

MEALY MOUNTAIN CARIBOU HERD COMPONENT STUDY

Density Distribution Survey and Population Estimate

For

**PHASE III
TRANS LABRADOR HIGHWAY
Happy Valley-Goose Bay To Cartwright Junction**



**GOVERNMENT OF
NEWFOUNDLAND AND LABRADOR**

**Department of Tourism, Culture, and Recreation
Science and Research Division**

**A co-operative project between
Department of Works, Services, and Transportation
and
Wildlife Science and Research Division
Department of Tourism, Culture, and Recreation**

Report prepared by

**Robert D. Otto
Senior Wildlife Biologist (Labrador)
Science Division - Wildlife and Protected Areas
Department of Tourism, Culture, and Recreation**

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Executive Summary

The Mealy Mountain caribou herd of south-eastern Labrador is listed as “Threatened” by both provincial and federal governments. Routing options for phase III (Cartwright Junction to Happy Valley - Goose Bay) of the Trans Labrador Highway pass through the historic range of this herd. In 1994 a minimum population count found approximately 500 animals over the range of the herd, while the entire population was estimated at 243 animals in 1997. During late-winter 2002, approximately 31 000 km² was surveyed using a stratified block design, with high and low density areas receiving approximately 10% and 5% coverage, respectively. A total of 139 caribou were observed “on-transect” in 7 discrete groups, with an additional 7 animals observed “off-transect” during surveys, resulting in a population estimate of 2585 ± 1596 caribou. Six (6) caribou were fitted with Very High Frequency (VHF) radio collars for a subsequent radio telemetry project. During capture efforts, an additional 137 different caribou were observed for a minimum population count of 283 animals. Caribou were observed in most of the historic range of the herd, with the major concentration along the Strand just north of the North River. Caribou were found dispersed throughout that area where the proposed Phase III routing occurs.

Background

The Mealy Mountain caribou herd (MMCH) occupies that area of Labrador from the Kenamu River near Goose Bay eastward to the south Labrador coast. The northern limit for the herd is essentially Lake Melville and Groswater Bay, with incidental and survey reports of occasional animals on the northern shore of Groswater Bay, and near the community of Rigolet. This herd extends southward toward the Lower north shore of Quebec as well as toward the Straits area of Labrador. It is difficult to determine the exact extent of the southern limit of the herd, as there are local pockets of caribou existing in these southern areas, and their herd affiliation, if any, is not understood.

Woodland caribou in Labrador are listed as "Threatened" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The MMCH is the scientifically least well known of the three recognized Woodland caribou herds in Labrador, and has not been the subject of ongoing research and monitoring efforts since 1988. However, in 1994 a survey of the herd range was undertaken and provided a minimum count of approximately 500 animals (Chubbs 1994). In 1997, a density-distribution survey was completed to estimate population size, and resulted in an estimate of 223 animals (Schaefer 1997). However, the 1997 work was hampered by a clumped distribution of sighted animals, many observed while off survey lines. As a result, the confidence interval for this work was extremely wide, covering approximately 200% of the estimate.

The MMCH has undergone wide fluctuations in population size in the past. For instance, the herd was estimated at less than 200 individuals in the mid-1970's, increasing to approximately 2000 animals in the mid-1980's. Coupled with the estimates from 1994 and 1997, it is clear that the MMCH herd exhibits an inherent population cycle. However, there is a high potential for new pressures, such as road construction, tree harvesting activities, and increased human access to the area, to have a major impact on herd dynamics.

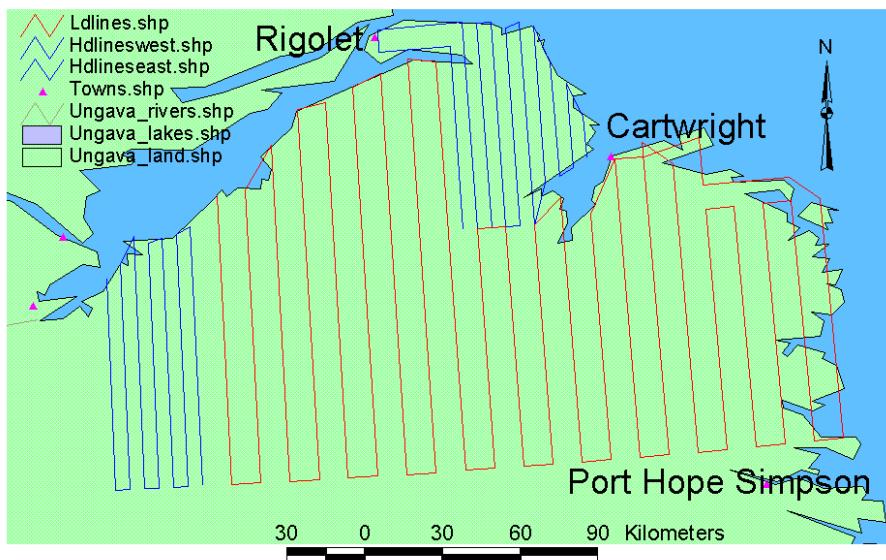
This report summarizes the first step in re-establishing an ongoing research and monitoring program on the MMCH: a density distribution survey, population estimate, and initial collaring of a sample of individuals from the herd.

