THE DISAPPEARANCE OF CARIBOU REINTRODUCED TO CAPE BRETON HIGHLANDS NATIONAL PARK

Prepared for Parks Canada

by

T. Charles Dauphiné, Jr.
Canadian Wildlife Service

1974

Environment Canada / Environnement Canada

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K1A 0H3.

December 17, 1974.

Mr. P.A. Thompson,
Regional Director, Atlantic Region,
National and Historic Parks Branch,
5161 George Street,
Halifax, N.S.

Dear Mr. Thompson:

It is my pleasure to submit to you the original and two copies of a report entitled, "The Disappearance of Caribou Reintroduced to Cape Breton Highlands National Park," prepared by Mr. T.C. Dauphiné of the Canadian Wildlife Service. The report was requested by and is a contribution to the Parks Canada Inventory Program and was performed under the Advisory Services function of the Canadian Wildlife Service. Copies are being provided under separate cover to Regional Director, Ontario, and to the Director-General, Parks Canada. Mr. Dauphiné would like your approval to publish a modified version of the report (without the Recommendations) in a scientific journal. A copy of the modified version will be sent to you when it is prepared in several weeks.

Mr. Dauphiné's report describes a search conducted for the missing caribou in March 1973, by himself and the Warden Service. The results of this and later searches indicate that the caribou are indeed gone. He analyzes information obtained about the caribou since their release and evaluates various factors which could have caused their decline or disappearance. The evidence, which must remain circumstantial because no specimens could be obtained for examination, points to neurologic disease caused by a parasite of white-tailed deer as the most probable explanation. Mr. Dauphiné states that the lethal effect of this disease on wild caribou was unknown when the reintroduction took place, and that there would have been no practical way to prevent exposure to the parasite or death from the disease it caused.

I hope the report will be useful in dispelling some of the mystery surrounding the caribou's disappearance, and I welcome the comments of you and your staff concerning its presentation and content.

Yours sincerely,

J.E. Bryant,
Director.

Encl.

EMS-1004

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ABSTRACT

Fifty one caribou from Quebec were introduced into Cape Breton Highlands National Park, Nova Scotia, in 1968 and 1969. The herd was sighted frequently in and near the Park for about one year; it then declined and finally disappeared by the summer of 1972. An aerial and ground search in March 1973, revealed that the caribou were not present on the range they occupied in previous winters, and they could not be located in other parts of the northern peninsula of Cape Breton Island which offered suitable habitat. Observations made before the caribou's disappearance indicate that they did not disperse, but instead remained in the vicinity of their release site, making short seasonal movements between local habitats. Reproduction occurred. There is no evidence of extensive starvation, poaching, or predation. Neurologic disease, caused by the meningeal worm Parelaphostrongylus tenuis which parasitizes the white-tailed deer of the region, is implicated as the cause of the disappearance. During the decline of the herd, three caribou were observed with symptoms like those of neurologic disease.

INTRODUCTION

The woodland caribou (Rangifer tarandus caribou), which originally inhabited much of eastern Canada south of the St. Lawrence River, has been extirpated everywhere in that region except the Gaspé Peninsula (Banfield 1961: 73-76). This drastic reduction in range, brought about by excessive hunting and habitat destruction, was largely complete by 1900 (Smith 1940, Benson 1955, 1956, Benson and Dodds, unpublished manuscript). In the remote highlands of Cape Breton Island, however, some caribou persisted until they apparently succumbed to hunting in the 1920's. Their habitat remained relatively untouched by forestry, agriculture, and fire (Nichols 1918, Lamb 1954). Much of that original habitat has been preserved since 1936 within the boundaries of Cape Breton Highlands National Park (CBHNP). In the early 1960's the National and Historic Parks Branch, realizing the potential for the restoration of the woodland caribou in CBHNP, requested the Canadian Wildlife Service to appraise the feasibility of a reintroduction.

1939 - June 29 !
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CWS biologists examined the Park, concluded that it was capable of supporting caribou, and recommended obtaining wild, adult stock from neighbouring populations which bore closest taxonomic resemblance to the indigenous caribou of Cape Breton Island (Kelsall no date, Scotter 1966). Two groups of caribou, totaling 51 animals, were captured one year apart in northeastern Quebec and released in the Park (MacDonald 1969).

