MOOSE ON CAPE BRETON ISLAND, NOVA SCOTIA: 20TH CENTURY DEMOGRAPHICS AND EMERGING ISSUES IN THE 21ST CENTURY

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ABSTRACT: Presumed extirpated in the early 1900s, moose were re-introduced to Cape Breton Island by the federal Park Service in the late 1940s. After 25 years of gradual growth the population expanded rapidly following a spruce budworm outbreak in the mid- to late-1970s, yielding a large huntable population by the mid-1980s. Continued growth of the herd has presented a number of management challenges and opportunities to the Province of Nova Scotia, the local First Nations, and Parks Canada, each seeking to maintain sustainable moose numbers from different perspectives. Presented here is a history of population growth and exploitation of moose on Cape Breton in the latter 20th Century, the evolution of cooperative management of the herd, and emerging management issues.

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EARLY HISTORY AND RE-INTRODUCTION OF MOOSE

Moose (*Alces alces americana*) were native to Cape Breton Island, Nova Scotia, and were a major source of food, clothing, and tools as well as an important spiritual and cultural totem for the Unama'ki (Cape Breton Island) Mi'kmaq for 2,000 years prior to the arrival of Europeans in the 1500s (Davis and Browne 1996). As elsewhere in eastern North America, the arrival of Europeans on Cape Breton brought commerce, especially for hides, which resulted in harvests much larger than previously required by First Nations; reports of several commentators from 1600 to 1800 indicated a repeated pattern of apparent over-harvest and dramatic population decline followed by recovery. In the mid-1600s Nicolas Denys observed that moose, formerly abundant, had been reduced to the point that "The Indians . . . have abandoned the island [Cape Breton], finding there no longer the wherewithal for living." (Ganong 1908). Nevertheless, a letter (undated but likely from the 1790s) from A.C. Dodd to Lord Sheffield is quoted by Cautley (1934): "In the year 1729 upwards of 10,000 moose were killed by Indians and foreign hunters, merely for their skins and the carcasses left to rot in the woods. They are now scarce." Peterson (1955) cited a record of moose presence on Cape Breton from 1784. Fletcher (1884) reported "Moose, once numerous, are now seldom seen." Reporting on the suitability of northern Cape Breton Island for the establishment of a national park, R.W. Cautley (1934) wrote "At the present time there are a number of whitetail deer within the site, but very few moose and no caribou." R.M. Anderson, who visited northern Cape Breton in 1924, reported that moose had been considered extinct for several years but that there was memory in Ingonish of large hunts in the 1880s (Clarke 1942).

The Province attempted an introduction of 2 adults and 5 calves from mainland Nova Scotia to Inverness County in 1928–29 (Peterson 1955), but to little effect (Benson and Dodds 1977). On the recommendation of

Clarke (1942), the newly created Cape Breton Highlands National Park (the Park) attempted to re-introduce moose to the Park following the Second World War. This introduction may have marked one of the first attempts by the National Parks Branch to restore a former indigenous species to a park. Nevertheless, the rationale for the introduction appears to have been mostly to provide a large mammal to attract park visitors (MacEachern 2001). The introduced animals came from Elk Island National Park in central Alberta which was suffering from an overabundance of moose and elk in the 1930s and 1940s (Lothian 1976). While conspecific with the eastern moose, these were the western subspecies *A. a. andersoni*.

Whether moose actually were extirpated from Cape Breton at the start of the last century is moot. While the extirpation has been attributed to over-harvest (Clark 1942, Peterson 1955, Cameron 1958), one has to question on practical grounds the notion that hunting alone could have resulted in the elimination of the species, given the ruggedness of the terrain, the severe winter weather conditions, and the available hunting tools and techniques of the era. It is possible that sweeping environmental factors, such as forest succession through the 19th Century, also contributed to the decline of moose. While Denys describes the plateau of the mid-1600s as dominated by "Firs intermingled with a few little Birches" (Ganong 1908), and Bentley and Smith (1956) surmised that fir dominated the plateau for the last 300 years, there is evidence that great expanses burned in the late 1700s (Bridgland et al. 1995). The resulting second growth would have provided ample moose habitat through the 19th Century, but the quality of this habitat may have been reduced as the forest returned to mature balsam fir (*Abies balsamea*), which was the case in the early 1900s when Fernow (1912) characterized 42% of Victoria County and 15% of Inverness County as "virgin" conifer forest; forest which upon examination by Nichols (1918) turned out to be uniformly 70 years old.

