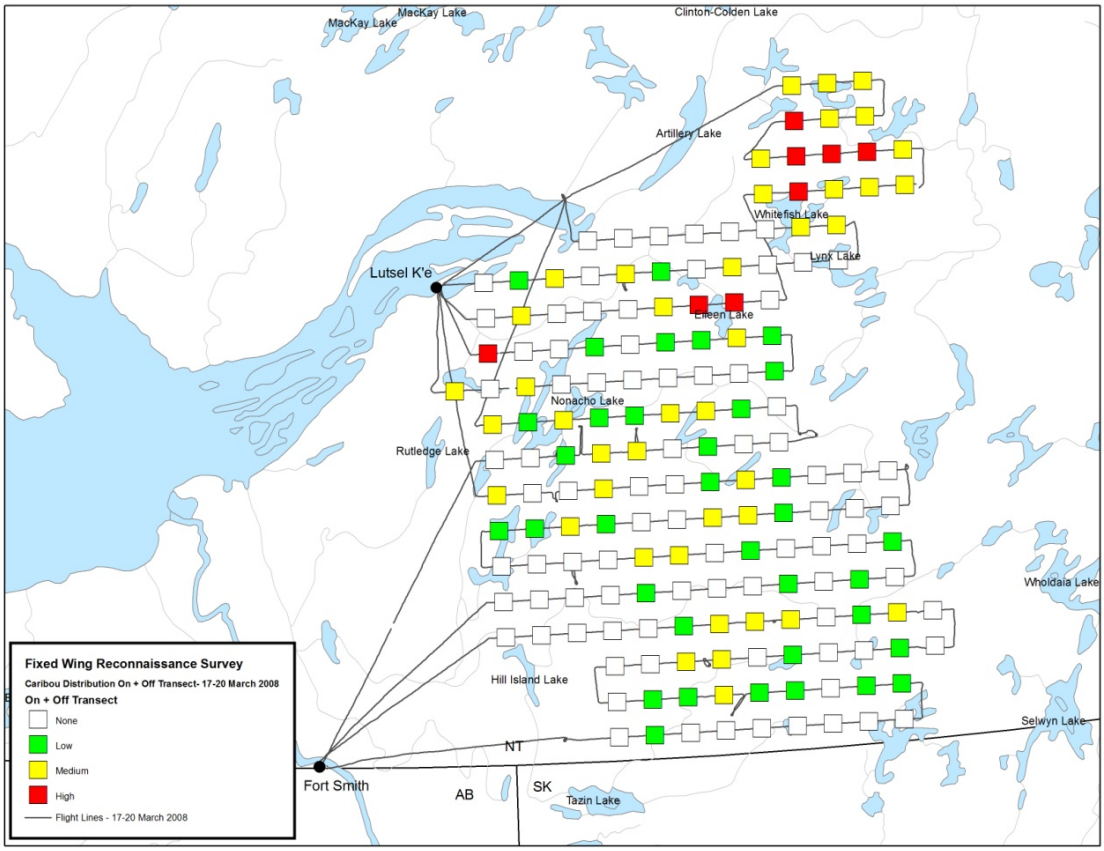

Figure 4: Distribution of adult caribou observed on/off transect, 17-20 March 2008. Distribution is categorized as none, low, medium or high.

The distribution of caribou observed during the fixed wing transect survey was similar to the distribution of GPS and satellite-collared cows during this same period (Figure 5). However, the entire distribution of caribou observed below treeline at low to medium densities was not fully represented by the collared cows. Additionally, there were no collared cows in the Eileen Lake area where caribou were observed on transect at high densities.

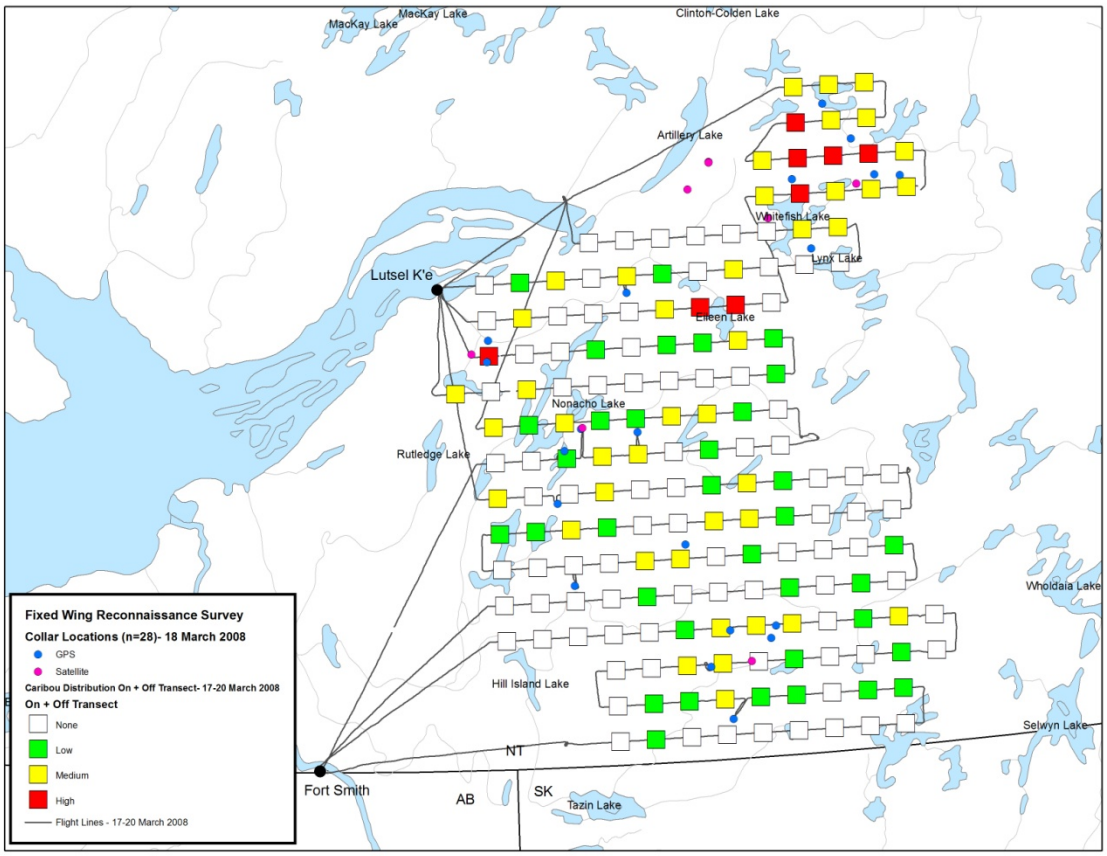

Figure 5: Distribution of adult caribou observed on/off transect during the systematic transect survey (17-20 March 2008) and the location of collared cows on 18 March 2008. GPS locations are represented by blue circles; satellite collars by pink circles.

During the fixed wing transect survey, we counted a total of 18 wolves and 4 wolverine during 20 hours of survey flying, giving a sighting index of 900 wolves/1,000 hours flown. All wolves and wolverine were seen above treeline (Figure 6).

