

Using caribou knowledge in expanding the Wabakimi protected area

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Abstract: When Wabakimi Wilderness Park was created in 1983, conservation of woodland caribou (*Rangifer tarandus caribou*) was one of the primary considerations. Twelve years later, in April 1995, the Government of Ontario announced that the Park, measuring some 155 000 ha, was to be expanded into a ca. 890 000 ha protected area. This was done following 2.5 yr of deliberations of the Wabakimi Park Boundary Committee. The Committee tried to reach consensus on an expanded protected area by examining a variety of options in terms of criteria related to a range of key values, one of which was woodland caribou. The analysis procedure involved dividing the 1.25-million-ha study area into more than sixty "assessment units". These were defined primarily on the basis of approximate sub-watershed boundaries. Each assessment unit was ranked on a five-level scale with respect to goodness for each value, including seasonal caribou habitat. High-value habitats for wintering, calving, and migration dominated the assessment of habitat importance for caribou. The initial assessment phase included six park expansion concepts ranging in size from just over 200 000 ha to about 1 million ha. One of the concepts (about 750 000 ha), was based specifically on the caribou value. In the second phase, four refined options were examined, ranging from just under 600 000 to roughly a million ha. Two additional options were added to the four and submitted to the Ontario Ministry of Natural Resources for consideration. The Committee was, in the end, unable to reach full consensus on which of the final options to recommend. However, upon consideration of the Committee's final report and other input, the Ontario Government announced in April 1995 the more than five-fold expansion. The new protected area contains about 475 000 ha of high-value caribou habitat. Caribou were a key value in determining both the ultimate size and configuration of the expansion.

Key words: *Rangifer tarandus caribou*, parks, boreal forest, Canada, caribou habitat.

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Introduction

Natural resources decision-making works best when it is comprised of a productive blend of rational analysis and bounded politics (Lee, 1993). Analysis for decision-making normally consists of a protocol including: (a) identification of criteria and indicators by which potential solutions are to be judged; (b) creation of alternative potential solutions; (c) prediction of the state of each indicator under implementation of each alternative solution; and (d) evaluation of alternative solutions in terms of the predictions (Duinker & Baskerville, 1986). Selection and implementation of a preferred alternative solution then follow.

In 1992, the Ontario Ministry of Natural Resources (OMNR) established a public advisory committee - the Wabakimi Park Boundary

Committee (WPBC) - to review the boundary of Wabakimi Provincial Park, located a few hundred kilometres north of Thunder Bay, and recommend improvements to that boundary. The Committee engaged in a 2.5-yr process that included both technical analysis and consensus building. In the technical analysis, eleven values (criteria) were chosen for evaluation of boundary-expansion alternatives. Among the eleven values was habitat for woodland caribou - *Rangifer tarandus caribou*. Early in the process, the WPBC members agreed that it was one of the highest priority values to consider, not only in its own right but also because it was felt to be closely linked with other biotic values.

This paper relates how caribou were treated by the WPBC in arriving at its conclusions about what expansions to recommend. After presenting back-



Fig. 1. Location of the original Wabakimi Park in Northwestern Ontario.

grounders on both the Park and the WPBC, we discuss current understanding of the status of caribou in the Wabakimi area. Then we describe the assessment protocol used for the caribou value, along with our view on how caribou influenced the various decisions of the WPBC. We conclude with recommendations for future exercises that might need to consider caribou in decisions for protected areas.

Background to the Wabakimi Wilderness Park

Overview of values in the area

The Wabakimi area (Fig. 1) contains a variety of unique and representative features - biotic, physical,

and cultural - that have long been of great interest from park protection and representation perspectives (Lee Kam, 1993). Woodland caribou are found throughout most of the area, and were one of the primary considerations in the establishment of the original park (Cumming, 1987). Winter habitat, calving sites and summer habitat are distributed across the landscape (see below).