Benson and Dodds (1977) doubted that moose would have been completely absent from Cape Breton Island for the half century prior to the re-introduction project. They suggested that even if all Cape Breton moose had been extirpated at some point, the narrow Strait of Canso, which separates Cape Breton from the mainland, could hardly be considered a serious impediment to moose movement. Indeed, the Nova Scotia Department of Natural Resources (NSDNR) has reports in the past 25 years of moose swimming from Isle Madame on southern Cape Breton to Guysborough County on the mainland and back.

In mid-August of 1947, 5 cows, 1 female calf, and 2 male calves were released at Roper Brook on the east side of the Park (Cameron 1958, Lothian 1976). These were sighted through the following winter ranging from the Aspy Valley at the north end of the Park to Ingonish and a point 25 miles south of the Park (Kelsall 1948). Another 10 Alberta moose, 5 bulls and 5 cows, were released at the same location in June of 1948 (Cameron 1958, Lothian 1976). Between September 1948 and March 1950 there were 21 records of sightings or tracks in the Park, including 3 mortalities and 3 new calves (Boyer 1950). These and sightings in 1952 and 1954 (Cameron 1958) showed a wide dispersal throughout the Park and beyond. Sightings of moose were sporadic through the late 1950s amounting to < 10 animals per year, but increased through the 1960s regularly surpassing 20 sightings after 1964, reaching 57 in 1969 (Warden Service, Cape Breton Highlands National Park, unpublished wildlife observation data).

The first formal ungulate surveys in the Park began in 1970 with aerial monitoring of caribou (*Rangifer tarandus*) re-introduced in 1968 and 1969. While caribou numbers plummeted, moose reported in these surveys rose steadily from 2 in 1970 to 66 in 1975 (MacDonald and Buchanan 1975). A switch

from fixed wing to helicopter resulted in only a partial survey in 1976; despite flight time shortened from 35 to 9 hours, 45 moose were recorded.

POPULATION MONITORING AND MANAGEMENT

The eastern spruce budworm (*Choristoneura fumiferana*) is a defoliator of balsam fir that is native to eastern North America (Martineau 1984). It returns cyclically approximately every 30 years, with the severity of the outbreak largely determined by the condition of the forest at the time. Outbreaks on Cape Breton Island occurred in the mid-1840s, the 1890s and 1911–15 (NSDLF 1977). An outbreak, starting in 1974 and lasting until the early 1980s, occurred when most mesic sites on the plateau were dominated by almost pure stands of balsam fir aged approximately 120 years, resulting in an average mortality of 87% (MacLean and Ostaff 1989). Second growth in the moribund fir stands was dominated by vigorous growth of white birch (*Betula papyrifera*).

The widespread replacement of fir with birch, arguably more palatable to moose (Peterson 1955), was accompanied by a dramatic increase in moose numbers. A helicopter survey of the whole Park in 1977 (Couchie and Baldwin 1977, Prescott 1979), while focussed on distribution rather than abundance, was the first to attempt to account for moose not seen but indicated by track concentrations. Substituting the observed average group size of 2 animals for each "unassociated" track concentration, the population was estimated at a minimum of 215 moose.