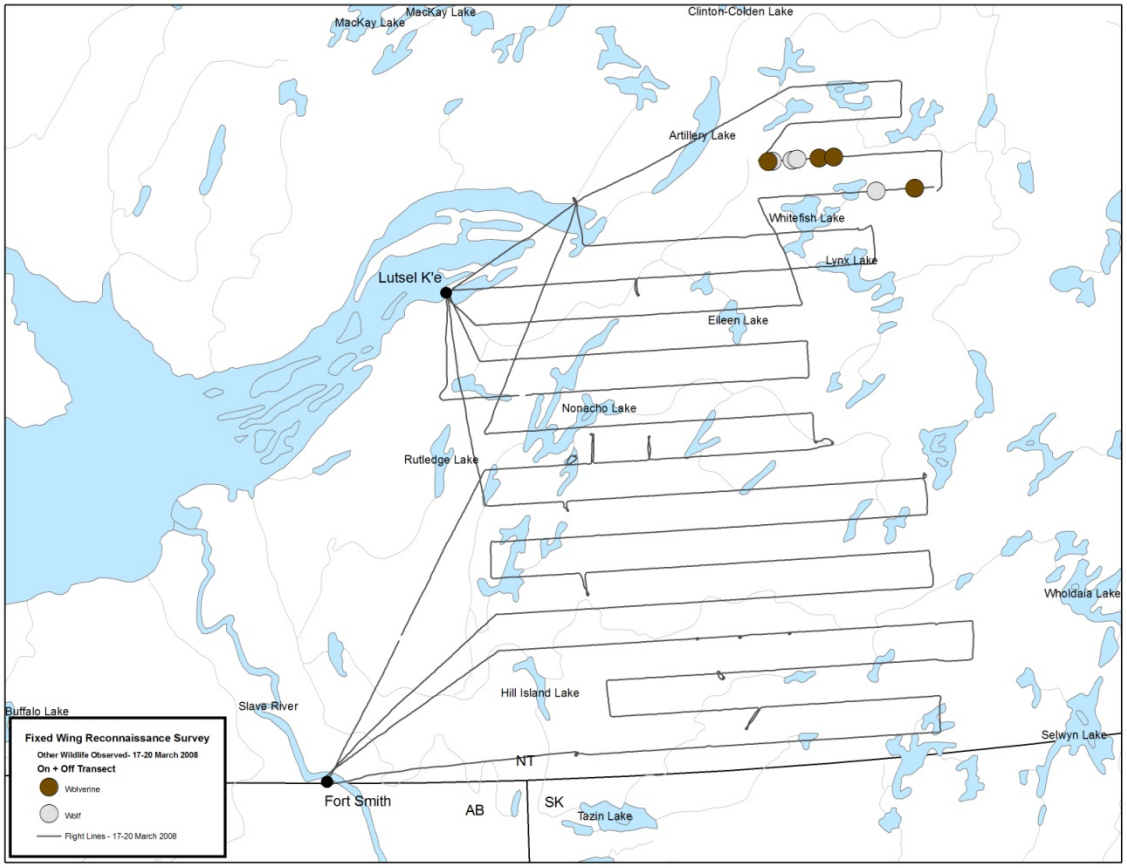

Figure 6: Wolves (brown) and wolverine (grey) observed during the fixed wing transect survey, 17-20 March 2008.

Composition Survey

We flew a total of 33.9 hours during the composition survey from 24-28 March 2008 (Figure 7 and Figure 8). Two days of the composition survey were conducted above treeline, while two days were spent classifying caribou below treeline based on the results of the fixed wing transect survey (Figure 9). We also classified caribou around the location of each GPS and satellite collared caribou (Figure 10).

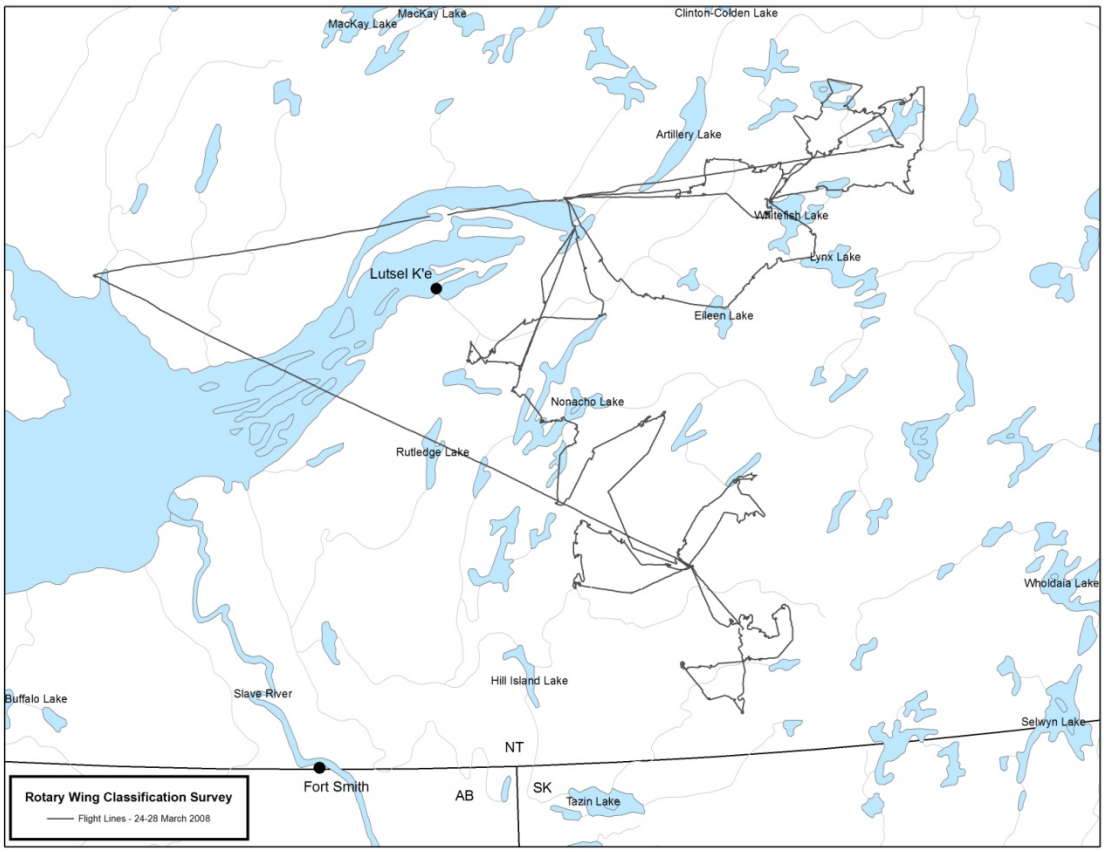

Figure 7: Flight lines during the composition survey, 24-28 March 2008.

