Finlayson Caribou Herd
Late-Winter Population Survey, 2007

Prepared by

Jan Adamczewski*
Rob Florkiewicz
Rick Farnell **
Carol Foster
Katherina Egli

Fish and Wildlife Branch

Yukon
Environment

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SR-10-01

ACKNOWLEDGEMENTS

Financial support from Yukon Zinc made possible Rick Farnell's involvement in the survey. Adam Roth (Yukon Environment's Geomatics unit) provided patient and skillful support in developing the maps for this report. We would like to thank Dorothy Dick, Kathlene Suza, Robertson Dick and Conservation Officer T.J. Grantham for their capable help with helicopter survey flying. Our thanks to pilots Denny Denison, Gerd Mannsperger, Andy Robertson and Bill Karman for their experience and skills in flying on this survey.

* Current address: Jan Adamczewski
Department of Environment and Natural Resources
Government of the Northwest Territories

**Rick Farnell, Consulting Biologist, Yukon Zinc Corporation

Copies available from:
Yukon Department of Environment
Fish and Wildlife Branch, V-5A
Box 2703, Whitehorse, Yukon Y1A 2C6
Phone (867) 667-5721, Fax (867) 393-6263
Email: environmentyukon@gov.yk.ca

Also available online at www.environmentyukon.gov.yk.ca

Suggested citation:

ADAMCZEWSKI, J., R. FLORKIEWICZ, R. FARNELL, C. FOSTER, AND K. EGLI. 2010. Finlayson caribou herd late-winter population survey, 2007. Yukon Fish and Wildlife Branch Report SR-10-01. Whitehorse, Yukon, Canada.

SUMMARY

- The survey was done March 10 - 15, 2007.
- We estimated that the Finlayson herd had 3,077 +/- 5.6% caribou; 62.9% cows, 13.6% calves, 9.8% young bulls and 13.2% mature bulls. There were 21.7 calves for every 100 cows, and 36.6 bulls for every 100 cows.
- The survey results show that there were 1,000 fewer animals in the Finlayson caribou herd than in 1999, and the herd was almost half the size that it was in 1990, at the conclusion of 6 years of wolf control.
- Nearly two-thirds of the caribou were found near Finlayson Lake, with smaller numbers near Caribou Lakes. In all previous late-winter surveys the opposite had been true. This shift in distribution may have been the result of above-normal snow depth in the Caribou Lakes area and less than normal snow depth near Finlayson Lake.
- We used the same survey methods that had been used in previous counts of the herd. Survey crews were experienced and flying conditions were very good so we were very satisfied with the survey conditions.

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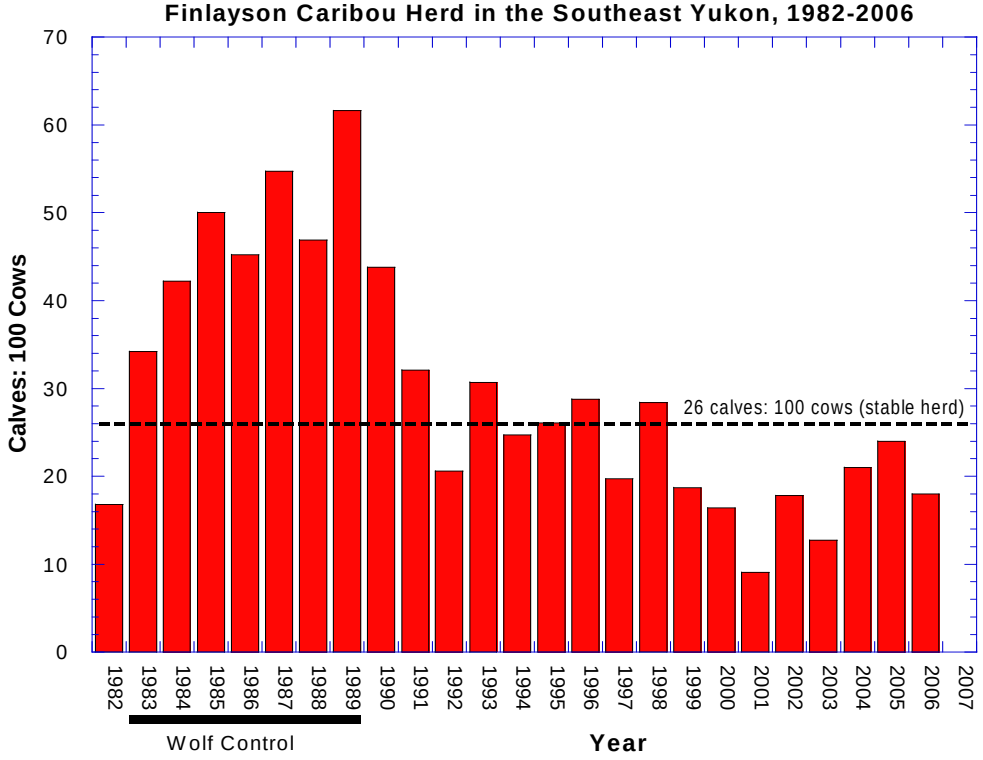
INTRODUCTION

This report describes the results of a late-winter population survey of the Finlayson caribou herd, a population of woodland caribou found east of Ross River in the southeast Yukon. The survey was done due to concerns over the herd's status; fall surveys from 1999 to 2006[1] showed poor calf numbers that suggested a declining herd.

Graph 1. Calf:Cow Ratio from Fall Composition Surveys of the Finlayson Caribou Herd in the Southeast Yukon, 1982-2006



The Finlayson caribou herd has been an important resource for the Kaska people, hunted and greatly valued, long before any surveys or studies by biologists. The construction of the Campbell Highway in the 1960s greatly increased access to the main Finlayson caribou winter range (Map 1) in addition to increasing hunting opportunities during the fall. In the early 1980s the herd was thought to be declining rapidly, in part due to a non-sustainable hunter harvest. A program of aerial wolf control was carried out annually from 1983 to 1989, with wolf numbers in Finlayson range reduced by about 85% from the pre-control estimate of 245 wolves. The Finlayson caribou herd grew from about 2000 animals in 1982 to nearly 6,000 in 1990. After wolf control ended in 1989, however, wolf numbers quickly rebounded and since about 1991 the caribou herd

[1] Fall surveys of caribou herds such as the Finlayson herd do not estimate the herd's size; they are meant to provide a cross-section of the herd – the proportions of calves, cows and bulls. Calf survival varies from year to year and the fall calf:cow ratio is an indicator of the herd's trend that year (stable, increasing, or decreasing).