A variety of earth- and life-science features are found in the area. Especially significant in the context of the boundary review were the provincially significant moraines, spillways, and other glaciofluvial features associated with glacial Lake Agassiz (Teller & Thorleifson, 1983). Also found in the area are various kames, dune complexes, and peatlands. The area is representative of the boreal forest (Rowe, 1972), with the principal tree species including jack pine (*Pinus banksiana*), black spruce (*Picea mariana*) and trembling aspen (*Populus tremuloides*).

Much of the area has a history of traditional Aboriginal use, with one lake containing one of the highest known concentrations of native pictographs in Ontario (Dewdney & Kidd, 1967). Several communities surround and make use of the Wabakimi area, including four First Nations and the hamlets of Armstrong, Collins and Savant Lake. Armstrong, southeast of the current Wabakimi Park, is the largest community and is an area base of operations for many of the fly-in remote tourism establishments. Fishing and hunting are major uses of the landscape from both recreational and tourism perspectives. Many canoeists frequent the area because of the variety and quality of canoeing opportunities available. Although difficult to quantify, the area is considered to have high value for remoteness and for wilderness experiences.

Creation of the park

OMNR began working on the concept of a large wilderness park northwest of Armstrong in the mid-1970s, primarily to obtain protected-area representation of Site Region 3W (Hills, 1976). The Wabakimi Park concept evolved slowly, with a variety of names: Whitewater Lake Candidate Wilderness Area, Ogoki-Albany Wilderness, and, when Minister of Natural Resources of the day Allan Pope announced its creation in 1983, Wabakimi Provincial Park. Even with park establishment, there remained considerable public interest and controversy surrounding the park bounda-

ry. Many parks advocates felt that the park was much too small to be a self-regulating ecosystem, and that many significant earth and life science features remained outside its boundaries.

Background to the Wabakimi Park Boundary Committee

Rationale

During the past few decades, decision-making in natural resources in North America has been undergoing a shift from authoritarian and bureaucratic approaches to democratic and inclusive approaches (Johnson & Duinker, 1993). Such a shift has been welcomed and endorsed in forest decision-making in Ontario (e.g., Ontario Forest Policy Panel, 1993; Koven & Mattel, 1994). Indeed, our experience is that the OMNR has been embracing such a shift in recent years, and the WPBC is a prime example.

Park advocates felt that the 1983 park boundaries were highly inadequate because they omitted critical caribou habitat, important recreational features, and other significant park values. Rather than conducting some classic public-consultation hearings and calling in written submissions, OMNR decided to put the issue in the hands of a group of local and regional people, carefully selected to represent a wide range of interests in the area. The WPBC was thus created in fall 1992.

Mandate and membership

The mandate of the WPBC was to review the existing boundary and develop a single, consensus-based boundary recommendation to OMNR's Regional Director for the Northwest Region. OMNR gave the WPBC a small secretariat and modest budget to support its activities, and did not constain the WPBC as to any expected magnitude or orientation of a boundary adjustment. The WPBC comprised 16 local individuals representing the following interests and organizations:

- First Nations (3)
- OMNR district office (1)
- OMNR regional office (parks) (1)
- tourist outfitters (fly-in fishing and hunting, and canoeing and ecotourism) (2)
- anglers and hunters (1)
- conservation and environmental groups (2)
- prospecting and mining interests (1)
- rural community interests (2)
- timber companies (2)
- outdoor education group (1)

Regional and provincial groups desiring participation in the park-expansion discussions were engaged through two workshops specially designed for their input. In addition, opportunities were extended to the general public for consultation and input.

Consensus-seeking deliberations

The WPBC used standard consensus-seeking techniques for its overall decision-making process. After six months of preliminary discussions, a facilitator was retained to move the process along more vigorously without losing sight of the consensus goal. Majority votes were avoided as much as possible, but were accepted as necessary when stalemate situations arose. Voting has the advantage of efficiency, at the expense of effectiveness in the sense of buy-in by the parties affected by decisions. On the other hand, consensus building is relatively inefficient but can be highly effective. The commitment of WPBC members (and the OMNR, to its credit) to consensus was so strong that the WPBC exceeded its original one-year deadline and took almost 2.5 years to reach its conclusion.