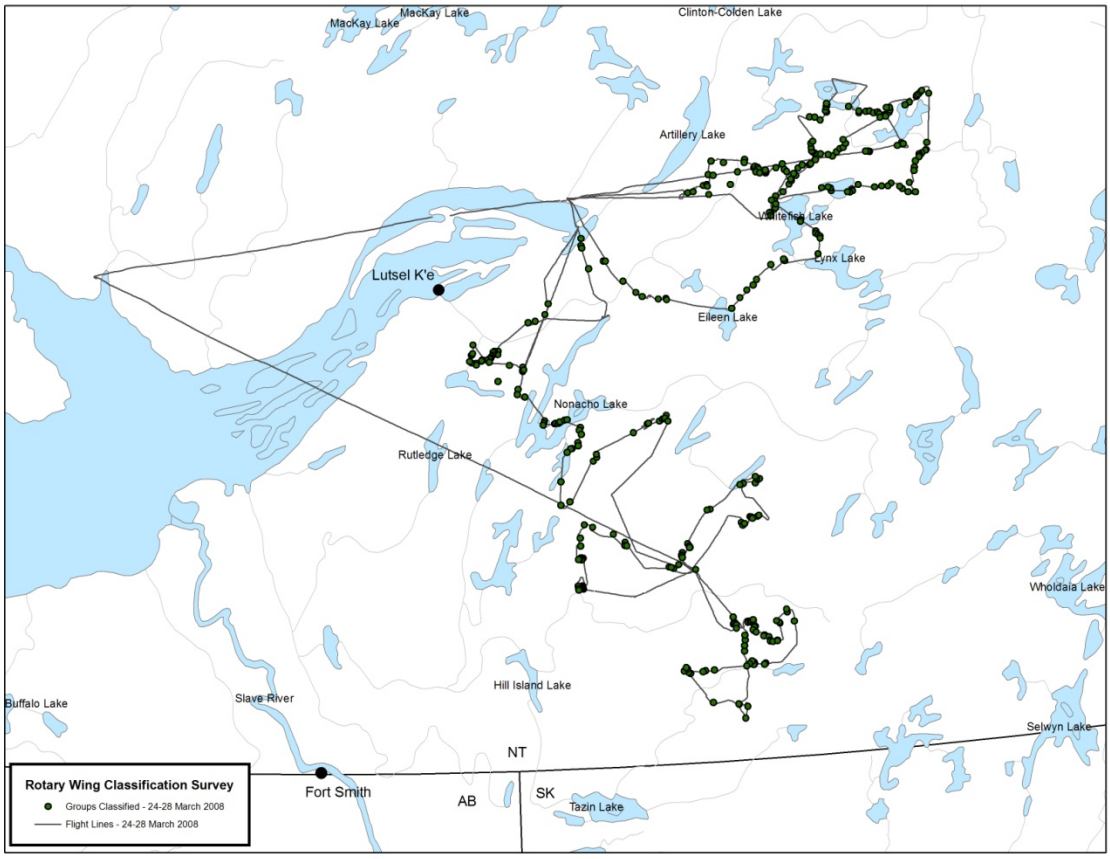

Figure 8: Flight lines and groups classified during the composition survey, 24-28 March 2008.

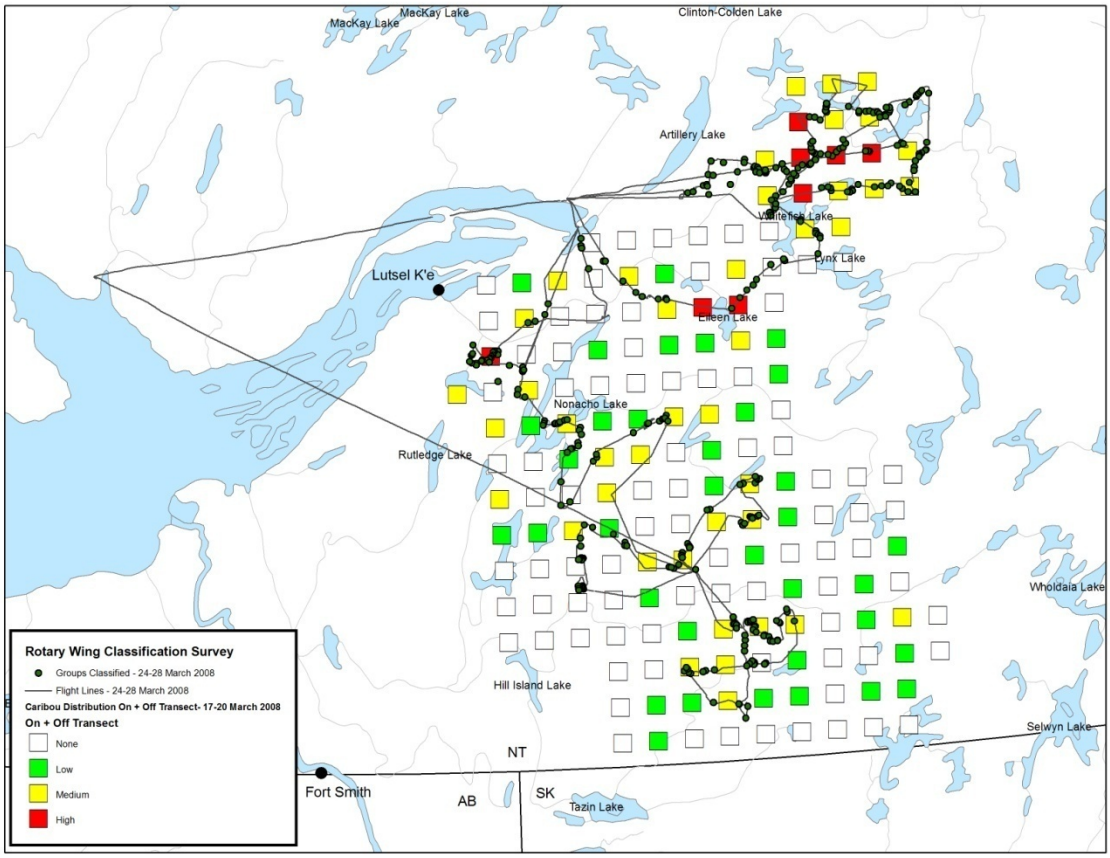

Figure 9: Groups classified during the composition survey conducted 24-28 March 2008 overlaid on the distribution of adult caribou observed on/off transect during the fixed wing transect survey conducted 17-20 March 2008.

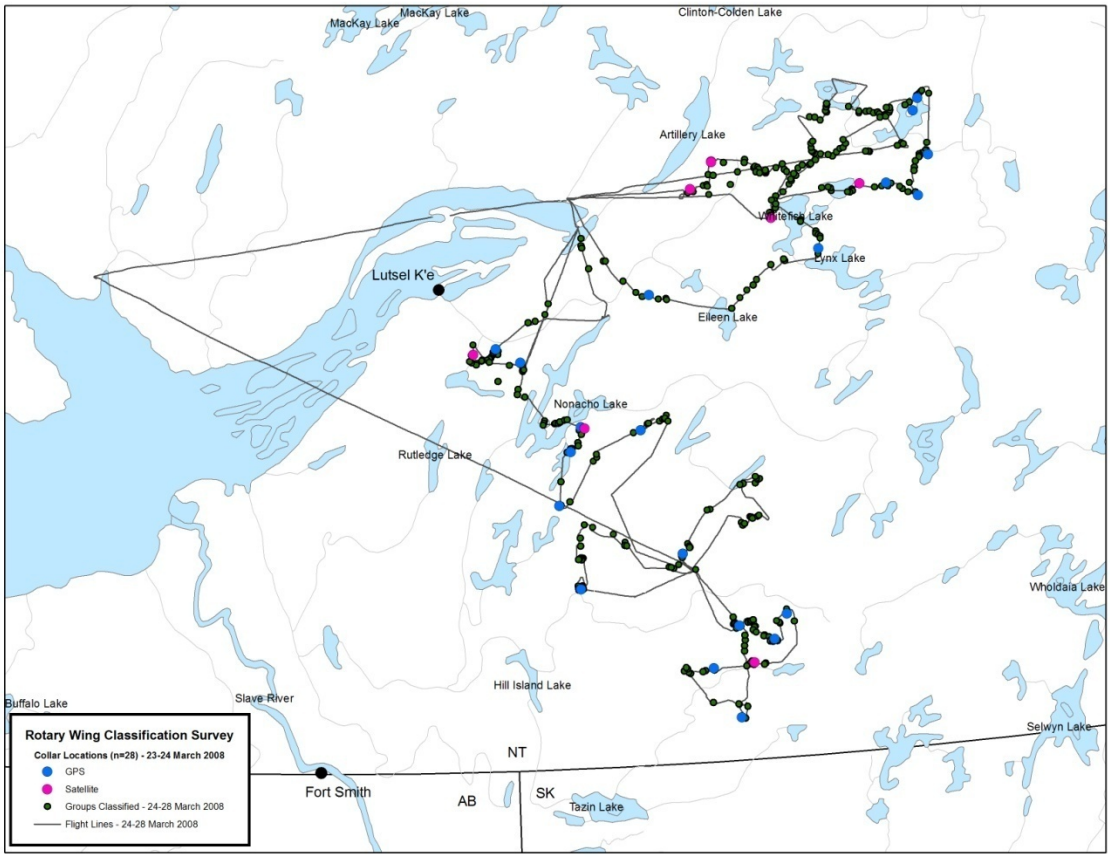

Figure 10: Groups classified during the composition survey conducted 24-28 March 2008 in relation to the location of GPS (blue) and satellite (pink) collared cows on 25 March 2008.