Density Distribution Survey Methods

Caribou or their sign were located visually from an A-Star 350-B model helicopter along north-south flight lines forming a grid pattern over the majority of the historic range of the MMCH. Survey area was delineated to maintain continuity with previous surveys, and to accommodate areas

where recent sightings have occurred. Survey crew consisted of two experienced observers on either side of the aircraft, including the pilot, experienced in various wildlife surveys. The area was divided into high and low density strata, based on previous caribou locations and historic knowledge of MMCH occurrence. High density strata lines were spaced at intervals of 5 minutes of longitude (approximately 5.54 km). Low density strata were spaced at intervals of 10 minutes of longitude (approximately 11.1 km). Figure 1 shows the grid system layout design for the survey, including the high and low density strata areas. Lines were flown at an average of 500 to 700 feet above ground level (AGL), at an average speed of approximately 150-200 km/h, with observers concentrating on that area within 250 m on either side of the aircraft, resulting in an effective transect width of 500 m.

Figure 1. Survey design including high density (blue) and low density (red) survey strata, Mealy Mountain caribou survey 2002.

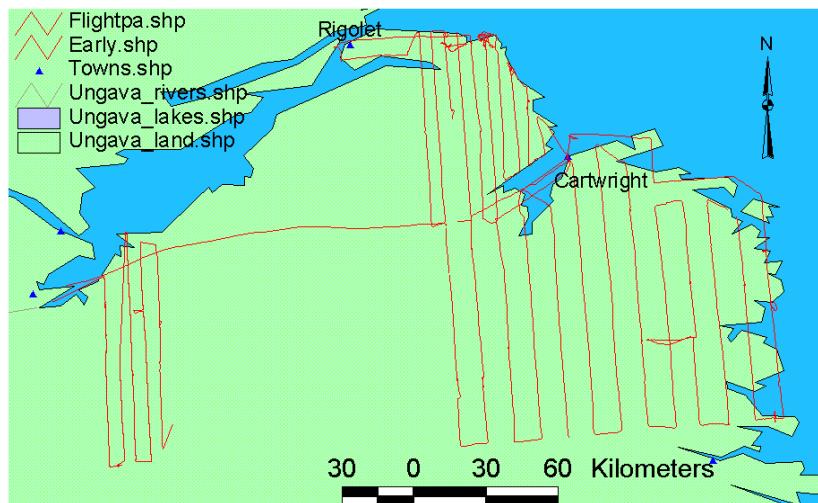


Observations of either caribou or sign were made beyond the 250 distance whenever possible, with all observations recorded with global positioning system (GPS) coordinates, allowing precise determination of location relative to the transect. During all survey flights, a datalogging GPS unit was used to record the position of the survey helicopter while traversing survey lines, as well as when following animal sign/observations. There were times when GPS coverage was poor, and/or when the GPS settings were not in effect, resulting in gaps in the digital record. In addition to

caribou sightings, crews recorded all observations of animals or sign for fox, otter, porcupine, lynx, moose, and wolf. All animal sightings were recorded with a GPS location.

Surveys were conducted on five individual days between 26 March and 7 April 2002. A total of 38 transect lines were flown. There was little snowfall (< 10 cm) during the survey period, with greatest accumulations (10 - 15 cm) occurring in the northwestern portion of the survey area (Mealy Mountains proper). However, because the surveys were flown west to east, the accumulation occurred after that area was surveyed. Great care was taken to perform surveys when conditions were considered at least good, with all but one day considered as very good or optimal conditions. One observer on all survey flights was provided by the Innu Nation. Figure 2 shows flight lines and transit routes actually flown during the survey; a portion of the survey is missing due to poor GPS reception and/or GPS malfunction.

Figure 2. Actual survey flight lines flown during Mealy Mountain caribou survey, 2002. Note : missing central portion due to GPS malfunction.