Due to the cost of surveying by helicopter and the apparent growth of the herd, the Park stepped back from annual surveys. The 1980 survey followed the same methodology as used in 1977 with the exception that the multiplier for "unassociated" tracks was reduced to 1 moose per track concentration (Warden Service Cape Breton Highlands National Park 1980). In 1985 a random stratified survey design was adopted for the first time (Wentzell 1985) that was based on park Land Regions from the Park's ecological land classification (EER 1978). Approximately 10% each of the Acadian and Boreal Land Regions, where moose were known to concentrate in winter, were surveyed with 37 randomly selected survey blocks measuring 2 km^2. This survey yielded a population estimate for the entire Park of 1,126 moose with a 95% confidence interval ranging from 678 to 1573 moose.

One consequence of the spruce budworm outbreak was the development in the late 1970s of an extensive road network to allow salvage of damaged wood from the plateau south of the Park. With this new access, the size of the Cape Breton herd was better realized; a 1978 survey on provincial crown lands south of the Park estimated a minimum of 163 moose. In 1980 the Province of Nova Scotia established a moose management zone in northern Cape Breton (Zones 1, 2, and 3, Fig. 1) and opened the area for an experimental, limited hunt with 60 licenses awarded by lottery (Pulsifer and Nette 1995). Fifty licenses were issued for a second experimental hunt in 1981.

Harvest results indicated that the population could support a limited hunt and from 1986 to 2002, 200 licenses were awarded annually for all of Victoria and Inverness Counties outside the Park (Zones 1–4; Fig. 1). The season was limited to a single week from 1986 to 1992; in 1993 it was expanded to 2 weeks with no change in the number of licenses issued (200; Pulsifer and Nette 1995). Through the 1980s, information for managing the moose harvest was primarily based on hunter success rates. Hunter success through this period averaged 78%, ranging from 57 to 93%. Despite the known expansion of the population to southwest Cape Breton Island, hunting effort was largely restricted to the southern highlands between the Cabot Trail and the Park (Fig. 1). In 2003 the number of licenses issued was increased to 310. The 2-week hunt was

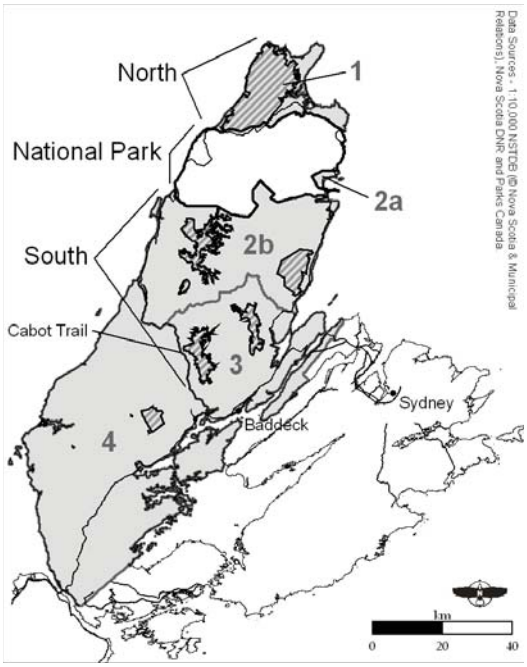

Fig. 1. Moose survey areas (North, Park, and South) and NSDNR Moose Management Zones 1-4 (gray) located on Cape Breton Island, Nova Scotia. Provincial protected Wilderness Areas are indicated by hatching.

split into 2, single week hunts, and licenses were issued for specific management zones to better distribute the hunt geographically as well as temporally. In 2004 a third single week hunt with an additional 25 licenses was established in December for the area north of the Park; in 2005 this hunt issued 35 licenses for a total of 345 licenses.

Aerial surveys were conducted both north and south of the Park in 1987–1993 (survey areas; Fig. 1) using parallel, half-mile-wide transects spaced 2 miles apart (Scott 1976); observed animals were sexed and aged. Estimates for the combined population of these 2 survey areas ranged from 1,848 in 1989 to 2,940 in 1993. By the early 1990s the Park was concerned about the size of the moose herd and its impacts on forest composition. Recognizing that the herd was not restricted by agency boundaries, NSDNR was approached and an informal arrangement was made for Park staff to assist as spotters on the provincial surveys in return for coverage inside the Park. In 1992 and 1993 these cooperative transect-based surveys were carried out mostly on Provincial lands north and south of the Park and in 1994 were restricted to the Park. The 1994 results indicated a Park population of 2,016 animals at a density of 2.23 moose/km^2 (Thompson 1995). The switch from LORAN-C to GPS navigation provided the ability to more accurately map the distribution of animals.