Classifications of 11,163 caribou were made from 296 groups between 24-27 March 2008 (Figure 8) (Appendix I). We observed a total of 5,964 1+ year old cows (225 bald cows), 2,133 1+ year old bulls, 187 yearlings and 2,879 calves (Table 1). We assumed a 50% sex ratio for yearlings and adjusted the number of 1+ year old cows and 1+ year old bulls to 6,058 and 2,226, respectively. The observed sex ratio was 36.7 bulls:100 cows. The calf:1+ year old cow ratio was 48.2 calves:100 cows (SE=1.7). Assuming a sex ratio of 60 bulls:100 cows, 50 bulls:100 cows, and 43 bulls:100 cows, the proportion of calves in the population was estimated at 23.0, 24.0 and 25.0, respectively, and the recruitment rate was 29.9, 31.6 and 33.3, respectively.

Table 1: Daily summary of caribou classified during the composition survey, 24-27 March 2008.

Date	Cows With Antlers	Cows Without Antlers	Cows Total	Calves Total	Bulls Young	Bulls Prime	Bulls Total	Yearlings Total	Total 1+Yr Caribou	Total Caribou
24-Mar-08	1,224	42	1,266	368	398	65	463	80	1,809	2,177
25-Mar-08	2,446	96	2,542	1,001	691	191	882	91	3,515	4,516
26-Mar-08	1,362	54	1,416	918	349	121	470	10	1,896	2,814
27-Mar-08	707	33	740	592	166	152	318	6	1,064	1,656
Totals	**5,739**	**225**	**5,964**	**2,879**	**1,604**	**529**	**2,133**	**187**	**8,284**	**11,163**

During the composition survey, we saw a total of 51 muskoxen, 2 moose, 16 wolves and 6 wolverine during 33.9 survey hours giving a sighting index of 472 wolves/1,000 hours flown. All of the wolverine and all but one wolf were observed above treeline (Figure 11). The lone wolf observed below treeline was near Manchester Lake, NWT.

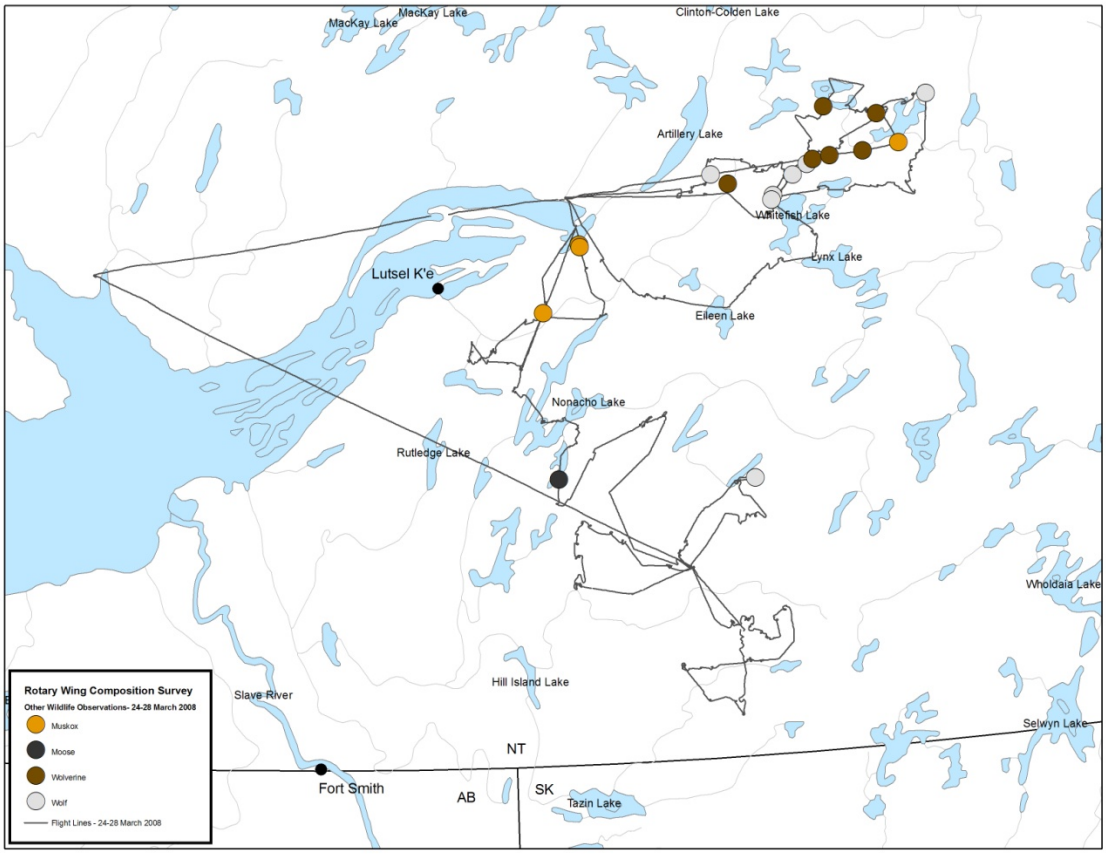

Figure 11: Other wildlife observed during the composition survey conducted 24-28 March 2008. Species include muskox (yellow), moose (black), wolverine (brown) and wolf (grey).

DISCUSSION

There was little movement of caribou observed below treeline between the fixed wing transect survey and the subsequent composition survey. However, above treeline, caribou appeared to move in a northeast direction between the two surveys. Caribou observed in the Eileen Lake area during the fixed wing transect survey were located between Eileen and Lynx Lakes, NWT during the composition survey. Similarly, during the composition survey we had to cover an area east of that flown during the fixed wing transect survey to account for the eastward movement of animals. Caribou above treeline exhibited higher winter movement rates than those below treeline; this may be related to a scarce amount of winter forage available above treeline (GNWT unpublished data). Although we observed some movement of caribou during the fixed wing transect survey and the composition survey, we did not observe any large aggregations numbering in the thousands of caribou or the northward migration of groups towards calving grounds. In general, the locations of collared cows were representative of the major densities of caribou observed during the transect surveys, but not of the entire distribution of caribou observed at lower densities.

The calf:cow ratio increased as we classified groups further south. The calf:cow ratio above treeline was 35.1 calves:100 cows (SE=1.6), while below treeline the calf:cow ratio was 69.9 calves:100 cows (SE=2.4). Similarly, nursery groups that consisted of more calves than cows were seen below treeline. This may represent the segregation of breeding versus non-breeding cows, with breeding cows seen further north.

Bulls, both young and mature, were seen within all the groups classified above and below treeline. We observed more exclusive bull groups below treeline at the southern extent of the caribou distribution. The bull:cow ratio above and below treeline was 35.3 bulls:100 cows and 36.5 bulls:100 cows, respectively. The similar sex ratio values obtained both above and

below treeline may suggest that the bull component was under-represented and that the proportion of the calves in the population did not need to be adjusted to account for the under-counting of bulls. The unadjusted proportion of calves in the population was 26% and represented a maximum recruitment rate of 35%.