Caribou Live Capture Methods

Captures were conducted as soon as enough animals and groups were located to make it efficient, and were started on 5 April, ending on 7 April 2002. During this time period, two helicopters were in the air simultaneously, with the survey crew working lines in advance of the capture crew. Captures were conducted from an AS350-BA helicopter. All caribou captures were

performed with the use of a net, fired from the helicopter, with the animals hooded and physically restrained. No chemical immobilizing agents were used. Caribou were colour ear-tagged and measured, and blood and fecal samples were collected whenever possible. Animals were fitted with very high frequency (VHF) radio transmitter collars (Telonics, Inc., Mesa, AZ, USA) and released. One animal was captured on 5 April, four on 6 April, and one on 7 April. When returning to Goose Bay on 7 April, the first five animals captured (during the previous days) were checked and were alive. One assistant for all capture work was provided by the Innu Nation. Table 1 summarizes the capture effort with locations mapped in Figure 3.

Table 1. Mealy Mountain caribou herd capture information, April 2002.

Date	Animal ID	Location	Frequency	Sex	Age
5 April	MM2002001	north Park Lake	151.570-s	M	3-4
6 April	MM2002002	Paradise river	151.450-s	F	4-5
6 April	MM2002003	Paradise river	151.290-s	M	unk
6 April	MM2002004	SE Mealies	151.120-s	F	6-7
6 April	MM2002005	SE Mealies	150.750-s	F	calf
7 April	MM2002006	Strand	151.580-s	F	unk

Analysis Methods

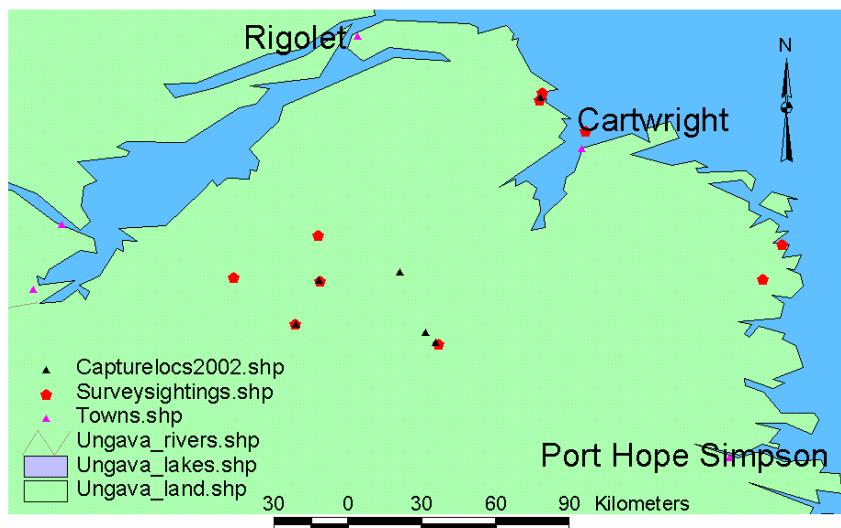
Calculation of population size and variance followed Gasaway et al. (1986). Briefly, observable stratum population estimates and variances were calculated, followed by total observable population estimate, sampling variance, and degrees of freedom. Next, an expanded population estimate was calculated, as well as total sampling variance. Finally, a total population estimate and confidence interval was determined. A sightability correction factor of 1.2 was used (Bergerud 1963). Calculation of transect length and area of sampling strata were performed using ArcView GIS.

Results and Discussion

A total of 139 caribou were observed “on-transect” with an additional 7 caribou found “off-transect” during survey flights. Zero caribou were observed in the western High Density stratum, 70 caribou in five (5) discrete groups observed in the Low Density stratum, and 69 caribou in two (2)

discrete groups observed in the eastern High Density stratum. Most observations of caribou were made within a few seconds of spotting tracks. On two occasions tracks were observed and subsequent search effort found groups of caribou. On two occasions we followed tracks and were unsuccessful in finding caribou. Pooled observations from both the survey and capture flights resulted in a minimum count of 276 animals. Locations of caribou observations are shown in Figure 3.

Figure 3. Locations of caribou found during Mealy Mountain caribou survey (red pentagons) as well as caribou capture locations (black triangles)



Otter, fox, and porcupine were the most numerous wildlife observations made during the surveys. Other regularly recorded observations included moose, marten, polar bear, and lynx. Only one set of wolf tracks were observed. Table 2 outlines frequency of non-caribou wildlife observations.

Table 2. Non-caribou wildlife observation frequency during Mealy Mountain caribou density-distribution survey, 2002.