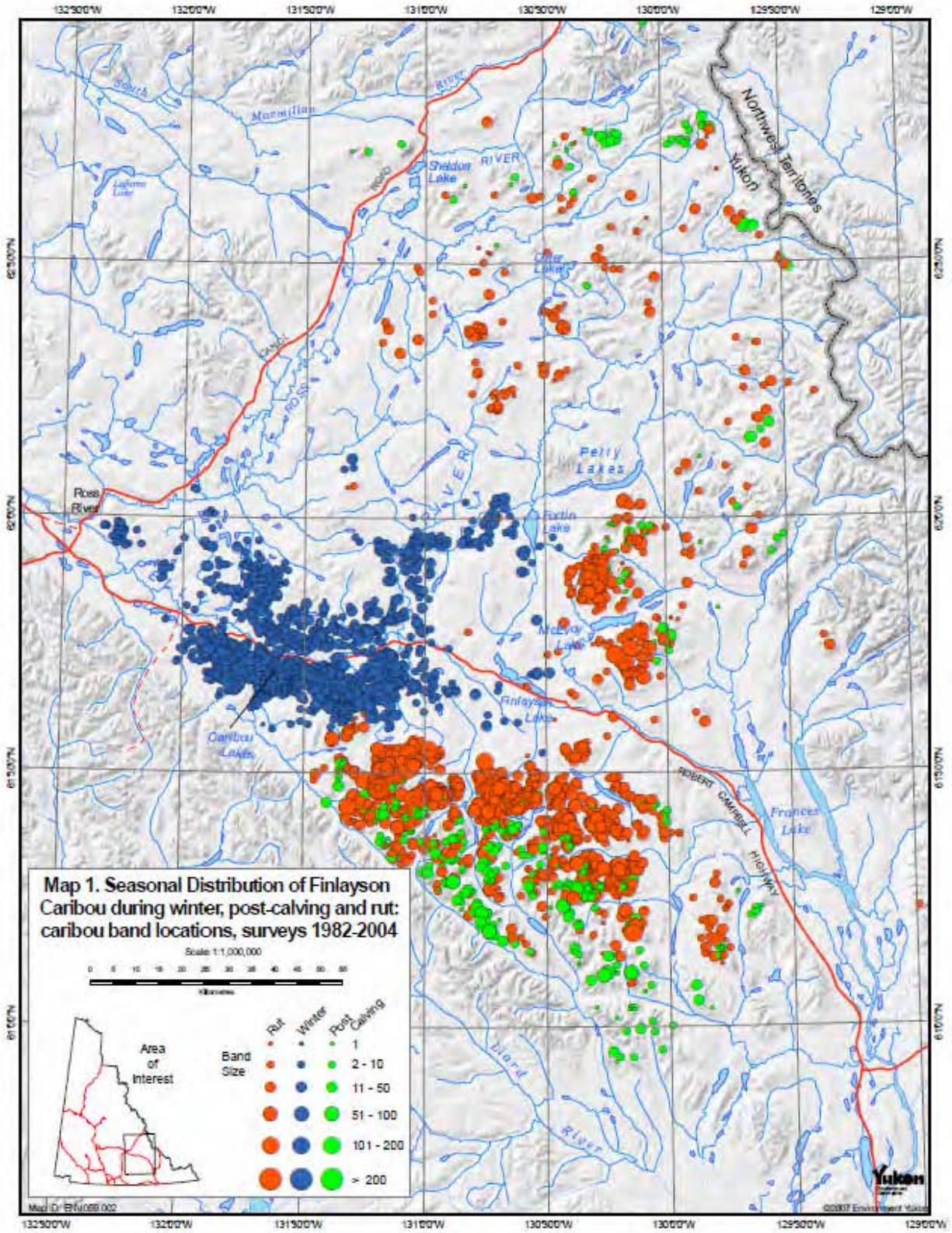
has declined. The Finlayson herd was last estimated in March 1999 at 4,130 caribou +/- 16.9%. In most years since then annual fall calf numbers have been below 20 per 100 cows (Graph 1). A fall calf:cow ratio of about 26 calves per 100 cows is thought in Yukon to be generally consistent with a stable herd, one where recruitment of young balances naturally occurring mortality. Ratios consistently below 20:100, as in the Finlayson herd from 1999 to 2006, are indicative of declining herds.

STUDY AREA

The Finlayson caribou herd's summer and fall ranges are primarily on alpine plateaus south of Finlayson Lake (Figure 1, Map 1). However, approximately one-third of the herd uses a widely-scattered group of alpine blocks north of the Campbell Highway, ranging nearly to the border with the Northwest Territories. The herd's winter range is a lowland forested area east of Ross River, where there are abundant ground lichens under relatively open black spruce, white spruce, and lodgepole pine forests. These lichens are the primary winter food for caribou. This winter range lies north of the Pelly Mountains, which create a snow- and rain-shadow effect by intercepting the predominant weather systems from the southwest. The low snow cover and abundant ground lichens in the main Finlayson winter range are typical of Yukon woodland caribou winter ranges.

The Finlayson caribou winter range outlined in Map 1 covers an area of 6,671 km^2. Caribou in this herd and in many other Yukon herds are counted in the late winter because they are spatially most concentrated at that time. By late March, the caribou are usually aggregated in a fraction of this winter range; the total area of blocks flown in March 2007 was 1,790 km^2, about one-quarter of the total. The ranges used by caribou in the summer and fall cover a much greater area (See Map 1); the costs of a fall survey over this large expanse would be much higher than for a late winter survey.

Figure 1. The Finlayson caribou herd's winter range is a lowland forested area east of Ross River


Map 1. Seasonal Distribution of Finlayson Caribou during winter, post-calving and rut: caribou band locations, surveys 1982-2004
Scale 1:1,000,000
Area of Interest
Band Size
Rut
Winter
Post Calving
1
2 - 10
11 - 50
51 - 100
101 - 200
> 200
Sheldon Lake
Petty Lakes
Ross River
Caribou Lakes
Finlayson Lake
Frances Lake
Robert Campbell Highway
Northwest Territories
Yukon
Liard River
Yukon

METHODS

The methods used for the March 2007 Finlayson caribou survey were consistent with those used in the 4 previous surveys of this herd (1986, 1990, 1996 and 1999). All Fish and Wildlife staff involved in the survey had participated in one or more previous surveys of this type. The method is an adaptation of a survey first developed for moose and adapted for woodland caribou in the Yukon (Farnell and Gauthier 1988) and has been used for many herds in the Yukon. The following steps were followed:

1. The survey area was divided into 216 blocks (average 30.9 km^2), with most block boundaries based on natural features such as creeks or heights of land (Map 2).

2. Experienced observers flew in 2 small fixed-wing aircraft through each of the survey blocks looking for caribou or fresh sign of caribou (Figure 2). Snowfall had ended just a few days before the survey began, allowing good distinction between recent (fresh) sign and older caribou tracks and feeding craters. Survey blocks were assigned to one of 3 categories:

Primary – at least 12 caribou seen or abundant fresh caribou sign (42 blocks);
Secondary – fewer than 12 caribou seen, or limited fresh sign (47 blocks); or
Out – no caribou and no recent fresh sign (127 blocks).