The calf:cow ratio obtained in late March 2008 for caribou distributed east of Great Slave Lake from the NWT-Saskatchewan border to above treeline was higher than the average for Beverly spring composition counts conducted 1978-1995 (mean = 39 calves:100 cows) (Williams 1995). We do not think that cow mortality was significantly greater than calf mortality; except for Lutselk'e in the NWT, there was little harvest on the herd this past fall and winter. Data from a collaring program conducted in April 2008 across the late winter distribution of the Ahiak and Beverly herds indicated that cow pregnancy rates were less than 50% (GNWT unpublished data). Cows in the late summer-fall 2007 may have extended their lactation period due to low calf fat reserves, which would have reduced subsequent pregnancy rates due to lactational infertility, but also resulted in higher over-winter calf survival. Therefore, the high calf survival rates observed in March 2008 and apparent low pregnancy rates of cows suggest that calf survival in March 2009 will be much lower than that observed in March 2008, assuming that cow mortality is not significantly higher than calf mortality during this period.

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APPENDIX I: Observations from spring composition surveys conducted on the range of the Ahiak and Beverly caribou herds, 24-27 March 2008.

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
62.85570	-107.94583	24-Mar-08	2	8		8	5	7	5	12		**25**				
62.86001	-107.88821	24-Mar-08	3	35	2	37	15	13	1	14	3	**69**				
62.88743	-107.76902	24-Mar-08	4	22	1	23	9	4	1	5	1	**38**				
62.89036	-107.73240	24-Mar-08	5	23		23	14	8		8	1	**46**				
62.88256	-107.72580	24-Mar-08	6	77	5	82	26	25	7	32	1	**141**				
62.88224	-107.47494	24-Mar-08	7												1	
63.00679	-107.66734	24-Mar-08	9	6		6	4	1		1		**11**				
63.00405	-107.29692	24-Mar-08	10	10		10	2			0		**12**				
62.98908	-107.30211	24-Mar-08	11	34	4	38	7	13	3	16		**61**				
62.95933	-107.20078	24-Mar-08	12	8	2	10	7	5	0	5		**22**				
62.96561	-107.18759	24-Mar-08	13	79		79	16	5	0	5		**100**				
62.95914	-107.15722	24-Mar-08	14	6		6	3			0	1	**10**				
62.94963	-107.14867	24-Mar-08	15	13		13	7	4		4		**24**				
62.93682	-107.18010	24-Mar-08	16	31	2	33	12	7		7	3	**55**				
62.93005	-107.13943	24-Mar-08	17	51	1	52	18	21		21	4	**95**				
62.92890	-107.07726	24-Mar-08	18	74	2	76	18	12		12	8	**114**				
62.93593	-107.07429	24-Mar-08	19	11	2	13	3	1		1		**17**				
62.94191	-107.07880	24-Mar-08	20	29	1	30	6	25		25	4	**65**				
62.94946	-106.95618	24-Mar-08	21	28	1	29	5	21	4	25	3	**62**				
62.93898	-106.86858	24-Mar-08	23	64	1	65	20	10	6	16	3	**104**				
62.92609	-106.84489	24-Mar-08	24	25	1	26	12			0		**38**				
62.80800	-106.98635	24-Mar-08	25											2		
62.78661	-107.00723	24-Mar-08	26											1		
62.90366	-106.75023	24-Mar-08	27											1		
62.95131	-106.58701	24-Mar-08	29											2		
62.97376	-106.51785	24-Mar-08	32												1	
63.00619	-106.51989	24-Mar-08	33	11		11	7	2		2	1	**21**				
63.01371	-106.53815	24-Mar-08	34	20		20	8	0		0	3	**31**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
63.01933	-106.54979	24-Mar-08	35	29	1	30	16	3	5	8		**54**				
63.05694	-106.55069	24-Mar-08	37	18		18	5	1		1		**24**				
63.06684	-106.52876	24-Mar-08	38	42	3	45	14	21	2	23	2	**84**				
63.19113	-106.54042	24-Mar-08	39	11		11	0	2	2	4		**15**				
63.18627	-106.48310	24-Mar-08	40			0		2	1	3		**3**				
63.17066	-106.42488	24-Mar-08	41			0		1	5	6		**6**				
63.20724	-106.34741	24-Mar-08	42	3		3		1	3	4	1	**8**				
63.21477	-106.35683	24-Mar-08	43	10		10	5			0	1	**16**				
63.23413	-106.34777	24-Mar-08	44												1	
63.24524	-106.33591	24-Mar-08	45	18	1	19	5			0	1	**25**				
63.24997	-106.33779	24-Mar-08	46	20		20	4	1	5	6		**30**				
63.22466	-106.09695	24-Mar-08	47	53	1	54	8	8		8	2	**72**				
63.18797	-105.98758	24-Mar-08	48	7		7	6		1	1	1	**15**				
63.19732	-105.98722	24-Mar-08	49	37		37	14	7	6	13	1	**65**				
63.19160	-105.91235	24-Mar-08	50	25		25	4	18	1	19	1	**49**				
63.19220	-105.86917	24-Mar-08	51	37	3	40	3	25	1	26		**69**				
63.18176	-105.82706	24-Mar-08	52	13		13	6	3	2	5	3	**27**				
63.18374	-105.78216	24-Mar-08	53	8		8	4	2		2	1	**15**				
63.17322	-105.76495	24-Mar-08	54	38	1	39	9	32	2	34	10	**92**			1	
63.16486	-105.70259	24-Mar-08	55	15	1	16	4	1		1		**21**				
63.15759	-105.69820	24-Mar-08	56	32		32	7	17		17	3	**59**				
63.01752	-105.55145	24-Mar-08	57										16			
63.01112	-105.53351	24-Mar-08	58	15		15	5	2		2	1	**23**				
63.00568	-105.60077	24-Mar-08	59	15	1	16	4	19		19	6	**45**				
62.99061	-105.91251	24-Mar-08	60	63	2	65	8	30	1	31	3	**107**				
62.99148	-105.92867	24-Mar-08	61	50	3	53	13	18	1	19	7	**92**				
62.99275	-105.95692	24-Mar-08	62											1	1	
62.98443	-106.32893	24-Mar-08	63												1	
62.93584	-107.65621	24-Mar-08	66											7		
62.84050	-107.71408	25-Mar-08	1	11	1	12	1		1	1	1	**15**				
62.71435	-107.05607	25-Mar-08	71	65	2	67	36	33	14	47		**150**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
62.74922	-107.00026	25-Mar-08	72	38	1	39	25	17	1	18	1	**83**				
62.78935	-107.03575	25-Mar-08	73	9		9	3	9	2	11	1	**24**				
62.76805	-106.99192	25-Mar-08	74	7	1	8	4		3	3		**15**				
