PROJECT HISTORY SHEET

Project No. M2-1-4 Date August 25, 1965

Title Caribou Introduction Cape Breton Highlands National Park

Investigator J.P. Kelsall

Date of approval of project plan

Date of submission of progress report July 19, 1965

THIS HISTORY SHEET ACCOMPANIES: (check one)

Project Plan Progress report x

Completion report Draft manuscript

Proposal for shift of emphasis

Other (describe)

a) PUBLICATIONS AND REPORTS ARISING FROM THE PROJECT: (Bibliographic references; proposed titles)

b) PAPERS DELIVERED:

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FINANCIAL STATUS (to be completed at Ottawa)

Year	Investigator	Estimate	Disbursement	Cost to Date
64-65	J.P. Kelsall	$740.00	$242.96	$242.96

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Project Number: M2-1-4

Investigators: John P. Kelsall; personnel from game agencies of Nova Scotia, and Newfoundland or Quebec, and from Cape Breton Highlands National Park

1. Objectives: The re-establishment of caribou in Cape Breton Highlands National Park has been discussed for many years. The latest delay was caused by a planned hydro development of the Nova Scotia Power Commission on the head-waters of the Wreck Cove Brook. The proposed dam would flood a large part of the best caribou range on the highlands. Included would be range presently within the Park, which would be alienated for the purpose. The status of the project is undecided as of January 19, 1965, according to the Chief Engineer of the Commission. The development is probably feasible, but not desirable in view of the dependance of the Island's economy on coal mining, which is used in the manufacture of thermal power.

Even with reduced ranges, caribou could undoubtedly live on the highlands with the development. They would only need protection from hunters and poachers who might gain access to the highlands from construction roads. It would therefore seem best to plan for an early introduction, and not to await a final decision. At the earliest, it seems possible that the animals could be transferred in the autumn of 1965.

2. Justification: American woodland caribou, Rangifer tarandus caribou (Gmelin) (Banfield, 1962) ranged Cape Breton Island, especially its high inland portions, until about 1924. For some two hundred years they were hunted intensively. Hunting, and not environmental change, is believed to have caused their disappearance.

Cape Breton Highlands National Park includes habitat in which caribou should prosper. The condition of their highland ranges seems to have changed only for the better since their disappearance. There have been no extensive forest fires, food supplies (in the form of fruticose lichens and ericaceous plants) are uniformly excellent, and the area is protected against damage by humans. An introduced stock would meet little competition from other herbivores. Caribou were a natural part of Cape Breton Highlands National Park's endemic fauna. Their re-establishment would add aesthetic value, and could promote the perpetuation of the species.

3. Review of literature and related work: Anderson (1942), Clarke (1942), and Cameron (1958), have written on the history of caribou on Cape Breton Island. The caribou herd probably disappeared there by 1924, and more recent reports are questionable. Range conditions at that time were not recorded. It may safely be assumed that range deficiency was not responsible for the decline: marked diminution of caribou had been noted following 1900, and they were so scarce during their last decade that range, even if overbrowsed,

would no doubt have recovered. Clarke (1942) found ranges excellent in 1942, and estimates that the highlands could carry 4,000 animals. I examined ranges at varied points on the highlands in 1961 (Keleall, 1961) and found excellent lichen growth.

There is no evidence from the meteorological records for Halifax and Sydney (e.g. Meteorological Branch, 1964), which go back well into the 1800's, that extremes in temperature or precipitation might have reduced the caribou population in the decade before their disappearance. The Atlantic coast is subject to great climatic variation. Thus on an 80 year average at Halifax, mean minimum temperatures in February are 15.7°F. and the absolute minimum has been -21°F.; mean snowfall has been 74.6 inches and greatest snowfall has been 141.8 inches. Local conditions on the high caribou range may differ considerably from those of the nearest meteorological recording stations, but, if catastrophic climatic conditions had occurred, they would no doubt be indicated by the available records.