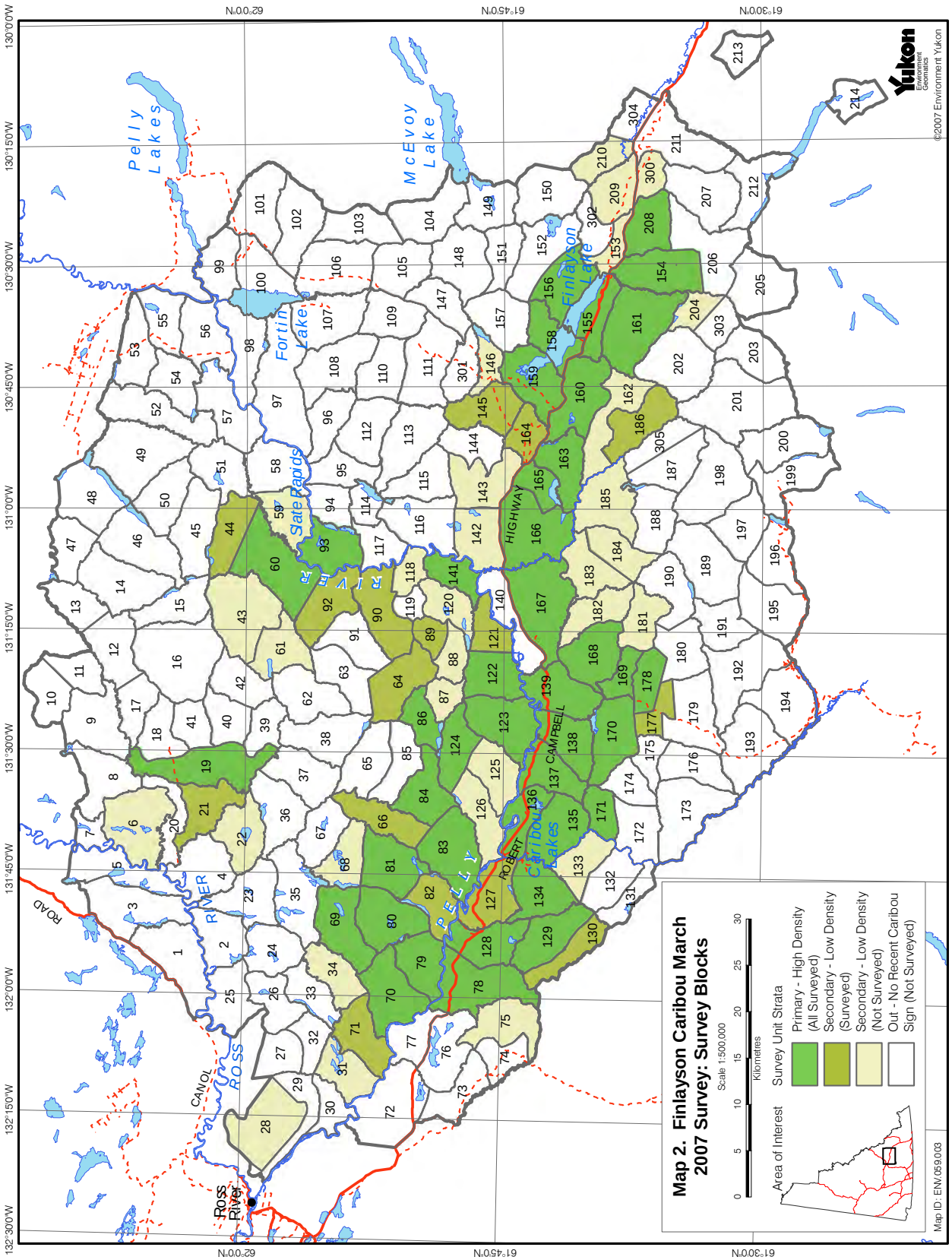
3. Using 2 helicopters, we counted each of the 42 primary blocks by flying in back-and-forth flight patterns designed to detect all groups of caribou. Flying time averaged 2 minutes per km^2 of each survey block. Sixteen of the 47 secondary blocks were chosen randomly and counted as representing all the secondary blocks (see Map 2).

4. All groups of caribou were classified from helicopters as to numbers of cows, calves, young bulls (antlered), and mature bulls (no antlers), and the location of each group was recorded with a GPS (Global Positioning System). Two helicopters were used at the same time to minimize the chance that caribou might move between survey blocks. The entire survey (fixed-wing and helicopter flying) was completed in 6 days.

5. Because some animals are always missed on aerial surveys, we used a "sightability correction factor" (SCF) of 1.22. This factor means that if we saw 100 caribou, we estimate that 22 additional caribou were there but not seen. An SCF is calculated by re-surveying an area just counted at a higher intensity (slower flying or flight lines closer together) to find animals missed on the first flight. An SCF was not calculated in 2007, but was based on the average of those calculated in 1996 (average SCF=1.24) and 1999 (average SCF=1.20) under similar survey conditions.

6. A computer program was used to give an estimate of total population size. The calculations were fairly simple: all the caribou seen in the primary blocks were added up, which accounted for more than 93 % of the total. The much lower numbers of caribou seen in the 16 secondary blocks were treated as though the same overall numbers of cows, calves and bulls had been found in the other 29 secondary blocks, taking into account the relative area of each block. The combined total from the primary and secondary blocks was multiplied by 1.22 to account for caribou not seen during the survey. The computer program calculates a variance around the population estimate; the variance is a measure of the uncertainty in the survey result.

Figure 2. Aerial view of Finlayson caribou sign on a frozen pond, March 2007. All 42 blocks with abundant fresh caribou sign were classed as Primary and surveyed.


Map 2. Finlayson Caribou March 2007 Survey: Survey Blocks
Scale 1:500,000
0 5 10 15 20 25 30
Kilometres
Survey Unit Strata
Primary - High Density (All Surveyed)
Secondary - Low Density (Surveyed)
Secondary - Low Density (Not Surveyed)
Out - No Recent Caribou Sign (Not Surveyed)
Area of Interest
Map ID: ENV.059.003
©2007 Environment Yukon
Yukon
Environment
Economics
Pelly Lakes
McEvoy Lake
Fortin Lake
Finlayson Lake
State Rapids
HIGHWAY
CAMPBELL
ROBERT
PELLY
Caribou Lakes
ROSS RIVER
CANOL
ROAD
Ross River
130°0'0"W
130°15'0"W
130°30'0"W
130°45'0"W
131°0'0"W
131°15'0"W
131°30'0"W
131°45'0"W
132°0'0"W
132°15'0"W
132°30'0"W
62°0'0"N
61°45'0"N
61°30'0"N

WEATHER AND SNOW CONDITIONS

Weather during the 6 days of the survey was generally good, with sunny skies, scattered clouds, or high overcast conditions. Occasionally there was some low fog or cloud cover in the mornings, which delayed the start of the day's flying. Temperatures were -10 to -15 °C in the early mornings, and were usually a few degrees above freezing in the afternoons. There were a few localized snow squalls but no extended snowfall. Light conditions were generally good and allowed us to assess whether caribou sign was fresh or older, although there were some periods when broken cloud or overcast made the light conditions on the ground flatter, without sharp edges on the shadows. Snow cover on the ground was continuous and averaged 40–50 cm deep, which was normal or slightly above normal for the region at that time of year. There were several snowfalls in the region at the end of February and beginning of March, which allowed us to separate recent caribou feeding craters and tracks from older caribou sign. Flying time on each day of the survey ranged between 4 and 7.5 hours.

RESULTS AND DISCUSSION

Population estimate and trend

The estimated number of caribou in the Finlayson herd in March 2007 was 3,077 +/- 5.6% at the 90% confidence level (Table 1). About two-thirds of these were cows, with calves (13.6%), young bulls (9.8%), mature bulls (5.7%) and unclassified caribou (0.4%) making up the other third of the herd. The calf:cow ratio of 21.7:100 was similar to the October 2006 calf:cow ratio of 18.0:100, and the bull:cow ratio of 36.6:100 was similar to the October 2006 ratio of 39.0:100.