62.82692	-106.90399	25-Mar-08	75	16	2	18	11	8	1	9	1	**39**				
62.86221	-106.82932	25-Mar-08	76	4		4	2	1	2	3	2	**11**				
62.87775	-106.80354	25-Mar-08	77	20	1	21	6	3		3		**30**				
62.88680	-106.80622	25-Mar-08	78	74	3	77	26	17	12	29	3	**135**				
62.91292	-106.77115	25-Mar-08	79	27	1	28	8	7		7	1	**44**				
62.93994	-106.71609	25-Mar-08	80	2	1	3		1	1	2		**5**				
62.95373	-106.66534	25-Mar-08	81	37		37	3	7	2	9	2	**51**				
62.99999	-106.45448	25-Mar-08	82	37	3	40	13	10		10		**63**				
62.99281	-106.36973	25-Mar-08	83	59	3	62	18	18	5	23	3	**106**				
63.00352	-106.27838	25-Mar-08	84	50	1	51	32	8		8		**91**				
63.01730	-106.23450	25-Mar-08	85	56	1	57	19	28	21	49	4	**129**				
63.02116	-106.20271	25-Mar-08	86	91	1	92	38	46	2	48	3	**181**				
63.04051	-106.17063	25-Mar-08	87	36		36	15	4	1	5	1	**57**				
63.06205	-106.19398	25-Mar-08	88	16	1	17	6	14		14	1	**38**				
63.15497	-105.76222	25-Mar-08	89	4		4	1	4		4		**9**				
63.17735	-105.65193	25-Mar-08	90	9		9	4	2	2	4		**17**				
63.18735	-105.64166	25-Mar-08	91	16		16	11	2		2		**29**				
63.19978	-105.64252	25-Mar-08	92	40	1	41	13	18		18	1	**73**				
63.20084	-105.68092	25-Mar-08	93	30		30	10	2		2	1	**43**				
63.21585	-105.41963	25-Mar-08	94	31		31	13	10	1	11	1	**56**				
63.20572	-105.46978	25-Mar-08	95	15		15	8	3	1	4	1	**28**				
63.23973	-105.33442	25-Mar-08	96	13		13	6	3		3	3	**25**				
63.24484	-105.32858	25-Mar-08	97	34	2	36	9	13	1	14	1	**60**				
63.25138	-105.30793	25-Mar-08	98	24	2	26	9	5		5	1	**41**				
63.26136	-105.28284	25-Mar-08	99	9		9	4	1		1		**14**				
63.26710	-105.26578	25-Mar-08	100	20	1	21	4	2		2		**27**				
63.24997	-105.19332	25-Mar-08	101											1		
63.00467	-105.27508	25-Mar-08	102	33		33	5	3		3	1	**42**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
62.96995	-105.28942	25-Mar-08	103			0		3	3	6		**6**				
62.96624	-105.29988	25-Mar-08	104	19		19	7	6	1	7	2	**35**				
62.95568	-105.33973	25-Mar-08	105	19	2	21	4	2		2	2	**29**				
62.95190	-105.37182	25-Mar-08	106	6		6	1			0		**7**				
62.94428	-105.36619	25-Mar-08	107	42	3	45	8	8		8	4	**65**				
62.93853	-105.37676	25-Mar-08	108	40	1	41	18	1	4	5	5	**69**				
62.92041	-105.42009	25-Mar-08	109	20	2	22	11	6	4	10		**43**				
62.89019	-105.44055	25-Mar-08	110	69		69	19	15	1	16	3	**107**				
62.87219	-105.44784	25-Mar-08	111	118	4	122	42	21	1	22	6	**192**				
62.81469	-105.50981	25-Mar-08	112	53	3	56	23	8	1	9	1	**89**				
62.76415	-105.45735	25-Mar-08	113	46	3	49	11	7	2	9	1	**70**				
62.76769	-105.53743	25-Mar-08	114	8	2	10	8	1		1		**19**				
62.78726	-105.59502	25-Mar-08	115	3		3	3	4		4		**10**				
62.80002	-105.62203	25-Mar-08	116	39	1	40	18	6		6	1	**65**				
62.82090	-105.71295	25-Mar-08	117	36	3	39	10	4		4		**53**				
62.80843	-105.74783	25-Mar-08	118	24	1	25	6	4	1	5	1	**37**				
62.81031	-105.81535	25-Mar-08	119	16		16	6	5	1	6	1	**29**				
62.81005	-105.89559	25-Mar-08	120	39		39	11	5	1	6		**56**				
62.82889	-106.07057	25-Mar-08	121	76	3	79	27	8	2	10	2	**118**				
62.80902	-106.14408	25-Mar-08	122	19	1	20	7	3		3	1	**31**				
62.80135	-106.14180	25-Mar-08	123	3		3	5	8	9	17		**25**				
62.79597	-106.16896	25-Mar-08	124	10		10	2	5	3	8		**20**				
62.79853	-106.19624	25-Mar-08	125			0		4	5	9		**9**				
62.81097	-106.37221	25-Mar-08	126	14	1	15	4	9	7	16	2	**37**				
62.82447	-106.37783	25-Mar-08	127	9		9	4	1	1	2		**15**				
62.83172	-106.40188	25-Mar-08	128	57	2	59	25	22	18	40	4	**128**				
62.83101	-106.47626	25-Mar-08	129	24	2	26	13	9	3	12	2	**53**				
62.68125	-106.73240	25-Mar-08	130	27	3	30	14		2	2		**46**				
62.67177	-106.73599	25-Mar-08	131	17	2	19	8		2	2	1	**30**				
62.61696	-106.58176	25-Mar-08	132	25	1	26	15	6	4	10	1	**52**				
62.60561	-106.58206	25-Mar-08	133	9	1	10	5	8	2	10		**25**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
62.59715	-106.55768	25-Mar-08	134	11		11	4	4	4	8		**23**				
62.58871	-106.53913	25-Mar-08	135	5		5	3	9		9		**17**				
62.57864	-106.54050	25-Mar-08	136	5	1	6	2	6		6	2	**16**				
62.50179	-106.57585	25-Mar-08	137	30	5	35	10	11	3	14		**59**				
62.48199	-106.94344	25-Mar-08	138	64	3	67	28	42	8	50	2	**147**				
62.49103	-106.95315	25-Mar-08	139	94	2	96	42	34		34	4	**176**				
62.46723	-107.09937	25-Mar-08	140	107	4	111	58	28	5	33	7	**209**				
62.39964	-107.26392	25-Mar-08	141	8		8	6	4		4		**18**				
62.37275	-107.30425	25-Mar-08	142	75	4	79	32	17	2	19		**130**				
62.34898	-107.37473	25-Mar-08	143	28	1	29	17	9	4	13	1	**60**				
62.31382	-107.45810	25-Mar-08	144	7		7		6		6		**13**				
62.26220	-107.55458	25-Mar-08	145	64	4	68	23	19	4	23		**114**				
62.33402	-108.25416	25-Mar-08	146	15		15	8			0		**23**				
62.32727	-108.24782	25-Mar-08	147	31		31	21	9	4	13		**65**				
62.33369	-108.33703	25-Mar-08	148	41		41	27	4	3	7		**75**				
62.34968	-108.50850	25-Mar-08	149	3		3	2			0		**5**				
62.37224	-108.57659	25-Mar-08	150	12		12	3			0		**15**				
62.43392	-108.70669	25-Mar-08	151	9		9	10	1	3	4		**23**				
62.53945	-108.90940	25-Mar-08	152	3	1	4	3			0		**7**				
62.53840	-108.88745	25-Mar-08	153	14	1	15	4			0	1	**20**				
62.65706	-109.14207	26-Mar-08	154	2		2	2		1	1		**5**				
62.62032	-109.14674	26-Mar-08	155										15			
62.60815	-109.14060	26-Mar-08	156										2			
62.50436	-109.07263	26-Mar-08	157	6		6	2		1	1		**9**				
62.25164	-109.67225	26-Mar-08	158	10		10	8	2	4	6	1	**25**				