Three males and 15 females were captured at 51°30'N and 65°10'W and released on March 23, 1968. Five males and 28 females were captured near 53°00'N and 68°00'W and released on March 24, 1969.

The Park Warden Service surveyed the reintroduced herd each winter and also kept a record of sightings reported by the public. Many caribou, including some newborn calves, were observed in and near CBHNP during 1969 and 1970. Thereafter, the caribou were seen with diminishing frequency and in smaller groups; they finally disappeared - except for occasional unverified sightings - by the summer of 1972. The situation resembled the ill-fated introduction of 9 female and 2 male Newfoundland caribou to the Liscomb Game Sancturary on mainland Nova Scotia in 1939 (Tufts 1939). Those animals disappeared for unknown reasons a few years after their release (Cameron 1958).

In the autumn of 1972 the National and Historic Parks Branch requested the CWS to direct the Park Warden Service in a search for the caribou and, if the search was successful, to establish a system for monitoring the size of the herd and the condition of the habitat. This report describes a search conducted for the caribou in March 1973. It also analyses the information obtained about the caribou after their release on Cape Breton Island in an attempt to determine the probable cause(s) of their disappearance.

THE STUDY AREA

The northern peninsula of Cape Breton Island appears well suited to support caribou. The dominant topographical feature, the highland, is a massive, relatively level plateau of PreCambrian rock which ranges from 1000 to 1700 feet above sea-level. The sides of the plateau drop off steeply at coastal headlands and into deep, V-shaped valleys occupied by shallow, rapid streams.

The vegetation of the highlands is boreal and forms a mosaic of climax forest and open "barrens." On the plateau the forest consists predominantly of balsam fir (Abies balsamea) in pure stands and mixed with spruce (Picea mariana and P. glauca) and larch (Larix laricina). The forest varies in density from open, park-like stands to stunted thickets or "tuckamores." The barrens are formed by sphagnum bogs on wet sites and in dryer places by heaths of ericaceous shrubs, sedges (Carex spp.) and lichens. Nearly pure stands of Cladonia and Cetraria lichens, staple winter foods of caribou, are extensive in the southeastern part of the Park (Scotter 1966). With decreasing elevation on the slopes of the plateau, the forest cover becomes continuous and the species composition grades through coniferous-deciduous mixtures to a deciduous Acadian forest community near sea-level. The plant associations of CBHNP have been described and mapped by Atlantic Resource Planners (1972) and Beil et al. (1971).

The cool, damp maritime climate of Cape Breton Island has a mean annual temperature of 36°F, a mean temperature in January of 28°F and in July of 63°F, a mean annual precipitation of 45 inches, and a mean annual snowfall of 100 inches (Canada Department of Transport 1970). However, there are no published climatological data which satisfactorily describe the conditions which exist on the northern highlands, where elevation has a large effect. Kelsall (1965) reported that the average accumulation of snow on the plateau near CBHNP in March of 1965 was over twice what it was at sea-level only two miles away. He also found that the snow on the highlands, which ranged from an average depth of 27 inches in open barrens to over 60 inches in some forests, had multiple layers of dense, hard crust caused by the frequent thaws characteristic of the region's maritime climate. Kelsall concluded that that type of snow could seal off terrestrial forage from the reach of caribou.

While the floral composition of much of the Cape Breton highlands is unchanged since the time of the indigenous caribou, there have been major changes in the fauna. The white-tailed deer (Odocoileus virginianus) first appeared in northern Cape Breton Island about 1915 (Benson 1955: 23) and has been abundant in CBHNP for the last three decades (Clarke 1942, Carter 1955, Benson 1961). The moose (Alces alces), which became very scarce or extinct on northern Cape Breton Island about 1900 (Benson 1955), was successfully reintroduced into

CBHNP in 1947 and now occupies most areas of suitable habitat. The caribou's major indigenous predator, the wolf (Canis lupis), has been extinct since early in this century (Smith 1940).