There have been other changes in the fauna of Cape Breton Island. The eastern timber wolf (Canis lupus), presumably the most important natural predator on caribou, was extirpated about 1850 (Cameron, 1958). The cougar (Felis concolor) may have been present to prey on caribou on Cape Breton Island at one time, and there are occasional reported sightings of the species to the present (Wright, 1959). Black bear (Ursus americanus) and Canada Lynx (Lynx canadensis) are still present in Cape Breton, and both prey on caribou in Newfoundland (A.T. Bergerud, pers. comm.). Lynx seemingly

attack only calf caribou, and then often unsuccessfully. The predators still extant in the park might kill some caribou, but, once the species was established, their effects could only be beneficial.

Caribou and moose (Alces alces) earlier coexisted on Cape Breton Island, and they disappeared at about the same time. A western subspecies of moose, (A. a. andersoni), was introduced in 1947 and 1948 (i.a. Kelsall, 1948; Cameron, 1958) and the population has thrived and increased (Kelsall, 1961). There is little competition between the two species for food, particularly in winter, for moose are high browsers and caribou are low grazers. White-tailed deer (Odocoileus virginianus) became established in Nova Scotia in the last decade of the 19th century (Dodds and Bartlett, 1961). The establishment of deer has been thought by some to have caused the disappearance of caribou. Deer and caribou, however, apparently coexisted in the New England States for centuries. Deer did not reach Cape Breton Island until about 1916 (Benson, 1961), at a time when the caribou had almost disappeared, and the first deer did not reach the highlands until the last caribou were disappearing (Anderson, 1942). Caribou, moose, and deer probably coexisted on mainland Nova Scotia before the 15th century (. . Erskine, pers. comm.). Deer now invade the highland caribou ranges in summer but their numbers there are small (i.a. Kelsall, 1961). They appear to withdraw almost entirely to the valley bottoms and coastal areas in winter, where they feed on browse plants (maple, birch, fir) of no importance to caribou.

Elaphostrongylus (Pneumostrongylus) tenuis, the nematode now believed to be the cause of "moose sickness" in the Atlantic Provinces (Anderson, 1964; Smith et al., 1964), has been identified in deer on Cape Breton Island (Smith, pers. comm.). There is no reason, however, to believe that the organism would endanger caribou. A related nematode has been identified as endemic in Newfoundland caribou (Peters et al., 1959; Choquette, pers. comm.).

Statements below concerning Newfoundland and Gaspé caribou are attributable to Mr. A.T. Bergerud, Director of Wildlife Management, Department of Mines, Agriculture and Resources, unless other references are cited. Mr. Bergerud's knowledge of those caribou is unique, and I am grateful to him for useful discussions of proposed introduction.

4. Location and description of area: Cape Breton Highlands National Park comprises 367.2 square miles and lies across the northwestern end of Cape Breton Island. The Cape Breton highlands are an elevated, and locally broken plateau of approximately 724 square miles, only about one-third of which are actually in the Park. The highlands within the Park appear to offer the best habitat for caribou. They include dry tundra with a heavy growth of lichens and low ericaceous shrubs, sphagnum bogs, sedge meadows, lake margins, spruce-lichen associations, and "tuckamoor" (the stunted, dense, sterile spruce thickets so characteristic of many parts of Newfoundland). All portions of the highlands except the tuckamoor, constitute excellent caribou range. Elevation varies from about 1,000 feet above sea level to over 1,700 feet. Re-established

caribou would not confine their activities to the Park; they would range freely over highlands in the Park and in adjacent parts of the Province.

5. Methods: It will be necessary to carry out the following operations:

a) establishment of exclosure plots for range studies

b) introduction of caribou

c) periodic appraisal of herd condition

Exclosure plots

Exclosure plots offer the most convenient method of determining the relationship of the herd to the range as the herd increases. Six exclosure plots, each one-tenth of an acre in size, would be sufficient to represent the plant associations important to caribou on the highlands and higher slopes. A marked but unfenced control plot should be established in very similar cover near each fenced plot. A tenth acre size is large enough for both clipping and continuous production estimates. The plots can be established from the Lake of Islands and Chetiocamp Lakes trail. The public do not have access to this trail, which is mainly for fire protection, and the plots could be placed out of the sight of the few passers-by, in any event. Cost estimates for erecting them are given below.