Table 1. Estimated numbers of Finlayson caribou in March 2007

Survey Component: Number of Caribou	Total Caribou	Cows	Calves	Young Bulls	Mature Bulls	Not Classified	*Area of blocks*
Number of caribou in primary blocks (42) – All counted	2,346	1,578	344	239	174	11	1,360 km^2
Number of caribou in secondary blocks counted (16 of 47)	60	3	0	3	54	0	429.5 km^2
Estimate of caribou in all secondary blocks (47)	176	9	0	9	159	0	1,261.7 km^2
Total number of caribou (not corrected for caribou not seen)	2,522	1,587	344	248	333	11	2,622.5 km^2
Population estimate (corrected for caribou not seen)	3,077 +/- 5.6%	1,935	420	302	406	13	2,622.5 km^2
Calves:100 Cows	21.7:100						
Bulls:100 Cows	36.6:100						

The results of this survey confirmed the decline expected from fall calf:cow ratios from 1999 to 2006. There has been a continual decline since 1990, and about 1,000 caribou fewer than the March 1999 estimate of 4,130 +/- 16.9% (Graph 4).

Graph 2. Estimated Population Size of Finalyson Caribou Herd in the Southeast Yukon, from March Surveys.

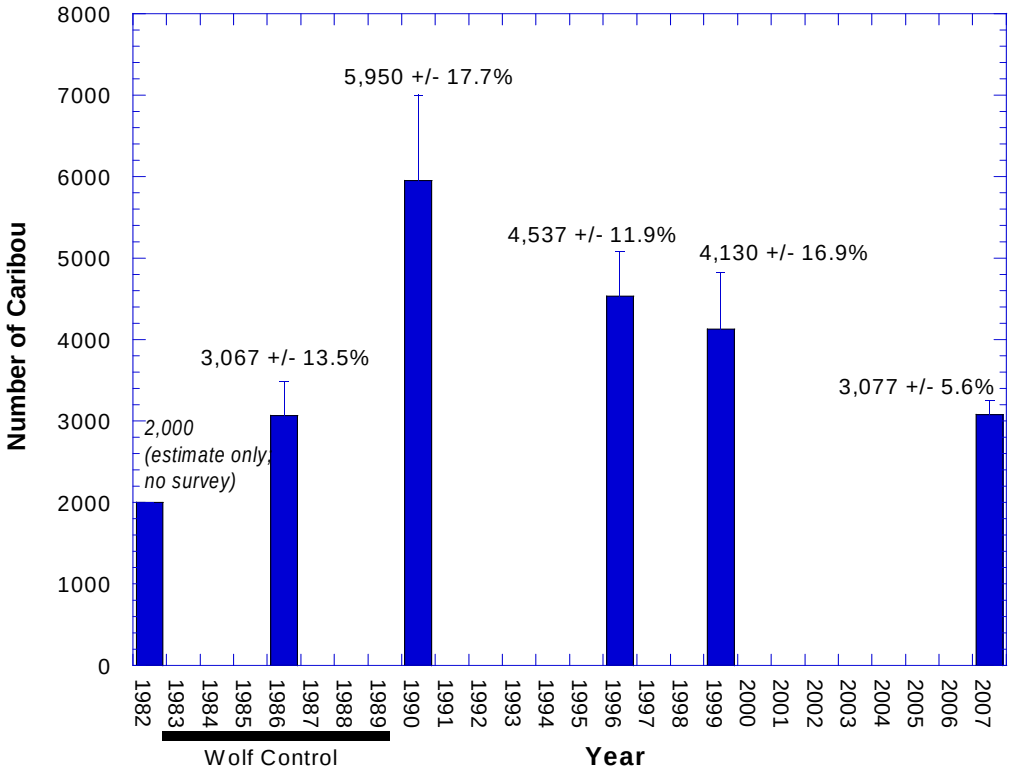


Figure 3. Snow depth near Finlayson lake was unusually shallow in 2007.

Caribou concentration near Finlayson Lake and snow depths

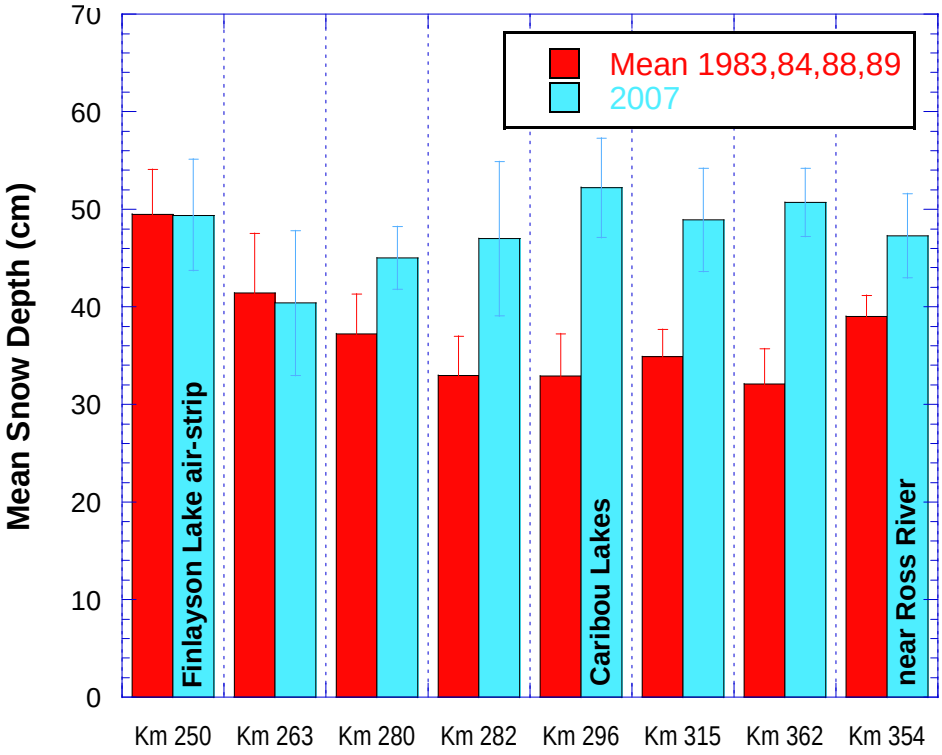
Well over half the caribou were seen in 10 survey blocks surrounding Finlayson Lake (Map 3). A lesser concentration of caribou was found in a series of blocks just south of the Campbell Highway in the Caribou Lakes area, and there were a few groups north of the Pelly River and in the Slate Rapids area. The caribou distribution seen in this survey differed substantially from the distribution found during surveys in March 1986, 1990, 1996, and 1999 (Map 4), when most caribou wintered south of the Pelly River and the Campbell Highway (near Caribou Lakes), with very few caribou near Finlayson Lake.

To assess whether the altered distribution of caribou in 2007 might be related to snow conditions, on April 4 and 5 we did a series of snow depth measurements at the same sites late-winter snow depth had been measured annually in the 1980s (R. Farnell, unpublished data). At each of 8 sites just off the Campbell Highway, beginning near Finlayson Lake and ending near Ross River, snow depth was recorded on a meter stick 10 times with 3 paces between measurements. Snow depth was also measured at 5 more sites along the Campbell Highway towards Watson Lake, to assess snow cover east and south of the Finlayson winter range; we often noted that snow-banks along the sides of the road increased east and south of Finlayson Lake, towards Frances Lake and Watson Lake.