METHODS

Historical Review

In order to reconstruct the circumstances surrounding the caribou's existence in CBHNP, I reviewed the records pertaining to the habitat appraisal, the transplant operation, and the subsequent monitoring of the introduced herd. The habitat appraisal was contained in reports submitted by CWS biologists to the National Parks Branch (Kelsall no date, 1965, Scotter 1966). A description of the capture, transport, release, and subsequent monitoring of the introduced herd existed in a series of "Game Reports - Caribou Observations" prepared by members of the Park Warden Service and submitted to the Director, Atlantic Region, National Parks Branch (MacDonald 1969, 1971, 1972a, b; McGuire 1970a, b). Other individuals also submitted reports to the National Parks Branch on the status of the caribou (Simard 1970, Wood 1971). I obtained further information through interviews with Warden J. D. MacDonald, Warden F. A. E. Wallace, and Operations Manager A. Fisk of CBHNP, all of whom had first-hand experience with the caribou restoration project and its aftermath.

The Search for the Caribou

The search for the missing caribou was conducted in March, 1973, using three approaches which are described below. The surveys were conducted by the Warden Service under my direction, and I participated in all surveys of potential caribou habitat.

Aerial survey within the Park. The aerial survey within the Park was designed to determine the relative numbers and distribution of deer, moose, and caribou, with emphasis on caribou. The Park was sub-divided into 37 zones by placing boundaries at changes in topography and in vegetative cover types. This strategy was a departure from the transect sampling used in the previous winter surveys in CBHNP by MacDonald (1971, 1972a) and McGuire (1970a, b). It was intended to reduce navigational and visual problems caused by the large variations in topography, vegetation density and weather conditions (visibility) which exist in northern Cape Breton Island. Zone boundaries were located to separate the flat plateau, steep slopes, and narrow valley bottoms and to separate treeless areas, thick stands of balsam fir, and mixed coniferous/deciduous forests. As a result, the vegetation and topography of each zone were relatively homogenous, facilitating the tasks of navigator and observers. Maps of the Park's ecosystems and vegetation cover types prepared by Atlantic Resource Planners (1972) were used for reference in establishing zone boundaries. Each zone was

surveyed independently and completely, and therefore the entire Park was covered (Fig. 1). The location of zone boundaries and the detailed method of conducting the survey are described by Wallace (1973).

Aerial search for caribou outside Park. Outside the Park, all of the potential caribou habitat in northern Cape Breton Island was surveyed from an aircraft. The portion of the peninsula north of the Park (approximately 190 sq. mi.) and south of the Park to Lake Ainslie and Bras d'Or Lake (approximately 1200 sq. mi.) was covered (Fig. 1). The survey aircraft followed every other east-west Universal Transverse Mercator Grid line (which are spaced 0.62 miles apart), deviating where necessary to circle lakes, bogs, barrens, clear-cuts, and other openings in the forest large enough to reveal caribou or their tracks. The pilot maintained the aircraft at an altitude of 400-500 feet and a ground speed of 50-70 mph. I participated as navigator-observer, and two wardens acted as observers. Logistical details are given by Wallace (1973).

Ground searches. Members of the Warden Service and I searched the areas where caribou had been observed in previous winters by snow vehicle and on foot. This survey was intended to reveal evidence which could be missed from the aircraft. It covered the lichen ranges at the head of the Ingonish River, Indian Brook, Clyburn Brook, and in the vicinity of Lake of Islands, Branch Pond, Cheticamp Lake, and Round Pond. The depth and hardness of the snow and the availability of terrestrial and arboreal lichens were examined at most of these sites.