The introduction

The introduction of caribou into Cape Breton Highlands National Park could be carried out in a number of different ways. The alternatives are discussed below.

The number, sex and age of the animals to be acquired

The number of caribou to be introduced will be limited by cost and supply. As many as possible should be obtained. A.T. Bergerud, Director of Wildlife Management in Newfoundland, suggests that 20 would be an acceptable minimum. Most of the herd should be adult females so that the herd will show a rapid increase. Two or three males per 10 females should be enough for breeding them, and sufficient to avoid the risk of losing all the males by accidental death or straying. Later introductions might be necessary if the first proves unsuccessful.

Should the introduced animals be domestic or wild?

Advantages of wild stock

1. Simplicity of the operation. No holding pens, keepers, and special diets would be needed. The twenty wild adults required could be captured, transported, and released within a week.

2. Selection for high quality and pregnant animals could be practised.

3. Wild adults might have a better chance of survival than hand reared calves. In Newfoundland, mortality among wild adults during capturing, transporting, releasing, and through the first winter following release, has been negligible even when the animals have been roughly treated.

Disadvantages of wild stock

1. Wild adults carry parasites, and not all can be eliminated without danger to the host.

2. Wild adults might stray from the area of release. Twenty-four caribou transported from Newfoundland and released in Maine over a year ago have apparently all strayed, some for upward of 90 miles, at the time of writing (Dunn, 1965). Some of those transplanted within Newfoundland have strayed, and some have not.

Advantages of domestic stock

1. Calves can be reared free of parasites.

2. In Newfoundland, experience has shown that hand-reared calves are consistently more sedentary than wild stock, and that, when transplanted, they are much less likely to stray away. However, when released with wild stock, hand-reared calves have strayed with the wild animals in both Newfoundland and Maine.

Disadvantages of domestic stock

1. Hand-rearing is expensive.

2. The establishment of the herd would take longer, for the hand-reared calves would not attain full reproductive potential for two years.

3. Hand-reared bulls have been found in Newfoundland to become dangerous when mature. Rutting bulls that were reared by humans apparently view the latter as competitors. Mr. A.T. Bergerud believes that this trait is retained by successive generations.

4. At least ten per cent mortality must be expected between capturing and release (A.T. Bergerud, pers. comm.) if hand-rearing is practised for a year. The yearlings would be smaller, and therefore less able to cope with their environment than wild adults.

Conclusion

The main advantages of hand-rearing calves for a year are obviously the opportunity that would be afforded of rearing parasite-free stock, and the more sedentary nature of hand-reared animals. In all other respects wild stock would be preferable.

Where should the stock to be introduced be secured?

It seems axiomatic that the introduced animals should be as like the extinct animals of Cape Breton Highlands National Park as possible. According to a recent revision (Banfield, 1962), the caribou of Cape Breton Island were eastern woodland caribou (*Rangifer tarandus caribou* (Gmelin)), and the extant populations that most closely resemble the island one are, in order, those of the mountains of Gaspé, the north shore of the Gulf of St. Lawrence, and Newfoundland. Unfortunately, the three populations must be ranked in the opposite order in availability. It will be necessary to decide whether the difficulty of obtaining stock most similar to the extinct population is outweighed by the value to the Park of having the best substitute that can be obtained.

Wild caribou are now captured in Newfoundland routinely, and cows have been transported considerable distances, with negligible losses. The Province of Newfoundland can provide caribou and can transport them to Cape Breton Island. The ease of obtaining caribou in Newfoundland means that the required numbers of bulls and cows could be selected, and physically superior animals could be chosen. Finally, Newfoundland caribou are closest to the desired release point.

The characteristics of the caribou of Quebec are poorly known in comparison to those of the Newfoundland animals. Quebec biologists have not captured them in quantity to date. It should be noted, however, that the introduction of caribou from the Gaspé Peninsula might prove important to the survival of the rare deme which occurs there, and there is no reason to believe that the techniques developed in Newfoundland would not be applicable in Gaspé or on the North Shore.