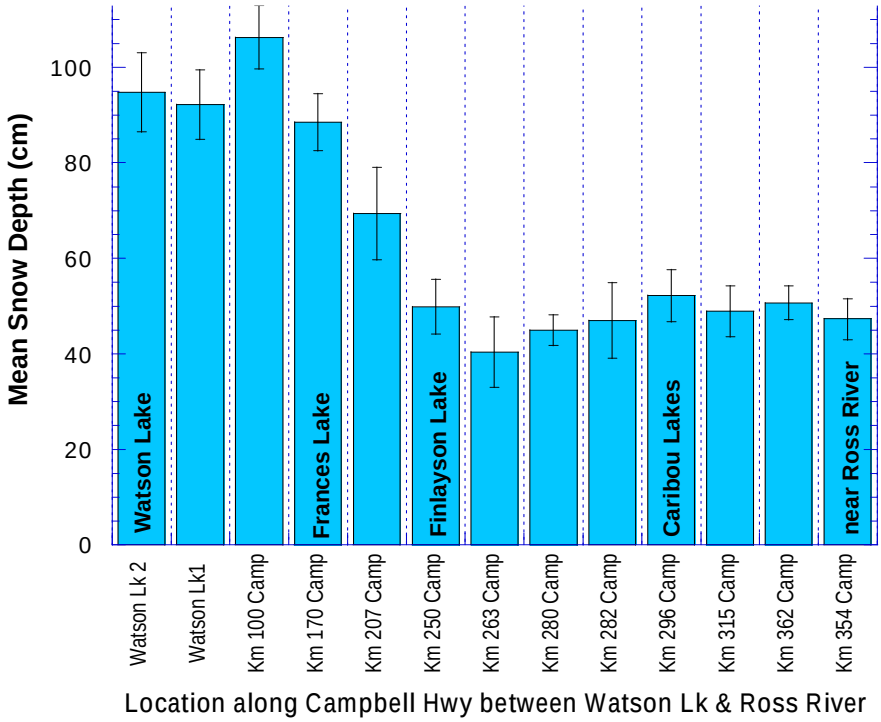
Snow depth across the Finlayson caribou winter range varied between 30 and 50 cm in the 1980s and in 2007 (Graph 3). In the 1980s, snow depth was usually greatest near Finlayson Lake, then decreased towards Caribou Lakes and Ross River. In 2007, however, the snow was deepest at Caribou Lakes and may have contributed to the shift of caribou towards Finlayson Lake.

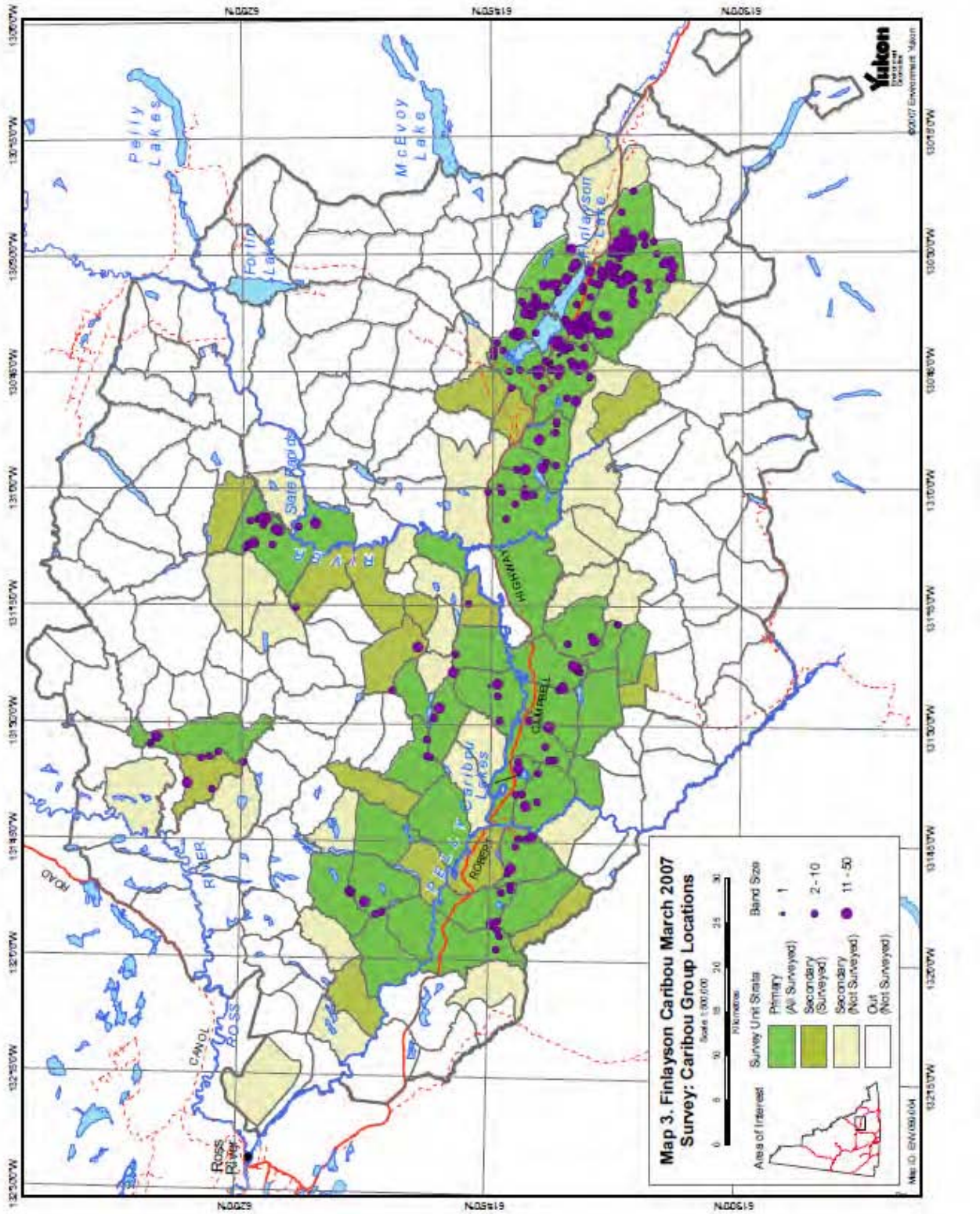
Along the Campbell Highway, snow was substantially deeper south of the main east-west line of the Pelly Mountains than in the Finlayson range (Graph 4), demonstrating the snow shadow effect of the Pelly Mountains.