Examination of Deer for Meningeal Worm

The presence of a large population of white-tailed deer in northern Cape Breton Island presented the possibility that the introduced caribou were exposed to a lethal neurologic disease caused by the meningeal worm Parelaphostrongylus tenuis. This parasite's normal life cycle in white-tailed deer (the final host) and terrestrial gastropods (the intermediate host) is well documented by Anderson (1963). Caribou can enter the cycle as an aberrant final host with fatal results (Anderson and Strelive 1968, Behrend and Witter 1968, Anderson 1971). P. tenuis had been found in white-tailed deer on mainland Nova Scotia by Smith et al. (1964), but its presence in northern Cape Breton Island had not been reported. Therefore, the heads and faeces of white-tails were obtained for examination from within and near the Park. G.G. Gibson of the CWS Pathology Laboratory

examined the heads of two deer from the Park for the presence of the adult form of the parasite. To determine the geographical extent of the infestation, if any, groups of deer faeces were collected by the Warden Service from deer yards on both the east and west sides of the Park. Using the Baermann technique (Anderson 1963), D. B. Lamperd and I removed larval helminths from the faeces and examined the larvae for their resemblance to the first stage larvae of P. tenuis described by Anderson (1963).

RESULTS

Aerial and Ground Surveys

A total of 76 hours was spent searching for caribou from aircraft, 52 hours within the Park boundaries and 24 hours in northern Cape Breton Island outside the park (Fig. 1). Ground parties travelled approximately 100 miles on the caribou's former winter range. These surveys did not find any evidence of caribou, past or present.

I had a brief opportunity during the surveys to appraise the winter habitat available to caribou. Foraging opportunities appeared excellent on the barrens, especially in the area known locally as the "Indian Rising" at the head of Clyburn Brook. The full exposure to wind action there kept the snow shallow and patchy. A mat of lichens several inches deep was exposed over hundreds of acres (Plates 1, 2). However, foraging in shrubby or treed areas (Plates 3, 4) was obviously difficult or

impossible because of the excessive depth, density, and hardness of the snow. The depth of snow in five sample pits in treed areas ranged from approximately 3 to 6 feet and averaged about 4 feet. There were at least two layers of crust, so hard that they were difficult to penetrate with a shovel. The conditions I observed were similar to those found by Kelsall (1965) in March, 1965. Kelsall (1965:11) concluded from his measurements of snow depth, density and hardness that "...it seems most unlikely that animals from any caribou population could feed efficiently on the ground by digging through snow of the sort described for most habitat types on the Cape Breton highlands." The open lichen barrens were the only exception, and there was no evidence of caribou on the barrens in March, 1973.

The Record of Caribou Observations

The number of caribou and the size of herds. The number of caribou and the size of the herds observed, when plotted against time since the introduction, provided insight into the nature of the decline (Fig. 2). I obtained these data from the Park's record of observations (McGuire 1970a, b; MacDonald 1971, 1972b). For approximately one year after the second introduction, both herd size and the number of sightings were high. A decline began in the fall of 1970, and ended approximately 1½ years later in the summer of 1972. More caribou were sighted in the calendar year 1969 than in all

subsequent years combined (Fig. 2). The decline in the number of sightings occurred despite an increasing search effort.

Herd composition and reproduction. The sex and/or age of the caribou was noted in 26 (35 per cent) of 74 observations. The tally of segregated individuals is 23 "adult" males, 75 "adult" females, and 25 calves. The male: female ratio in the segregated caribou (30: 100) is almost twice what it was in the introduced herd (18: 100). Females may have been leaving the population more rapidly than males, but it is also possible that males were more visible than females, or that some females were identified as males.

The introduced caribou reproduced successfully on Cape Breton Island. The calves seen in 1970 and 1972 (Fig. 2) must have resulted from local matings. (Calves observed in the summer of 1969, however, could have been born to females in the second group which were already pregnant when placed in the Park.) Obviously, some of the caribou remained in the area of the release and made contact during the breeding season.

Physical condition. The Wardens noticed signs of physical disability in some of the caribou they observed. Two "thin" bulls were observed in February, 1970; their condition was attributed to normal increase in

physical activity during the previous rut in autumn 1969 (McGuire 1970).

Two other caribou with more pronounced physical abnormalities were observed by McGuire (1970) in February, 1970. He described their condition (excerpt of letter to A. Fisk, April 25, 1973) as follows:

> "A young cow... [seen from the aircraft]. She would run from the plane and then her hind legs would buckle. She would then get up and run in another direction."
>
> "A mature bull dragging right hind leg. Fat and in good shape."

MacDonald (1971) observed a "crippled" cow in a herd of seven on April 2, 1971.