Landscape assessment units

Early on, the WPBC was considering an undefined study area of roughly a million hectares surrounding the current park of 155 000 ha. WPBC members were having difficulties dealing with the complexity of such a vast landscape. A common approach was needed for referring to discrete portions of the landscape, for defining boundary expansion alternatives, and for making detailed assessments of whether any particular location of the study area should be within or outside a park expansion. The group settled on the concept of landscape assessment units (AUs), defined as small (ca. 10-50 thousand ha) land/water areas that could be used for creating and assessing alternatives. For the most part, the group defined the AUs on the basis of subwatersheds, trying to maintain a reasonably consistent size. Thus, AU boundaries followed heights of land wherever possible and incorporated "complete" water systems. Some 65 AUs were delineated (Fig. 2), each named according to a dominant lake or river. The whole assemblage of AUs comprised an area of over 1.2 million ha (Fig. 2).

Option development

Option development began with consideration of alternative park sizes and configurations given cer-

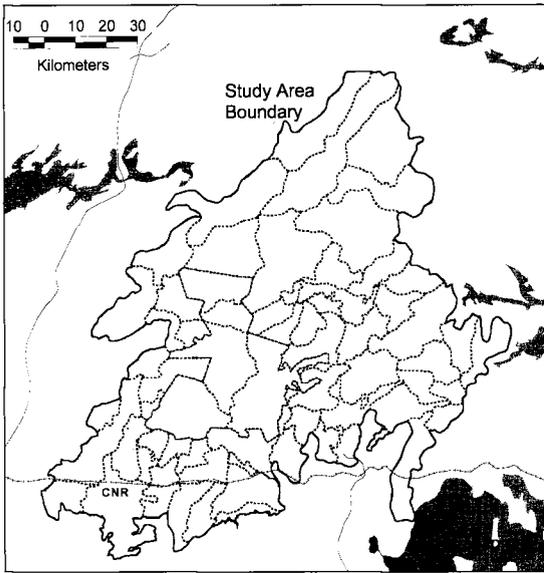


Fig. 2. Distribution of 65 assessment units within the study area of the Wabakimi Park Boundary Committee.

tain combinations of AUs. WPBC members quickly recognized the political ramifications of option development. Those who initially favoured a large park expansion were anxious to see some large alternatives developed and assessed, and were cool toward small options. Those who initially favoured a relatively small park expansion, or no expansion at all, were enthusiastic about creating such alternatives but were reluctant to accept more-generous expansion options.

With time, the group designed a set of six, first-round park-expansion options ranging in size from about 200 000 ha to about 1 million ha. These options were called "protected-area concepts", for two reasons: (a) "protected" areas rather than parks, because parks have narrow legal definitions and the WPBC was considering a wide range of options for protecting areas from roads, logging, mining, and hydro-electric development; and (b) the term "concepts" was considered more appropriate at this early stage of examining theoretical expansions, whereas "options" sounds more concrete and possible.

Once the six concepts were assessed by the WPBC, discussed in public forums, and reviewed by members of an invited scientific panel, the WPBC proceeded to develop four composite options for further assessment and discussion. The four options ranged from about 570 000 ha to 1 million ha. Essentially, two of the smaller expansion concepts were dropped, and the larger four were rede-

signed. One of the four options was based upon a combination of earth science features and woodland caribou habitat.

As the WPBC's work proceeded, full consensus on one new boundary appeared increasingly elusive. The WPBC was, however, able to agree on two options - one was based solely on conservation objectives (near 1 million hectares), and the other was a rather conservative option of almost 600 000 hectares. There was strong consensus that the latter option should be included entirely in any new protected area.

