

RESEARCH PROPOSAL TO THE NUNAVUT WILDLIFE MANAGEMENT BOARD

Prepared by: The Department of Sustainable Development
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Title: Population estimate and condition of island bound barren-ground caribou (*Rangifer tarandus groenlandicus*), Southampton Island NT.

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Background:

The Southampton Island caribou herd could be heading for a dramatic decline if their current rate of growth is maintained (Parker, 1975; Oullet, 1992). An analysis of forage quality, quantity, availability and type as well as caribou condition and a population estimate would help us determine if the Southampton caribou herd is beyond carrying capacity or has yet to approach it. Poor sightability and survey delays likely caused the 1995 population survey to underestimate the total number of caribou. These results introduce doubt as to whether the rate of growth of Southampton caribou is following an eruption pattern or if it is leveling off.

Wolves (*Canis lupus*) and barren-ground caribou (*Rangifer tarandus groenlandicus*) were a common component of Southampton Island ecology until the early 1900's. The decline of these animals became obvious by 1935 and was followed by the extinction of wolves by 1937 (Parker, 1975). The extirpation of caribou from Southampton was complete by 1953, a direct result of over hunting. The absence of this resource was keenly felt by residents of Coral Harbor prompting both the local HTO and government to initiate the re-introduction of caribou onto the Island. In 1967, 14 years following their extirpation, 48 caribou from Coats Island were introduced onto Southampton Island. Caribou numbers have since increased rapidly which is in part due to exceptional range conditions resulting from the 14-year absence of caribou from the Island. The lack of predation and low initial harvest rates also played a role in the overwhelming

success of the introduction which was first realized following a population survey in 1978, estimating 1,200 +/- 340 caribou (Heard and Ouellet, 1994). Since the 1978 survey the Southampton caribou population continued to grow rapidly to 4,000 +/- 660 in 1987, 9,000 +/- 3,200 in 1990, 13,700 +/- 1,600 in 1991, 18,275 +/- 1,390 in 1995 and finally 29,146 +/- 1,766 in 1997. These survey results, suggest a population growth rate of approximately 27 %/year which by 1991, was realized as a 5 fold increase in caribou densities in the vicinity of the Kirchoffer River (Heard and Ouellet, 1994).

The literature provides many examples of Island caribou population eruptions following introduction. These examples include the Islands of St. Paul (Scheffer, 1951), St. Mathew (Klein, 1968), Svalbard (Reimers, 1982) and South Georgia (Leader-Williams, 1988). The common thread connecting the dramatic declines observed on these islands appears to be related to forage quantity, quality and availability (Adamczewski *et al.*, 1988, 1993; Gates *et al.*, 1986; Heard and Ouellet, 1994; Ouellet, 1992; Ouellet *et al.*, 1994). Adamczewski *et al.* (1988, 1993) and Gates *et al.* (1986) identified winter forage availability as the catalyst for population fluctuations on Coats Island.

The Southampton Island Caribou Herd is extensively utilized both commercially and domestically. The latest estimates for annual domestic use are +/- 2,000 animals. Commercial harvests have seen a steady increase from 564 in 1991/92, to 759 in 1992/93, to 1554 in 1993/94, to 4,000 animals in 1996/97. A request to increase the commercial quota to 6,000 caribou was approved by the NWMB for the 1998-harvesting season.

Objectives:

The objectives of the proposed project are to: 1) monitor the condition of Southampton caribou and how any change in condition relates to range condition, availability and/or extent (supported by habitat mapping project); 2) determine the effect of the commercial harvest on the Southampton caribou and if the herd is beyond carrying capacity or has yet to approach it; and 3) incorporate the community members of Coral Harbor in the actual research process including data collection and interpretation in order to provide them with the tools necessary to become more involved in the management of the Southampton Island caribou herd.

The proposed studies will utilize condition and rumen analysis to determine Southampton Island caribou's current and projected state of health and an aerial survey for the purposes of management. Presently, large commercial quotas are being used in an attempt to manage the herd. Therefore, a population estimate combined with caribou condition and the condition of their habitat will play an essential role in steering management efforts in a direction that will provide sustainable harvests of caribou on Southampton Island over the long term. The proposed studies will attempt to answer the following questions:

- 1) Determine the condition of Southampton Island caribou

Biological rationale: The monitoring of sex and age specific condition will be achieved through the analysis of the Riney kidney fat index, the recording and sampling of any apparent disease and/or diseased tissue, the recording and sampling of parasitic infections, the measurement of back fat, bone marrow condition, pregnancy rates, fetal sex and age through the analysis of cementum-annuli. As condition work has been monitored over the last 4 years a continuation of this long term data set will greatly enhance our understanding of Southampton Island harvest management issues as well as our ability to predict future trends.

2) Determine the important forage species for caribou on Southampton Island

Biological Rationale: The identification of important winter forage species is a crucial component of any range study. In conjunction with the present commercial harvest rumen samples will be collected and analyzed. The condition of animals from which rumens are collected will also be examined. Over the long term, these combined data would provide an indication of condition change with change of preferred forage.

3) Determine the population of the Southampton caribou herd

Biological Rationale: Determination of population size is critical in assessing current management techniques in the search for sustainable harvests of the Southampton caribou herd. An aerial survey will provide a population estimate that will be used in two ways: using the population estimate from 1995 trend analysis will be performed; and, in amalgamation with range condition determination and the current habitat management project will provide carrying capacity status.