There seems to be little other evidence bearing on the comparative merits for introduction of the three stocks. The habitats differ little in essentials. The Cape Breton highlands are very similar in latitude, altitude, climatic conditions, and basic vegetation present, to the inland ranges of southern Newfoundland. Much the same may be said of Gaspé, although the ranges go higher there than those of Cape Breton Island (2,000 to over 4,000 feet as compared to 1,000 to 1,700 feet). Climatic factors are difficult to compare in an absence of records from the areas ranged, or potentially to be ranged, by the caribou. Weather maps (e.g. Geographical Branch, 1957) show Cape Breton Island snowfalls averaging under 100 inches annually, and averages from about 100 inches upward to nearly 150 inches at the other locations. The Cape Breton Island climate is probably close to that in the southern portions of Newfoundland. The climates elsewhere might be harsher, with lower temperatures and more snow.

The caribou of the three areas differ little in behaviour. Gaspé caribou are strongly altitudinal in their seasonal movements,

ranging between the high, isolated, treeless mountain tops, and the forested mountain slopes and valleys. It might be disadvantageous to them if they practised similar movements in Cape Breton Highlands National Park. There the highlands, rather than the slopes and valleys, constitute the major portion of the range. At the same time, nothing is known of the stimuli to which they thus respond.

Newfoundland caribou vary locally in their seasonal movements. Those of the Avalon Peninsula, for example, inhabit an area similar to western Cape Breton Island in size, shape, latitude, and exposure, and confine their activities to an area corresponding to the Park highlands. Unfortunately, no efficient methods for capturing animals on the Avalon Peninsula have been developed. The herd is small and the area is topographically unfavourable for capturing. Most Newfoundland caribou are relatively sedentary, though Bergerud (1959) divides them into migratory and non-migratory herds. The distances travelled between summer and winter ranges are generally less than 100 miles, and movements are not strongly altitudinal in nature. In general caribou ranges in Newfoundland tend to be inland from the coast at higher altitudes.

I have been unable to obtain reliable information on the seasonal movements of the caribou that originally inhabited the Cape Breton highlands. They may have remained on the highlands and upper slopes, descending rarely or never to the coast. I believe that the highlands, with their heterogeneous vegetative cover, would provide suitable caribou habitat for all seasons.

Capturing and transporting caribou

Caribou may best be captured when new-born calves, or, if adult, when they are swimming. Some caribou have been taken in the east by methods such as drugging from helicopters and corraling.

Calves and wild adult caribou have been transported in Newfoundland by air and ground vehicle. The animals stand up well to ground transportation. Crated, they will maintain condition for at least four days. Only if animals were brought from distant places such as the North Shore of the Gulf of St. Lawrence might air transport be desirable. Animals could be released directly from trucks on or near the highlands.

The question of parasites

A.T. Bergerud (pers. comm.) estimates that 75% of Newfoundland caribou have lungworm, 100% have nose bots, and nearly 100% (except the Avalon Peninsula herd) have warbles. Several other parasites have been reported (e.g. Peters and King, 1959).

Parasitologists consulted, including Dr. L.P.E. Choquette of the Canadian Wildlife Service and Dr. H.J. Smith of the Veterinary Research Laboratory in Sackville, have been unable to say what effect the parasites that might be introduced into Cape Breton Island with Newfoundland caribou might have on the local domestic stock and the indigenous mammal populations. Bot flies, and probably warbles, are found already in deer and domestic cattle on Cape Breton Island. Lungworms are periodically eruptive in cattle there, and, it would surprise me if they were not present in Cape Breton

deer and moose. Smith (pers. comm.) has found a lungworm, Muellaria capillaria, in caribou from Newfoundland kept at the Shubenacadie Game Farm in Nova Scotia, and in cattle. No studies have been made of parasites of the Gaspé and North Shore caribou bull.

Although organo-phosphate insecticides can be used against fly larvae, there is no way to be certain of ridding wild, adult caribou of all of their parasites except, perhaps, through long periods of treatment in solation. Such treatment would seem to be impracticable. The only way to ensure that adult caribou are parasite-free would be to obtain new-born calves and to rear them away from other animals.