62.24585	-109.75217	26-Mar-08	159	10	1	11	5	2		2		**18**				
62.10680	-110.08419	26-Mar-08	160	24	1	25	11	5	2	7		**43**				
62.08921	-110.08988	26-Mar-08	161	16	1	17	8	2	3	5		**30**				
62.10863	-110.12152	26-Mar-08	162	99	1	100	61	15	4	19	3	**183**				
62.10237	-110.13684	26-Mar-08	163	38	1	39	17	15	2	17		**73**				
62.08853	-110.13785	26-Mar-08	164	20		20	14	5		5		**39**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
62.08242	-110.15232	26-Mar-08	165	57	3	60	30	29		29		**119**				
62.07421	-110.16187	26-Mar-08	166	14	1	15	12	5		5		**32**				
62.07120	-110.18081	26-Mar-08	167	33	1	34	19	9	1	10		**63**				
62.06448	-110.20484	26-Mar-08	168	31	4	35	24	3		3		**62**				
62.06566	-110.25535	26-Mar-08	169	10		10	8	8	1	9		**27**				
62.05971	-110.26089	26-Mar-08	170	18		18	15	4		4		**37**				
62.06039	-110.26296	26-Mar-08	171	13		13	5	1		1		**19**				
62.04987	-110.31812	26-Mar-08	172	5		5	4	2		2		**11**				
62.04139	-110.32188	26-Mar-08	173	6		6	5	3		3		**14**				
62.05286	-110.36869	26-Mar-08	174	63	3	66	36	13		13		**115**				
62.05965	-110.39059	26-Mar-08	175	20	2	22	6	3		3		**31**				
62.09022	-110.36941	26-Mar-08	176	44		44	22	4	11	15		**81**				
62.09215	-110.36391	26-Mar-08	177	26	3	29	19	10		10	1	**59**				
62.09786	-110.35577	26-Mar-08	178	90	2	92	57	28	10	38		**187**				
62.14123	-110.34889	26-Mar-08	179	28	2	30	14	1	3	4		**48**				
62.05374	-110.18164	26-Mar-08	181	30		30	22	1		1		**53**				
62.03355	-109.96574	26-Mar-08	182	13	1	14	17			0		**31**				
62.02262	-109.82350	26-Mar-08	184	9		9	5		2	2		**16**				
62.28369	-109.56549	26-Mar-08	185										18			
62.33629	-109.52921	26-Mar-08	186			0	1		6	6		**7**				
62.00230	-109.82674	26-Mar-08	187	12		12	11		1	1		**24**				
62.00874	-109.81492	26-Mar-08	189	54	1	55	26	7	1	8		**89**				
61.91304	-109.88289	26-Mar-08	190	35	2	37	36	6	1	7		**80**				
61.95566	-110.09416	26-Mar-08	191	20	2	22	5	2		2		**29**				
61.88725	-109.89112	26-Mar-08	192			0			7	7		**7**				
61.87362	-109.81431	26-Mar-08	193			0			5	5		**5**				
61.75051	-109.61518	26-Mar-08	194	32	1	33	26	15	1	16	1	**76**				
61.73873	-109.62185	26-Mar-08	195	40	3	43	32	8	3	11	1	**87**				
61.72780	-109.62979	26-Mar-08	196	15	3	18	18	4		4		**40**				
61.73286	-109.50904	26-Mar-08	197	3		3	4	2	10	12		**19**				
61.73670	-109.49634	26-Mar-08	198	10		10	5	2	6	8		**23**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
61.73422	-109.47086	26-Mar-08	199	30		30	26	13	1	14	1	**71**				
61.73985	-109.45275	26-Mar-08	200	13		13	7	7		7		**27**				
61.74279	-109.45203	26-Mar-08	201	115		115	80	30	3	33		**228**				
61.74997	-109.40286	26-Mar-08	202	12	1	13	11	14	2	16		**40**				
61.71017	-109.23964	26-Mar-08	204	3		3	1	1		1		**5**				
61.69622	-109.25278	26-Mar-08	205	26	2	28	25	11		11		**64**				
61.67578	-109.23194	26-Mar-08	206	3		3	3	2		2		**8**				
61.63460	-109.27259	26-Mar-08	207	20	1	21	20	11		11		**52**				
61.61946	-109.26958	26-Mar-08	208	2		2	2			0		**4**				
61.60585	-109.33827	26-Mar-08	209	31		31	27	9		9		**67**				
61.60558	-109.35098	26-Mar-08	210			0			2	2		**2**				
61.58882	-109.39063	26-Mar-08	211	10		10	3			0		**13**				
61.44184	-109.46607	26-Mar-08	212													2
61.32450	-109.47877	26-Mar-08	213	26	2	28	24	3		3		**55**				
61.33987	-109.38290	26-Mar-08	214	17	1	18	12		1	1		**31**				
61.53785	-109.11709	26-Mar-08	215	1		1	1	2	14	16		**18**				
61.55666	-109.07926	26-Mar-08	216	7		7	1	4		4	1	**13**				
61.57141	-109.08024	26-Mar-08	217	6	1	7	6	1		1		**14**				
61.67096	-108.68034	26-Mar-08	218			0			3	3		**3**				
61.71178	-108.53111	26-Mar-08	219	13	1	14	8	7	1	8	1	**31**				
61.71477	-108.51705	26-Mar-08	220	6	1	7	1	3		3		**11**				
61.72171	-108.39930	26-Mar-08	221	1	2	3	3			0		**6**				
61.73089	-108.36797	26-Mar-08	222	3		3	4	2		2		**9**				
61.73196	-108.34951	26-Mar-08	223	15		15	9	2	1	3		**27**				
61.74978	-108.32523	26-Mar-08	224	24	1	25	17	2		2		**44**				
61.71979	-108.31044	26-Mar-08	226	5	1	6	2			0		**8**				
60.99773	-108.28507	26-Mar-08	227	17	1	18	13	9	7	16		**47**				
61.18927	-107.61305	27-Mar-08	229			0		2	5	7		**7**				
61.17453	-107.59993	27-Mar-08	230	4		4	4	2		2		**10**				
61.18237	-107.57965	27-Mar-08	231	3	1	4	1		16	16		**21**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
61.21418	-107.51805	27-Mar-08	232	4		4	3			0		**7**				
61.21177	-107.50395	27-Mar-08	233			0		2	3	5		**5**				
61.20576	-107.49466	27-Mar-08	234	3		3	2	4	2	6	1	**12**				
61.21353	-107.43721	27-Mar-08	235	3	1	4	3	2	2	4		**11**				
61.21759	-107.42359	27-Mar-08	236	25	2	27	18	6		6		**51**				
61.38327	-107.56568	27-Mar-08	237	2		2	1	1	1	2		**5**				
61.37883	-107.59756	27-Mar-08	238	7		7	6	2	3	5		**18**				
61.38305	-107.43804	27-Mar-08	239	5		5	5	1		1		**11**				
61.39758	-107.40641	27-Mar-08	240											1		
61.40266	-107.40245	27-Mar-08	241	6		6	3	1		1		**10**				
61.40156	-107.38876	27-Mar-08	242	5		5	3	6	2	8		**16**				
61.40446	-107.42054	27-Mar-08	243	1		1	1			0		**2**				
61.41348	-107.43422	27-Mar-08	244	4		4	5	1		1		**10**				
61.26462	-107.92905	27-Mar-08	245	6		6	2	3		3		**11**				
61.26136	-107.95648	27-Mar-08	246	2		2	4		2	2		**8**				
61.10085	-108.17935	27-Mar-08	247	6		6	5	5	13	18		**29**				
61.08820	-108.16645	27-Mar-08	248			0			3	3		**3**				