At the time it was assumed that these caribou had been crippled by injuries which they had obtained when captured and released one to three years before. Since the injuries were not believed to be of recent origin, no closer investigation was made. I could not find on record, nor did anyone I interviewed have knowledge of the mortality of any of the caribou that were released or of their offspring. (This fact, I believe, provides testimony to the limited contact maintained with the herd.)

Location and movements. As the Warden Service kept a record of the approximate location and date of each caribou observation, I was able to obtain an indication of the dispersal, seasonal movements and habitat preferences of the introduced caribou. The locations of 75 observations

are shown on a map of northern Cape Breton Island in Figure 3. "Winter" (December - April) and "summer" (May - November) sightings are identified to reveal differences in distribution during the periods with and without snow cover.

Most observations of caribou occurred locally; 64 per cent were within the Park's boundaries, and 84 per cent were within a 15-mile radius of the release site shown in Figure 3.

Twelve observations were located more than 15 miles from the release site, 11 north and one south of the Park. The southern observation was also the most distant; here, four animals were seen near Margaree on March 5, 1969, approximately 34 miles from the release site.

The seasonal distribution of the observations reveals that the caribou remained in a relatively small area and in one main habitat type in the winter, and that in the summer they ranged widely and entered a variety of habitats. Fifteen of the 20 winter sightings were located in the "eastern" barrens, an area of approximately 60 sq. mi. on the plateau in the south-eastern part of the Park. Most of that area has a minimum accumulation of snow, as previously noted. In contrast, the summer sightings were distributed over a much larger area, ie., most of the northern region of the peninsula (Fig. 3), where there is considerable variation in elevation and habitat. Many summer sightings occurred at or near the coast and in

valleys where the forest cover was mixed-wood or deciduous.

Some bias arising from the location of observers must be considered in the interpretation of the data on caribou distribution. In northern Cape Breton Island, the human population is concentrated on the coast, and there is little travel into the central highlands at any season. This may explain why many summer observations occurred near settled areas on the coast and along the route of the Cabot Trail where it crosses the highlands on the north boundary of the Park (Fig. 3). It is possible that the caribou could have also used the central highlands and the headlands northwest of the Park in summer; their presence there could have gone undetected because of the lack of observers. In contrast, the aerial surveys made in winter were free of that bias because they sampled the entire area. Also, the lack of sightings toward the base of the peninsula must indicate an absence of caribou, because the density of the human population and the occurrence of agriculture and forestry increase directly with distance south from the Park.

Seasonal herd size. The caribou formed larger groups in winter than in summer, according to the record of observations. The average number of caribou in 26 observations made in winter was 5.0, whereas the average size of 50 "groups" observed in summer was 2.7. The observation of a herd of 26 caribou in summer was unusual, since the next largest group

observed at that time of year was 8. In summer, 74 per cent of the sightings were of one or two animals; in winter, only 25 per cent.

Distribution of Deer and the Status of P. tenuis

According to the ungulate surveys made each winter since 1969, white-tailed deer occupy all of the major valleys and low coastal areas of mixed-wood forests in northern Cape Breton Island (McGuire 1970a, MacDonald 1971, 1972b). Many white-tails also feed in winter on knolls along the western headlands in and north of the Park (J.D. MacDonald, F.A.E. Wallace, pers. comm.). The record of observations indicated that in summer caribou used the areas where white-tails had concentrated in winter, but in winter the ranges of the two species were largely discrete (Fig. 3).

The deer population of northern Cape Breton Island is evidently widely infected with the meningeal worm P. tenuis. Larvae, indistinguishable from the first stage larvae of that parasite, were recovered from 15 (34 per cent) of 44 deer pellet groups. G.G. Gibson (pers. comm.) found adult P. tenuis in one of two deer collected from the Park in spring, 1973. In July, 1973, H.J. Smith (pers. comm.) of the Health of Animals Branch, Agriculture Canada, found that 7 of 9 deer from Inverness and Victoria Counties in northern Cape Breton were infected with meningeal worm. The infestation rate of both samples combined is 72 per cent, similar to the level of infestation reported by Smith et al. (1964) for mainland Nova Scotia.