Ridding introduced caribou of their normal parasites would be necessary only if the parasites menace the health of humans or other animals in the new environment.

Wide publicity given to a release of caribou would help to ensure the interest and co-operation of the public, and might help to prevent the shooting of caribou in mistake for deer should they stray from the Park. In Newfoundland, caribou releases are sometimes attended by several thousand spectators, who are given a conservation oration by a biologist. The animals are released in full view of everyone. Similar arrangements in the Park could do no harm, and might do some good.

Periodic Appraisal

What follow-up studies are required? Introduced caribou should be followed by checks from the air, and from the ground

where practicable, several times per year to determine their success in adapting to their new environment. Such scrutiny would be a long term project. Points for determination would be the seasonal whereabouts of the animals, survival rates, and annual reproductive success. Problems (excessive straying, poor reproduction, excessive mortality from any cause) would have to be dealt with when and if they emerged.

It is further recommended that adult wild caribou be used for an initial introduction, rather than hand-reared yearlings. The Newfoundland Department should be asked to assist a veterinarian, under contract to the Service, in eliminating, as far as possible, the parasites harboured by the captured caribou, before the animals are brought to the mainland. Experts from the Canadian Wildlife Service and the federal Department of Agriculture should be consulted to determine the treatment to be performed.

6. Materials and equipment required:

1) Fencing for enclosures (see estimates below for details).

2) Insecticides, vermicides, vaccines, etc. as recommended by veterinarian.

3) Food for the captives will be supplied by Newfoundland.

4) Animals in exchange. I believe that the Newfoundland Department of Mines, Agriculture and Resources wishes to obtain, in exchange for the supply, capture and transport of caribou, like services in connection with the introduction of elk, buffalo, or some other park species, to Newfoundland.

7. Personnel and co-operation required: A summer assistant or casual labourer will be needed to help build exclosure plots in the summer of 1965 or 1966. The six exclosures could probably be built by a crew of four men in a week. The Park might be able to supply the crew. A four-wheel-drive vehicle would be useful for locating sites and erecting exclosures.

On the arrival of the caribou, it might be necessary to make use of park vehicles and personnel for help in transporting the animals, and perhaps also in controlling traffic and the movements of spectators. Park Wardens would, of course, be expected to follow the progress of the caribou after release, and special patrols, twice or more per year, would have to be made.

8. Duration of the project: If the project proceeds as recommended, and if intra-Departmental arrangements are expedited, 20 wild adult caribou can be released on the Cape Breton Highlands in October or November, 1965. Either hand-reared calf caribou or wild adults could be released in the autumn of 1966. Depending on the success of the first introduction, the project may or may not be terminated soon after release date, with surveillance being continued by Park Wardens, and monitored by the Canadian Wildlife Service as time permitted.

9. Estimate of total cost: Most of the cost of the proposed introduction would be in the exchange of caribou for other animals. Exchange animals would cost us whatever man-hours and transport is needed for bringing 20 ungulates from Western Canada to Newfoundland.

The following estimates exclude the wages of a summer assistant and other Departmental personnel.

1. Meeting to arrange exchange of animals - transportation to some central location for a meeting, and maintenance while there 500.00

2. Four men for five days to erect six exclosure fences - 40 hours each at $1.50 . . . . . .240.00

3. Cost of fencing for exclosures
   193 rods wire fencing - #10 wire, 48" high, 16 stays/rod - at $1.70 . . . . . .328.10
   6 wire gates, 48" high at $12.00 . . . . . 72.00
   102 posts, spruce, 4" x 4" x 12', treated against rot, at $2.00 . . . . . .204.00
   Concrete to secure corner posts, signs for plots, shipping costs, miscellaneous hardware . . . . . .150.00 . . . 754.10

4. Travel and maintenance for the investigator while engaged with capturing, transporting, and releasing caribou -
   travel to and from Newfoundland 300.00

5. Contract with veterinarian, est. $100/day for 2 days 200.00

6. Cost of drugs etc. required (est.) 150.00

Plus cost of exchange animals if the caribou are obtained from Newfoundland. The cost of caribou from Quebec has not been determined.

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