61.08133	-108.16115	27-Mar-08	249	9		9	5	5		5		**19**				
61.08328	-108.16079	27-Mar-08	250	14		14	9	4		4		**27**				
61.08045	-108.16584	27-Mar-08	251	2		2	2			0		**4**				
61.05769	-108.24241	27-Mar-08	252	4		4	3		8	8		**15**				
61.04586	-108.25156	27-Mar-08	254	1		1	1	2	5	7		**9**				
61.04108	-108.25418	27-Mar-08	255			0		3		3		**3**				
61.03290	-108.24474	27-Mar-08	256	12		12	15	4	4	8		**35**				
60.68921	-107.75630	27-Mar-08	257	16	1	17	9	3	1	4		**30**				
60.68272	-107.76394	27-Mar-08	258			0			6	6		**6**				
60.67923	-107.73488	27-Mar-08	260	3		3	5			0		**8**				
60.66044	-107.73718	27-Mar-08	261	13	1	14	16	5	2	7		**37**				
60.69354	-107.61283	27-Mar-08	262	2		2	3	5	1	6		**11**				
60.68743	-107.61497	27-Mar-08	263	3	1	4	1		2	2		**7**				
60.68822	-107.58994	27-Mar-08	264	4		4	8	2		2		**14**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
60.69384	-107.57926	27-Mar-08	265	13		13	9			0		**22**				
60.69873	-107.56153	27-Mar-08	266			0			7	7		**7**				
60.66528	-107.54558	27-Mar-08	267	17	1	18	10	6	1	7		**35**				
60.66129	-107.55281	27-Mar-08	268	1		1	1			0		**2**				
60.64896	-107.56979	27-Mar-08	269	6		6	7			0		**13**				
60.63455	-107.53852	27-Mar-08	270	2		2				0		**2**				
60.61848	-107.45782	27-Mar-08	271	7		7	6	2		2		**15**				
60.61444	-107.46446	27-Mar-08	272	4		4	4			0		**8**				
60.60827	-107.41355	27-Mar-08	273	12	1	13	9	2		2		**24**				
60.59070	-107.40099	27-Mar-08	274	3		3	3			0		**6**				
60.58496	-107.40246	27-Mar-08	275	13		13	17	3		3		**33**				
60.58287	-107.37760	27-Mar-08	276	4		4	4			0		**8**				
60.58705	-107.32617	27-Mar-08	277	4		4	4	1		1		**9**				
60.58370	-107.32846	27-Mar-08	278	15		15	9	4	1	5		**29**				
60.67068	-107.28875	27-Mar-08	279	2		2				0		**2**				
60.67703	-107.29482	27-Mar-08	280	4	2	6	3			0		**9**				
60.68554	-107.32385	27-Mar-08	281	3	1	4	4			0		**8**				
60.72627	-107.20651	27-Mar-08	282	10		10	5	3		3		**18**				
60.73993	-107.21138	27-Mar-08	283	4		4	4	1		1		**9**				
60.67687	-107.14357	27-Mar-08	284	3		3		1		1		**4**				
60.47843	-107.46325	27-Mar-08	285	1		1	1			0		**2**				
60.47296	-107.47920	27-Mar-08	286	5		5	7	1		1		**13**				
60.48614	-107.58257	27-Mar-08	287	4	1	5	3	2	4	6		**14**				
60.47988	-107.57960	27-Mar-08	288	5	1	6	6			0		**12**				
60.47594	-107.58572	27-Mar-08	289	4		4	3		1	1		**8**				
60.49396	-107.60066	27-Mar-08	290	15	1	16	11	2		2		**29**				
60.48136	-107.62946	27-Mar-08	291	5	1	6	4		2	2		**12**				
60.47080	-107.65690	27-Mar-08	293	6		6	7			0		**13**				
60.46152	-107.99002	27-Mar-08	294	8		8	3	1		1		**12**				
60.45618	-108.10452	27-Mar-08	296			0			18	18		**18**				
60.45161	-108.23166	27-Mar-08	297			0			1	1		**1**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
60.45637	-108.24959	27-Mar-08	298	2		2	2		5	5		**9**				
60.46561	-108.29268	27-Mar-08	299	9		9	10	3		3		**22**				
60.47442	-108.25880	27-Mar-08	300			0			2	2		**2**				
60.48197	-108.26951	27-Mar-08	301	8		8	8	1		1	1	**18**				
60.29904	-108.02207	27-Mar-08	302	13		13	6	2		2		**21**				
60.28124	-107.75960	27-Mar-08	303	13		13	14	3		3		**30**				
60.28327	-107.76470	27-Mar-08	304	11		11	12	4	1	5		**28**				
60.20998	-107.70522	27-Mar-08	305	4		4	2			0		**6**				
60.26812	-107.67527	27-Mar-08	306			0			2	2		**2**				
60.54663	-107.66981	27-Mar-08	307			0		2		2		**2**				
60.57180	-107.66612	27-Mar-08	308	1		1	1			0		**2**				
60.59872	-107.65740	27-Mar-08	309	3		3	3	4	2	6		**12**				
60.62462	-107.65517	27-Mar-08	310	4	1	5	6	1		1		**12**				
60.89969	-109.27927	27-Mar-08	312	11		11	11			0		**22**				
60.90552	-109.28091	27-Mar-08	313	8	1	9	8	1		1		**18**				
60.91086	-109.28656	27-Mar-08	314	7	2	9	4			0	1	**14**				
60.91626	-109.28822	27-Mar-08	315	5	1	6	4	1		1		**11**				
60.91282	-109.29203	27-Mar-08	316	13		13	8	2		2		**23**				
60.91048	-109.30458	27-Mar-08	317	32	3	35	28	11	1	12	1	**76**				
60.91594	-109.33383	27-Mar-08	319	4	2	6	5			0		**11**				
60.90341	-109.33123	27-Mar-08	320	10	1	11	9	1	1	2		**22**				
60.89527	-109.32783	27-Mar-08	322	2		2	1			0		**3**				
61.05502	-109.27001	27-Mar-08	324	18		18	12	1		1		**31**				
61.05688	-109.28904	27-Mar-08	325	2		2	2	1		1		**5**				
61.05617	-109.29700	27-Mar-08	326	2		2	3	1		1		**6**				
61.04699	-109.28428	27-Mar-08	327	16		16	13			0		**29**				
61.05332	-109.30575	27-Mar-08	328	10		10	15		4	4	1	**30**				
61.05018	-109.31963	27-Mar-08	330	42	2	44	26	5	3	8		**78**				
61.11592	-109.29225	27-Mar-08	331	13		13	12	3		3		**28**				
61.15679	-109.29079	27-Mar-08	332	3		3	3			0		**6**				
61.22072	-109.24063	27-Mar-08	333	26	2	28	26	6		6		**60**				
61.20700	-109.15476	27-Mar-08	334	13	1	14	13	2		2		**29**				

Lat	Long	Date	Wpt	Cows W/Antlers	Cows W/O Antlers	Cows Total	Calves	Bulls Young	Bulls Prime	Bulls Total	Yearlings	Total Count	Muskox	Wolves	Wolverine	Moose
61.16841	-108.94598	27-Mar-08	336			0			12	12		**12**				
61.12441	-108.82875	27-Mar-08	337	23		23	17	3		3		**43**				
61.10965	-108.83302	27-Mar-08	338	10		10	4			0	1	**15**				
61.10748	-108.81159	27-Mar-08	339	6	1	7	5			0		**12**				
60.98814	-108.38890	27-Mar-08	340			0			3	3		**3**				
60.97965	-108.34324	27-Mar-08	341	14		14	12	8		8		**34**				
				5,739	225	5,964	2,879	1,604	529	2,133	187	**11,163**	51	16	6	2