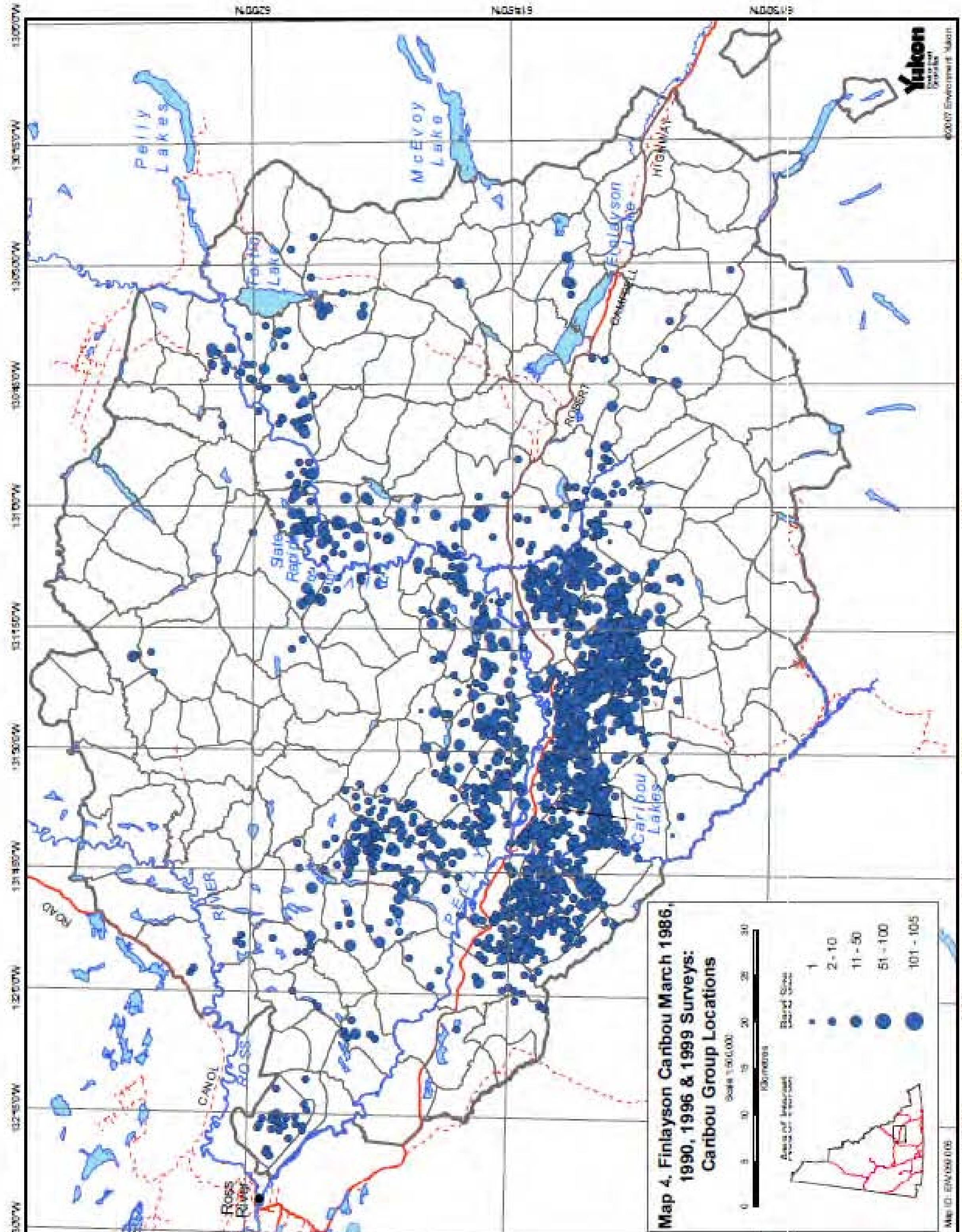
Graph 3. Mean Snow Depth in Finlayson Caribou Range between Finlayson Lake and Ross River



Graph 4. Mean Snow Depths From Watson Lake to Ross River along Campbell Hwy, April 4-5, 2007




Map 3. Finlayson Caribou March 2007
Survey: Caribou Group Locations
Survey Unit Strata
Primary (All Surveyed)
Secondary (Surveyed)
Secondary (Not Surveyed)
Out (Not Surveyed)
Band Size
1
2 - 10
11 - 50
Area of Interest
Pelly Lakes
McEvoy Lake
Finlayson Lake
Fortin Lake
State Road
HIGHWAY
Tablets
Caribou Lakes
ROAD
RIVER
CANOL
ROSS
Ross River


Map 4. Finlayson Caribou March 1986, 1990, 1996 & 1999 Surveys: Caribou Group Locations
Band Size
1
2 - 10
11 - 50
51 - 100
101 - 105
Pelly Lakes
McEvoy Lake
Finlayson Lake
Caribou Lakes
Ross River
HIGHWAY
ROBERT
CANOL
ROAD
RIVER
Yukon

Composition of caribou groups of different sizes

Caribou were found in groups ranging in size from 1 to 43. We assessed the average composition (proportions of cows, calves, and bulls) of caribou groups in size classes 1-5, 6-10, 11-20, and 21-43 (Table 2). Cows were, on average, more than half the group in each size class, but the proportion of cows was greatest in the biggest groups (72.4%) and least in the smallest groups (56.6%). The calves:100 cows ratio was greatest in the smallest groups (28.6), second-highest in the largest groups (23.6) and lowest in groups of 11-20 (18.3). Young bulls were found in similar proportions in all groups sizes, while mature bulls were rare in the largest groups (1.4%) and most common in the smallest groups (17.9%). Of the 228 mature bulls counted, 198 (86.8%) were in all-bull groups.

Table 2. Composition of caribou groups of different sizes, Finlayson March 2007 Survey.

Caribou Group Size	No. Groups	No. Cows	Average % Cows	No. Calves	Average % Calves	No. Young Bulls	Average % Young Bulls	No. Mature Bulls	Average % Mature Bulls	Calves: 100 Cows	Bulls: 100 Cows
1-5	65	133	56.6	38	16.2	18	7.7	42	17.9	28.6	45.1
6-10	85	424	63.5	94	14.1	69	10.3	80	12.0	22.2	35.1
11-20	67	638	66.1	117	12.1	107	11.1	98	10.2	18.3	32.1
21-43	22	466	72.4	110	17.1	58	9.0	9	1.4	23.6	14.4

Distribution of cows, calves and bulls

Because about two-thirds of the caribou counted on the March 2007 survey were clustered near Finlayson Lake, we compared the proportions of cows, calves and bulls found in 10 primary survey blocks near Finlayson Lake with the proportions found in 9 primary blocks near Caribou Lakes (Table 3). There were more than 5 times as many caribou in the Finlayson Lake cluster compared to the Caribou Lakes cluster, with similar high proportions of cows in both areas. There were few mature bulls in either area, particularly near Finlayson Lake, and the calves: 100 cows ratio was higher near Finlayson Lake (22.3) than near Caribou Lakes (17.7).

Table 3. Composition of Finlayson Lake and Caribou Lakes clusters of caribou, Finlayson March 2007 survey.

Caribou Cluster	No. Caribou	No. Cows	% Cows	No. Calves	% Calves	No. Young Bulls	% Young Bulls	No. Mature Bulls	% Mature Bulls	Calves: 100 Cows	Bulls: 100 Cows
Finlayson Lake	1,645*	1,191	72.8	265	16.1	166	10.1	23	1.4	22.3	15.9
Caribou Lakes	305	215	70.5	38	12.5	36	11.8	16	5.2	17.7	19.5

Finlayson Lake Group: 10 Primaries – Blocks 154, 155,156,158,159,160,161,163,165,166.
Caribou Lakes Group: 9 Primaries – Blocks 78,128,129,134,135,136,137,138,139.
* 11 unclassified caribou omitted.