No survey was done in 1995 or 1996, but in 1997 the Park and Province succeeded in surveying the entire northern Cape Breton study area from Baddeck to the northern tip of the island with the transect method. The population estimate was 2,018 moose for the entire area. Despite this success, both agencies were frustrated by the effort involved in surveying at an awkward time of year. Winter flying conditions in Cape Breton rarely stabilize before March, and there is only a narrow window in which to survey with snow cover for optimal tracking and moose sightability. A frustration arose from the transect methodology which, unqualified by any measure of statistical confidence, left interpretation of population change from one survey to the next open to considerable speculation since the trends in the single number estimate were far from consistent.

In 1998 the Park and NSDNR abandoned the transect method in favour of stratified random sampling modified from Gasaway et al. (1986) which had become standard elsewhere. Using pre-defined GPS waypoints to bound the blocks and routes to navigate within them, northern Cape Breton was divided into 205 survey units measuring 0.06 degrees longitude by 0.04 degrees latitude (average 20 km^2). In an attempt to reduce cost, stratification of survey blocks into density classes was done based on knowledge from the previous transect surveys, not by a pre-survey stratification flight. To increase survey efficiency, sexing and aging of animals were removed from the census proper to a separate survey done in spring,

supplemented by a second survey in fall.

As it was a trial year, the 1998 survey was restricted to the northern half of the study area that included the Park, provincial land north of the Park, and about one fifth of survey area south of the Park. The estimated population of 5,019 was very large, as was the confidence interval of ± 89%. The 1999 survey expanded coverage to the complete study area and increased the number of blocks surveyed; it produced a population estimate of 1,438 moose ± 46%. These results caused re-examination of the methodology, and after considering a number of possible contributing factors, it was speculated that insufficient samples and mis-stratification were likely responsible for the unacceptably wide confidence intervals. The solution was to define smaller survey units, survey more units, and invest in a pre-survey stratification flight.

FIRST NATIONS HARVEST

For millennia moose were a most important resource for the Mi'kmaq yielding meat, hides for clothing and footwear, bones for tools, and sinew for twine and rope. The ability to kill a large animal such as moose was one of the rights of passage of Mi'kmaq boys to manhood (Reeves and McCabe 1998). While the cultural significance of moose persisted, its use by Mi'kmaq declined through the 20th century due to low numbers of moose in the first half of the century, as well as misdirected policies of the federal government promoting assimilation, abandonment of traditional culture and values (Paul 1993), and fish and game laws introduced by the Province in the 1920s. The latter were applied to Mi'kmaq as well as non-natives and led to the Gabriel Sylliboy case of 1929 where the treaties were held to be of no force and effect by the Nova Scotia Provincial Court when the Grand Chief was charged and convicted of hunting muskrat out of season.

With passage of the Constitution Act of 1982, and reaffirmation of the precedence of Treaty Rights over subsequent federal and provincial legislation, came interest among First Nations in exploring and establishing what those rights implied. Through the 1980s a number of test cases related to natural resource use began to appear across Canada. The Sparrow case, which stemmed from a 1984 fisheries charge in British Columbia, resulted in a Supreme Court ruling that natives have first right of access to fishery resources and that native access came second only to needs for conservation and perpetuation of the resource (Supreme Court of Canada 1990). As a result of the Denny, Paul, and Sylliboy case, the Nova Scotia Court of Appeal established in 1990 that the Mi'kmaq had the right to fish salmon for food (Eric Zscheile, Kwilmuk Maw-klusuaqn Negotiation Office, personal communication).