Species	Sighting Count
Otter (<i>Lutra canadensis</i>)	50
Fox (<i>Vulpes vulpes</i>)	44
Porcupine (<i>Erethizon dorsatum</i>)	13
Moose (<i>Alces alces</i>)	12
Marten (<i>Martes americana</i>)	5
Polar bear (<i>Ursus maritimus</i>)	2
Wolf (<i>Canis lupus</i>)	1
Lynx (<i>Lynx canadensis</i>)	1

Caribou densities were estimated at 0.048, 0.0, and 0.182 animals/km² for the Low Density, High Density west, and High Density east strata, respectively. The population estimate for the herd was **2585 ± 1596 caribou** (alpha = 0.10). The characteristic clumped distribution of caribou during this late winter period contributed to the large variance. However, compared to previous surveys using this methodology, the 90% confidence interval (CI) of ± 61.7% is quite respectable. The current population estimate indicates a very significant increase from the last census estimate in 1997 (Schaefer 1997). In fact, such a rate of increase is biologically impossible. However, if one uses the upper 90% CI from 1997 of 534 caribou, and the lower 90% CI from the present work of 989 caribou, the calculated rate of increase is 37% per annum. Such a rate of increase is still extremely high. There are several possible explanations for this current situation:

1. This census is inaccurate,
2. The 1997 census was inaccurate,
3. The rate of increase of the MMCH was extremely high during the interval from 1997 to 2002 (using the upper and lower 90% CI's for 1997 and 2002, respectively), and/or
4. There was significant immigration to the MMCH during the time interval from 1997 to 2002.

I believe this census was superior to that performed in 1997, primarily due to the fact that this census used a helicopter, while Schaefer (1997) used a fixed-wing aircraft. Helicopters provide significant advantages for surveys in forested areas of southern Labrador, including the ability to fly

more slowly, maintain optimum survey altitude, quickly investigate possible sightings of sign, and provide superior visibility. We observed significantly more caribou in the region of the southern Mealy Mountains, an area characterised by many small lakes and ponds, and much tree cover. Further, during the capture sortie to the Strand area, we observed many additional caribou in close proximity to sighted animals only after actively searching the immediate area. An inability to quickly and accurately search near to sighted animals will greatly affect ability to observe all animals on sampling transects.

Using the upper 90% CI from 1997 and the lower 90% CI from 2002, an annual rate of increase of approximately 37% would be required to explain the census results. During the surveys, 118 caribou were classified. Classification results are summarized in Table 3.

From the classification results obtained, recruitment rates are extremely high with this herd. Additionally, the sex ratio of one male for every two females indicates that survival rates are extremely high as well. Demographically, if such statistics were maintained over a period of five years, there would be a tremendous increase in herd size. The missing piece of this puzzle is an age structure of the population, which should be greatly skewed toward younger animals. This data does not exist at present. Based on these results, it is possible for this herd to have undergone a steep increase in population size over the past 5 years, but improbable.

Table 3. Classification summary of the Mealy Mountain caribou herd, March-April 2002.

Category	Statistic
Females	56
Stags	28
Calves	34
Calves/100 F	60.7
Stags/100 F	50.0
% Calves	28.8

During January 2000, approximately 3000-5000 caribou from the George River caribou herd crossed Lake Melville eastward toward the Backbay area north of Cartwright. At the time, many local residents suggested that some of these caribou would remain, and provide a large influx of animals

into the MMCH. During January 2000, Wildlife staff deployed three satellite collars on animals judged to be George River caribou. One collar malfunctioned shortly after deployment (< 1 month). Both remaining collared animals migrated back to the George River region in summer 2000. Additionally, the great majority of animals estimated in the MMCH presently were in the low density stratum, an area known to have not been subject to incursion by the migratory George River herd. Both pieces of evidence suggest that the results of this census were not the direct result of large numbers of George River caribou moving and remaining in this area.

Recommendations

These results suggest a significant increase in population size for the MMCH. However, it must be remembered that, just as in 1997, we are dealing with a population estimate that has no additional data (i.e., collaring information, or annual demographic data) from which to "check" the finding contained herein. Caution should always be exercised when interpreting results of population surveys, and great attention should be placed on the precision of the present estimate (± 1596 caribou). The method used to derive a population estimate is the best for the present circumstances of having no marked animals within the population (either collared or ear-tagged). I recommend that, to understand the dynamics and population size of this herd, we require two initiatives:

- a) annual demographic surveys to estimate recruitment and survivorship, and
- b) a follow-up survey in March 2004 that uses mark-recapture methods to estimate population size.

The population estimate in 2004 can be dovetailed with surveys flown to satisfy recommendation (a) to reduce costs.

I recommend that the western portion of the MMCH range be treated as a low density stratum for future surveys. In 1997 and during the present survey, no animals were sighted in this area, and anecdotal reports suggest this is the case.

Acknowledgments

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