We mapped the calf:cow ratio in caribou groups of different sizes seen during the survey (Map 5) to look for spatial patterns and found that large groups with higher calf:cow ratios tended to be most common near Finlayson Lake. We also mapped the percentage of bulls among adult (non-calf) caribou in caribou groups of different sizes (Map 6) and found a strong segregation of bull-only groups north and east of the Pelly River.

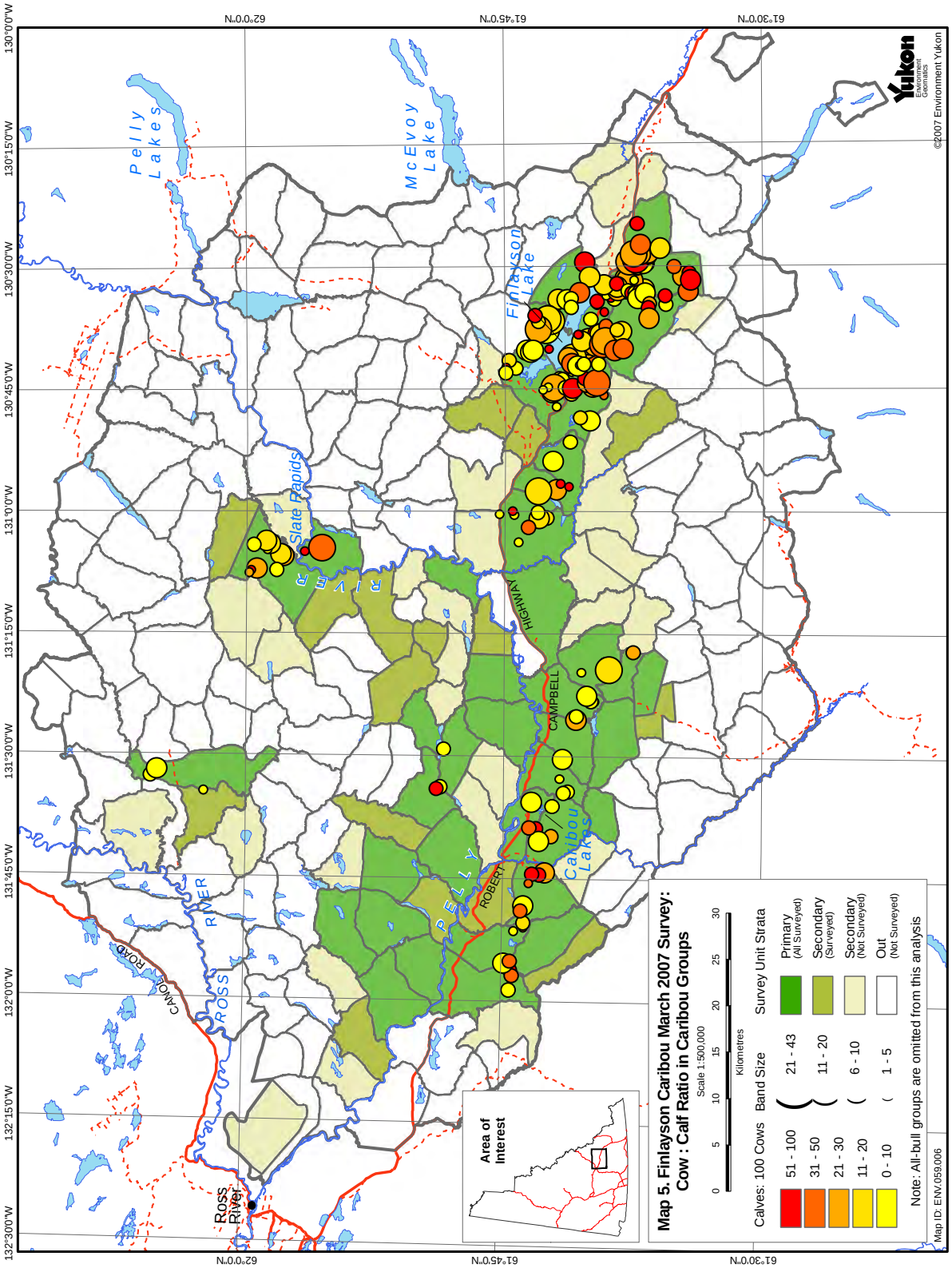
The segregation of bulls (particularly mature bulls) away from the main cow-calf concentrations of the herd is consistent with observations from earlier March surveys of this herd (R. Farnell, R. Florkiewicz, unpublished data). Because bull groups tend to be smaller, the survey blocks in which they are found are often classified as secondary. Because only a percentage of the secondary blocks are counted, some key blocks with bull-only caribou groups will be missed, by chance, which would not likely happen with the main aggregations of cows, calves, and young bulls in the primary blocks. Segregation patterns have been an issue in past March surveys of this herd (R. Farnell, R. Florkiewicz, unpublished data). In the March 2007 survey, the similarity of the bull:cow ratio to the fall 2006 bull:cow ratio provided some assurance that no significant bull aggregations were missed.

The tendency toward higher calf:cow ratios in the main concentration of wintering caribou near Finlayson Lake, particularly in larger groups, is intriguing. It is difficult to know whether this pattern reflects higher caribou calf survival in the Finlayson Lake area in winter, or a tendency for cows with calves to aggregate in that region, with calf:cow ratios mostly reflecting calf mortality earlier in the year on alpine ranges.

Other wildlife sightings

We saw 245 moose in the 1,789.5 km^2 of primary and secondary blocks surveyed for caribou, for an estimated density of 137 moose per 1,000 km^2 over the entire area. Most of the moose were found in regenerating burns. This estimate of moose density is considered low by Yukon-wide standards, and is much lower than the 228 moose per 1,000 km^2 found for an area east of the Liard River in November 2006 (Westover et al. 2007). However, the survey blocks flown on this survey were all in prime caribou winter habitat, which is unlikely to be prime moose winter habitat. A different (higher) estimate of moose density might have resulted if the survey area and stratification of blocks had been based on moose or moose sign. The number of moose within the Finlayson caribou herd's range is important because, in a two-prey system (wolves, moose and caribou) where the caribou are declining the predation rates on caribou could depend on predation rates on moose (Farnell et al. 1996, Hayes et al. 2003).

One great grey owl was also seen on the caribou survey, and some (uncounted) flocks of ptarmigan.