With the return of huntable populations of moose to Cape Breton Island, native harvest activity resumed in tandem with the provincially regulated hunt. To assert the Mi'kmaq right to hunt moose, a protest hunt was undertaken in 1988 which resulted in charges being laid on 14 Mi'kmaq. In 1989 the Province entered into conservation and safety agreements with the Confederacy of Mainland Micmacs, the Native Council of Nova Scotia, and the Union of Nova Scotia Indians allowing Mi'kmaq to hunt moose based on sport licenses issued but not filled (Pulsifer and Nette 1995). This agreement was renewed the following year, but with the Sparrow ruling in the Supreme Court and the Denny, Paul, and Sylliboy ruling in the provincial Court of Appeal, this agreement became irrelevant and the charges laid over the 1988 protest hunt were dropped.

The Marshall ruling (Supreme Court of Canada 1999), based on a fisheries case in Nova Scotia, determined that aboriginal resource use could not be restricted to non-commercial subsistence harvest, but could encompass resale to ensure a moderate livelihood. The extent to which these decisions might apply to terrestrial wildlife became a subject of

disagreement between the government of Nova Scotia and the Mi'kmaq leadership. Their impact on the prohibition of hunting in the Park was equally problematic for Parks Canada. One consequence of these rulings in Cape Breton was that, in addition to a traditional native subsistence hunt, a small number of natives embarked on harvesting moose for commercial sale of the meat to natives and non-natives. Though still illegal for a non-Mi'kmaq hunter to hunt without a license issued by the Province, a small number of natives started guiding unlicensed non-native hunters, on the assumption they could "share" hunting related treaty rights. These developments in the late 1990s were viewed with some concern by both native and non-native communities.

Prior to European settlement, the Mi'kmaq formed a loose confederacy of semi-nomadic family-groups, stretching from the Gaspé to Maine to southwest Newfoundland, organized on the basis of area of settlement and defined hunting territory. Unama'kik (Cape Breton Island) was 1 of 7 districts of the Mi'kmaq homeland. Mi'kmaq could hunt or fish in a district other than their own at the invitation of the saqamaw or chief of that district, the invitation being extended when consistent with *netukulimk*, the Mi'kmaq philosophy of care and respect for the land (Barsh 2002).

Through the 1990s there were reports of individuals both from Unama'ki bands and from mainland Nova Scotia bands engaged in increasingly large harvests of Cape Breton moose for the sale of meat throughout the Province. This raised concern of the Unama'ki leadership over the potential impact of unchecked commercial harvest on the sustainability of the herd because they viewed the native right to hunt as a community right rather than an individual right, and the Unama'ki bands as the rightful stewards of the moose on their traditional hunting grounds. A set of draft guidelines to manage the Mi'kmaq hunt was drawn up by Charles Webb and Tuma Young in the mid-1990s for the Eskasoni Fish and Wildlife Commission. These guidelines focussed on issues of hunter safety, conservation and management, eligibility, and culturally appropriate use. While they envisaged management and enforcement by Unama'ki wildlife officers and the use of an alternative justice system for resolving disputes and infractions, the guidelines had little authority beyond moral suasion. Consequently, the principal tool available for enforcement was the willingness of the native community to support hunters subscribing to these guidelines against prosecution under provincial or federal regulations.

EMERGENCE OF CO-MANAGEMENT

In 1999, at the invitation of the newly formed Unama'ki Institute of Natural Resources (UINR), talks began among UINR, NSDNR, and Parks Canada to address management of the Cape Breton moose herd. The Province and Parks Canada were at this point just gaining confidence in their ability to accurately census the herd. All parties had an interest in the sustainability of the harvest and all were concerned about the size of the native harvest. The Unama'ki bands viewed the herd as primarily a First Nations' resource from which cultural and economic benefits should equitably flow to their communities. With the Marshall case still under appeal at the Supreme Court, and with the Cape Breton herd remaining abundant, the Province focussed its enforcement on safety related matters of the Mi'kmaq hunt. Parks Canada was concerned with environmental degradation from all-terrain vehicle use, public safety issues, and visitor-use conflicts related to the prospect of hunting, especially unregulated hunting within the Park. These talks spawned 2 initiatives among the 3 agencies: a cooperative 5-year population and dispersal study and a cooperative moose management committee.