Study Area:

At 43,000 Km² Southampton Island is the largest Island in Hudson Bay. The entire western and much of the South eastern portions of the Island are dominated by low, flat often exposed limestone plains sparsely to densely vegetated by *Dryas integrifolia* (Mountain avens) barrens and *Carex* spp. (Sedge) meadows. The remainder of the Island is shaped by an undulating Precambrian shield dominated by a lichen (*Allectorina* spp., *Cetraria* spp.) and heath tundra (Heard and Ouellet, 1994). The snow season persists from mid-September to mid-June and accumulates up to 133cm of snow (Parker, 1975).

Methods:

The monitoring of sex and age specific condition will be achieved through the analysis of the Riney kidney fat index, the recording and sampling of any

apparent disease and/or diseased tissue, the recording and sampling of parasitic infections, the measurement of back fat, bone marrow condition, pregnancy rates, fetal sex and age through the analysis of cementum-annuli. All sampling will be carried out in conjunction with the commercial harvest which runs from mid-February to early May. Preferred forage species will be identified using rumen analysis. As condition work has been monitored over the last 4 years a continuation of this long term cost effective data set will greatly enhance both our understanding of Southampton Island harvest management issues and barren-ground caribou ecology in general.

The method proposed to achieve a population estimate is the stratified random transect aerial survey method. The method was chosen for reasons of continuity as well as appropriateness. The stratified random transect aerial survey technique is widely accepted as being the most cost effective means of estimating small populations while providing a high level of precision.

A high endurance single engine aircraft is recommended as the survey vehicle. Delineation or reconnaissance flights will be flown at low coverage for the purposes of determining relative densities of caribou within the study area. Based on this initial density information the study area will be divided into 3 strata. Actual survey effort will then be allocated proportionally to density in order to optimize the number of transects flown in each stratum. The first transect will be randomly placed along a baseline that bisects the stratum length-wise with each sequential transect evenly spaced. Survey data will be analyzed using Jolly's method 2 for unequal sample sizes.

Deliverables:

- 1) Annual progress reports to RWED HQ, contributing agencies, community HTO's and co-managers.
- 2) DRWED file report following data collection.
- 3) Published scientific papers in referred journals following data collection.
- 4) A cooperative RWED-Aiviit HTO five-year management plan.
- 5) Research summaries and public seminars on request.
- 6) The generation of over 100 person days of employment for local peoples.
- 7) The training of local contractors in data collection and analysis procedures.

The application of project results will be broad contributing to the refinement of a scientifically based management plan for Southampton Island caribou as well as to barren-ground caribou range ecology in general. It is hoped that an understanding of Southampton caribou condition and a population estimate will help managers make crucial harvest management decisions. Precise action will be required if we are to mitigate future large scale population fluctuations and the extensive long term range damage and recovery that would inevitably follow.

Schedule:

Condition and feeding habits data will be collected between February 1st and March 31st/2001 depending on commercial harvest start-up and completion. The aerial survey will occur in June 2001 and the rumen analysis will be completed by January 1st, 2002.

Personnel:

Mitch Campbell, Regional Wildlife Biologist, DRWED, Arviat, NT.

- project design and implementation

James McLelland, Acting Wildlife Technician, DRWED, Arviat, NT.

- coordinator of project logistics

One local hunter to be named by the Coral Harbour Hunters and Trappers

Organization to aid in data collection and to act as a survey observer.

Partners:

The proposed studies are a cooperative effort between the Department of Sustainable Development and the Coral Harbour Hunters and Trappers Organization. Present and future roles each of the organizations will play in the financial and logistic structure of the Southampton Island Management plan are being discussed.

Community consultation:

The proposed work is a component of a larger management plan being drafted by the Coral Harbour HTO and the Department of Sustainable Development. The goals of the management plan are two fold: to provide a long term management framework that will focus on maintaining caribou numbers at or above levels necessary to 1) sustain current and future domestic harvesting needs (primary objective), and, 2) sustain commercial harvesting needs (secondary objective). A copy of the proposal is currently being circulated to all regional HTO's and the Kivalliq Wildlife Federation for critical comment. Following the analysis, Coral Harbour will be revisited in order to explain the results of the rumen analysis, condition work, and population estimate. All display material and verbal communication will be transcribed and/or translated to insure understanding and inspire informed debate.

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Budget:

A: Project Expenditure Plan (2001)

**THE CONDITION, RANGE ECOLOGY, AND POPULATION ESTIMATE OF ISALND BOUND BARREN
GROUND CARIBOU (*Rangifer tarandus groenlandicus*), SOUTHAMPTON ISLAND NU.**

Output or Step	Person Days	2001 Expenditures (\$0.00)			
		Jan1-Mar.31	Apr.1-Sep.30	Oct.1-Dec.31	Totals
1 - Contract technician/observer (\$150/day x 20 days)	20	1.5 K	1.5K		3.00 K
2 - Snowmobile Rental (\$100/day x 15 days)		1.5 K			1.50 K
3 - Fuel purchase (600 L x \$.80/L)		0.5 K			0.5 K
4 - Fixed wing services (\$800/hr x 62.5hrs)			50.0K		50.0K
5 – Accommodations and food (20 nights x 2 staff)	20	4.0K	4.0K		8.0K
6 - Travel RWED x 2 staff		2.60 K	1.4K		4.0 K
7 - Pilot Accommodation and food (10 nights)	10		2.0K		2.0 K
8 - Incidentals (Shipping, equipment, lab supplies)		1.00 K	0.5K		1.50 K
9 – Sample Analysis – Rumens – 2000,2001 (\$7000 per year)			14.0K		14.0K
9 – Sample Analysis – Teeth - 1999, 2000, 2001 (\$1500 per year)			4.5K		4.5K
Totals		11.1 K	77.9 K		89.0K