Pelly Lakes
McEvoy Lake
Finlayson Lake
Slate Rapids
RIVER
HIGHWAY
CAMPBELL
Caribou Lakes
ROBERT
PELLY
ROSS RIVER
CANOL ROAD
Ross River
Area of Interest
Map 5. Finlayson Caribou March 2007 Survey:
Cow : Calf Ratio in Caribou Groups
Scale 1:500,000
0 5 10 15 20 25 30
Kilometres
Calves: 100 Cows
Band Size
Survey Unit Strata
51 - 100
31 - 50
21 - 30
11 - 20
0 - 10
21 - 43
11 - 20
6 - 10
1 - 5
Primary (All Surveyed)
Secondary (Surveyed)
Secondary (Not Surveyed)
Out (Not Surveyed)
Note: All-bull groups are omitted from this analysis
Map ID: ENV-059.006
Yukon Environment Geomatics
©2007 Environment Yukon
130°0'0"W
130°15'0"W
130°30'0"W
130°45'0"W
131°0'0"W
131°15'0"W
131°30'0"W
131°45'0"W
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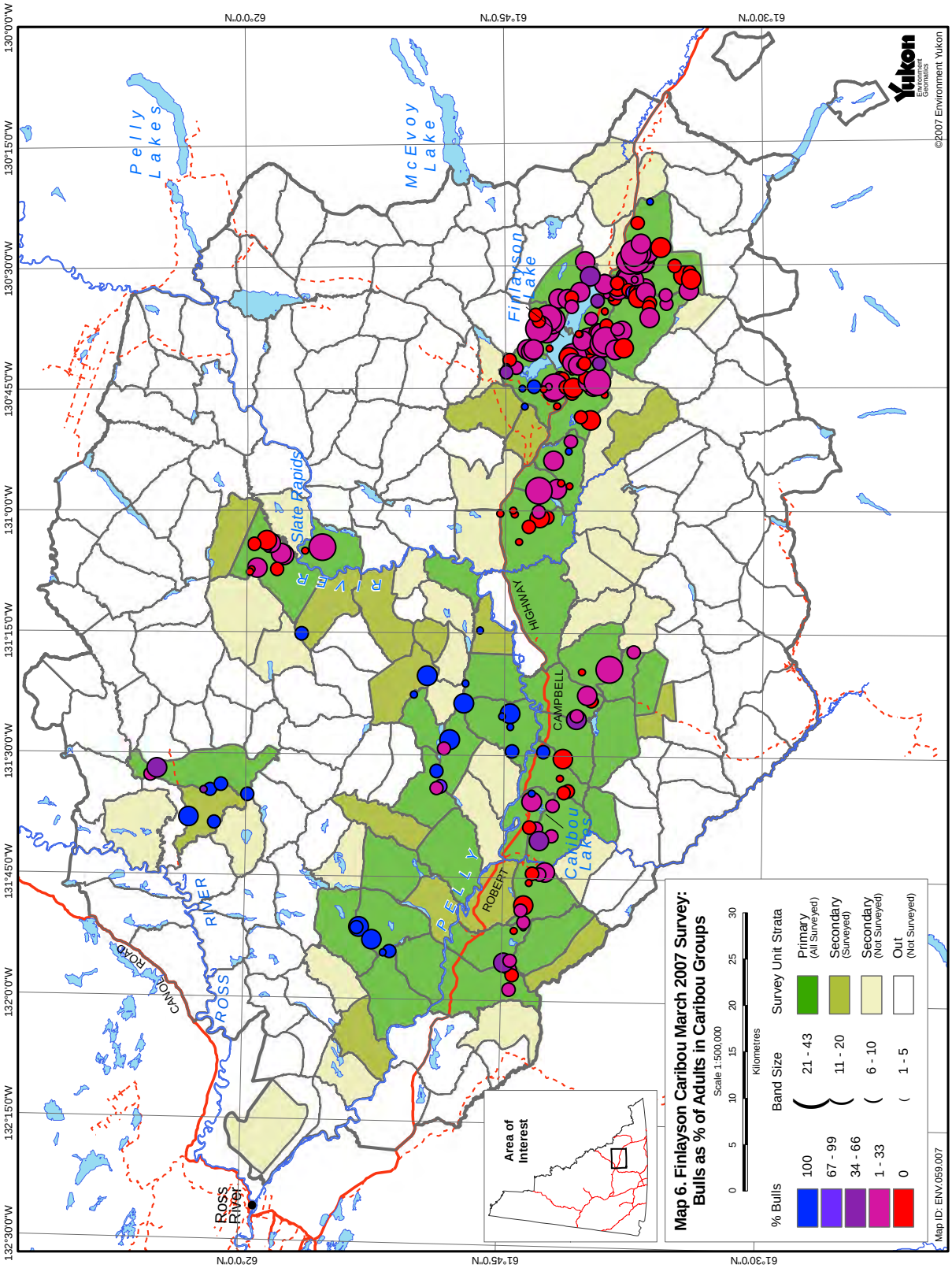
61°45'0"N
61°30'0"N


Map 6. Finlayson Caribou March 2007 Survey:
Bulls as % of Adults in Caribou Groups
Scale 1:500,000
Kilometres
0 5 10 15 20 25 30
% Bulls
Band Size
Survey Unit Strata
100
67 - 99
34 - 66
1 - 33
0
21 - 43
11 - 20
6 - 10
1 - 5
Primary (All Surveyed)
Secondary (Surveyed)
Secondary (Not Surveyed)
Out (Not Surveyed)
Area of Interest
Pelly Lakes
McEvoy Lake
Finlayson Lake
Slate Rapids
RIVER
HIGHWAY
CAMPBELL
Caribou Lakes
PELLY
ROBERT
ROSS
RIVER
CANOL ROAD
Ross River
Yukon
Environment
Environnement
Canada
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Map ID: ENV.059.007
62°0'0"N
61°45'0"N
61°30'0"N
130°0'0"W
130°15'0"W
130°30'0"W
130°45'0"W
131°0'0"W
131°15'0"W
131°30'0"W
131°45'0"W
132°0'0"W
132°15'0"W
132°30'0"W

CONCLUSION

The Finlayson caribou herd was estimated to be 3,077 caribou +/- 5.6% in March 2007.The Finlayson caribou herd declined by about 1,000 animals since March 1999. The observed decline had been expected because of the poor calf recruitment in most years during that period. The 2007 survey marked the continued decline in numbers since 1990. There can be no sustainable hunter harvest from a herd showing a steady decline in numbers.

Nearly 2/3 of the herd was clustered near Finlayson Lake. In 1986, 1990, 1996, and 1999 the bulk of the herd was found near Caribou Lakes. The shift in distribution may have been in part due to deeper-than-normal snow near Caribou Lakes in 2007. Mature bulls were mostly found in bull-only groups north and west of the Pelly River, while the main body of the herd was in cow-dominated groups near the Campbell Highway.

REFERENCES

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BUDGET

Item	Cost ($)
Helicopter 1 (27.5 hours @ $824/hr, no fuel)	$22,666
Helicopter 2 (25.8 hours @ $960/hr, no fuel)	$24,768
Fixed-wing 1 (Cessna 206, 6.5 hours @ $307/hr, no fuel)	$ 1,995
Fixed-wing 2 (Bushhawk, 9.1 hours @ $337/hr, no fuel)	$ 3,066
Jet B fuel - helicopters; Watson Lake 12 x $120.00 [drum] + 12 x $254.36 [fuel]	$ 4,492
Jet B fuel - helicopters; Whitehorse 27 x $120.00 [drum] + 27 x $188.86 [fuel]	$ 8,339
Avgas fuel - fixed-wings; Whitehorse 7 x $120.00 [drum] + 7 x 270.66 [fuel]	$ 2,734
Community observer flying ($150.00/day; 2 observers did not want payment)	$ 150
Staff hotel bills and meals in Ross River	$ 5,195
Total	$73,405