The research program was established through formal agreement between senior

management at the Park and the Renewable Resources Branch of NSDNR, and a less formal agreement with UINR. It was guided by a technical steering committee of biologists from Parks Canada and NSDNR and was implemented by a field coordinator who drew on staff from the 3 agencies. The research focussed on obtaining: (1) accurate data on population size, productivity, and survival to enable population modelling; (2) data on habitat use to determine distribution and impacts of moose on the forests of the Cape Breton plateau; and (3) information on patterns of habitat selection, dispersal, and seasonal migration.

The study area was the same as that used in the late 1990s surveys, all of Cape Breton Island north of the Cabot Trail (Fig. 1). The approximately 3,900 km^2 area was comprised of 3 distinct landscapes (survey areas; Fig. 1) differing in forest and wildlife management regime. The North survey area is predominantly provincial crown land, much of it protected as a provincial wilderness area in which there is no active forest management, hunting is permitted, but very limited motorized access. The middle or Park survey area has a policy of passive forest management and general prohibition of hunting. The South survey area is largely Nova Scotia crown land, most of it under forest lease to a nearby paper mill. This area is actively managed for wood fibre production, is open to hunting, has a dense network of woods roads, and receives a large amount of hunter effort, both native and non-native.

Full aerial population surveys were conducted annually until the desired confidence (90% C.I. of $\leq \pm 20\%$) was achieved, and every second year thereafter. To improve accuracy, a full stratification flight preceded each survey and the size of the survey blocks was reduced to 2 minutes longitude by 1 minute latitude (average 4.73 km^2) to survey more blocks with the same effort. Initially sex and age surveys were conducted annually in spring and fall, then spring only. Forty VHF and 14 GPS radio-collars were used variously on calves, sub-adults, and adults to track calf survival and juvenile dispersal, seasonal migration, home range, and landscape level habitat use.

Preliminary results, based on the whole herd over the entire study area, indicated wide fluctuations of the annual population and an estimated carrying capacity of 5,000–6,000 moose. Further analysis is required to determine if this pattern is consistent in each survey area, or if it varies with different regimes of forest management and moose harvest. It was evident that moose were not uniformly distributed throughout the study area in late winter, and aggregated in roughly the same areas each winter. The preliminary results also indicated that there may be relatively little dispersal between management areas and that seasonal movement and home range size are highly variable among individuals. Finally, demographic classification data suggested that hunting and carrying capacity affect both adult sex ratios and calf production within the survey areas. Of the three survey areas, the South survey area (Management Zones 2b and 3; Fig.1) was the most heavily hunted, had the lowest bull:cow ratios, and the highest calf:cow ratios and twinning rates.

The objective of the cooperative management committee has been essentially to establish real and effective Mi'kmaq management of the Mi'kmaq moose harvest on Unama'ki lands, to ensure both the continued sustainability and culturally responsible use of the harvest. Two priorities were education in the native communities on issues affecting the sustainability of the Mi'kmaq moose harvest, and development of a Mi'kmaq moose harvest plan supported by all native hunters to obtain a better estimate of the harvest. The 1990s guidelines were revisited as the basis of a management plan, but it became apparent that there were questions of eligibility and allocation that required political resolution that was beyond the mandate of this technical

committee. Who was to be eligible to hunt moose under these guidelines? Questions arose concerning status and place of residence. Foreseeing that it might eventually be necessary to implement a quota, how was the quota to be allocated equitably? Equally daunting was the absence of an existing mechanism for ensuring compliance. To raise awareness of the need to manage the native hunt, UINR undertook a survey of traditional ecological knowledge of moose among elders of the five Unama'ki bands. Concurrently a program for voluntary reporting of harvest data, including the collection of jaws, was established to educate native hunters on the importance of hunter reporting and to improve understanding of the size and demographics of the native harvest. Participation in the voluntary reporting program has been slow to build and accurate harvest data remains a large gap in management information.

In 2005 UINR was mandated by the Mi'kmaq Grand Council and the Unama'ki Council of Elders to develop and draft a management plan, and moose management has gained prominence in current tri-partite negotiations between the Mi'kmaq, the Nova Scotia, and Canadian governments aimed at bringing relevant modern interpretation to treaties that date from the 18th century. As part of this process, UINR has been commissioned by the Assembly of Nova Scotia Mi'kmaq Chiefs, which represents all 13 Nova Scotia bands, to meet with all potential beneficiaries – on and off reserve, status or non-status – to canvass their views on how the native hunt should be managed, in order to find a consensus that can be put forward in the tri-partite process.

EMERGING MANAGEMENT ISSUES

Continued viability of the Cape Breton moose population is of paramount importance to all 3 agencies. The herd is important to the economy of Cape Breton through providing opportunities for eco-tourism and hunting, as well as providing First Nations with an opportunity to revive their cultural heritage with respect to moose and forge modern and sustainable interpretations of treaty rights. As the moose population has risen and densities have remained high, it has been easy to meet the needs of all 3 agencies. Concern remains, however; can these population levels persist indefinitely? Still unclear is the reason for the population decline and apparent extirpation of moose in the late 1800s. Despite its apparent robustness, the current Cape Breton moose population exhibits tooth breakage and anomalous behaviours such as osteophagy and excessive bark stripping that have been interpreted as indicators of nutritional stress (Clough et al. 2006).

More important may be density dependent impacts of the herd on its own habitat including large areas of the plateau not recovered from the budworm outbreak of the 1970s. National Parks Policy calls for minimal human interference with natural processes (Parks Canada 1983, 1994), consequently, no effort was made to prevent or manage the infestation and the subsequent expansion of the moose population. By the mid-1990s it was apparent that moose were browsing preferentially on white birch, mountain ash (*Sorbus americana*), and balsam fir and that the expanding population was substantially impacting these preferred species (Basquill and Thompson 1997, Broaders 1998). By the early 2000s white birch regeneration and other deciduous shrubs were browsed to the point that grasses (particularly *Calamagrostis canadensis*) dominated large tracts, preventing germination and suppressing growth of tree seedlings. As well as reducing the habitat quality for moose, this halting or reversal of forest succession poses severe problems for marten (*Martes americana*) and lynx (*Lynx lynx*). Both are provincially endangered species limited to northern Cape Breton, and both require structurally complex, closed-canopy forest. The impact of moose browsing on forest succession also affects other species

including birds and small mammals that occupy post-disturbance boreal ecosystems from mid-successional through climax forest.

Of the 3 survey areas, the forest landscape of the Park, where hunting is not permitted, is probably the most compromised, followed by the remoter, more inaccessible areas of the provincial wilderness area north of the Park. While Parks Canada policy allows for strictly controlled active management where needed, it remains to be determined what manner and level of intervention would be possible and effective in reducing the moose population to allow recovery of the over-browsed forest in the Park. Assuming that natural succession would again produce a mature balsam fir forest, the capacity of that habitat to support moose is unknown. However, the population would certainly be smaller than currently exists, and all 3 agencies would have to decide how fewer moose could be sustained and shared.

Alternatively, if it is not possible to reduce the density of moose in the Park and the provincial wilderness area to the north, there is a risk of significant and long-lasting change to forest composition and biological diversity. Reduced habitat quality could well lead to density-dependent responses including decline in nutritional condition, productivity, and population. It remains to be seen if collaborative management will succeed in maintaining a healthy moose population over the long-term, or if we are destined to again experience widely fluctuating moose numbers in northern Cape Breton.

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