Values assessment

In its early work, the WPBC decided to group relevant area values into four classes: (a) ecological and watershed integrity; (b) landscape diversity and natural heritage; (c) recreation; and (d) sustainability of social and economic benefits. With time, the four classes gave way to the following eleven basic values which were used to assess both the first-round concepts and the second-round options:

- Aboriginal and traditional use
- canoeing
- woodland caribou habitat
- community development values
- Crown-land recreation
- earth-science values
- economic minerals
- life-science values

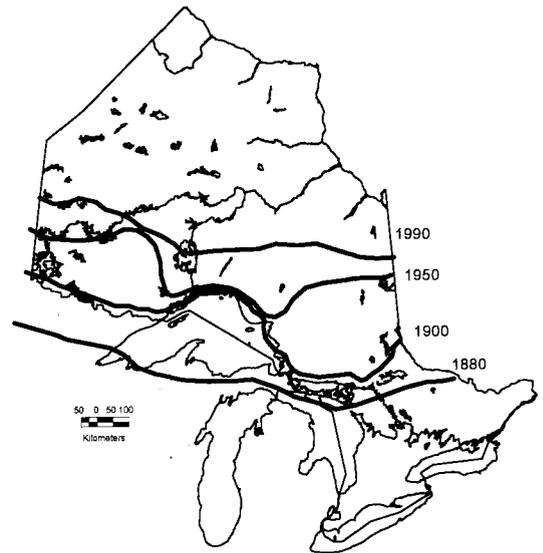


Fig. 3. Recession of the southern limit of continuous distribution of woodland caribou in Ontario since 1880 (source: Cumming & Beange, 1993).

- remote tourism
- remoteness
- timber capability

For each value, much time was spent gathering basic data and information on how the value was distributed across the study area and in each AU. In some instances, new data had to be collected. Then, members created schemes, in some cases quantitative, for rating the importance of each AU in terms of the value. For most values, a five-class system was used, so each AU could be rated low, low-medium, medium, medium-high, or high for a particular value. Maps showing the distribution of these classes became a vital source of information for WPBC members during assessment discussions. Besides the obvious utility of breaking down a complex task into more manageable bits, the AU approach facilitated greater objectivity in assessing and debating priorities for including AUs in an expanded protected area.

Caribou in the Wabakimi area

Most woodland caribou in Ontario live north of the northerly extent of roads and timber harvesting. The original Wabakimi Park (ca. 1983) lay near the southern edge of the line of continuous caribou distribution (Figs. 1, 3). Nonetheless, the original park contained a concentration of about 175 caribou (Bergerud, 1989). The size of the caribou population within the combined area of the proposed park expansion and adjacent caribou concentration areas such as Brightsand, Jojo Lake, and Lake Nipigon has been estimated at about 500 animals (R. Gollat, pers. comm., 1996). Frankel & Soulé (1981) have indicated that to avoid possible extirpation due to inbreeding in the short term, a minimum population of 50 breeding animals is required; to avoid long-term extirpations, a minimum of 500 breeding animals is thought to be required. Therefore, despite its large size and relatively high caribou concentrations, the largest possible Wabakimi Park could be at or below the lower limits of long-term caribou viability if the population were isolated. However, exchanges of genetic material may occur with caribou populations to the west, east and north.

There are generally agreed to be three critical habitats for woodland caribou: predator-free spring/summer calving areas, lichen-rich winter range, and corridors linking the two (Racey *et al.*,

1991; Cumming, 1992). The Wabakimi area is particularly well endowed with both winter and summer habitats. An arm of the ancestral Lake Agassiz extended into the area north of Armstrong, leaving a number of glaciofluvial features that constitute important caribou habitats, including peatland-dunefield complexes, outwash plains, glacial spillways, moraines, eskers, and extensive areas of wave-washed bedrock (Zoltai, 1965). Parks advocates have contended that many of the winter habitats are of high quality for caribou because of the shallow, dry and nutrient-poor soil conditions, resulting in low site index and low stocking, which in turn fosters prolific lichen growth (Morash & Racey, 1990). Antoniak (1993) found that many habitats could be well predicted using these parameters, and that virtually all actively used caribou habitats could be identified using a combination of standard forest resource inventory (FRI) data and remote sensing from Landsat.

Wabakimi's concentration of large lakes with convoluted shorelines and numerous islands offers many actual and potential calving sites and summer habitat (Timmermann, 1993a). The high density of lake chains and rivers constitute excellent travel corridors between winter and summer habitats.

Population studies on the Wabakimi-area caribou have only begun to become comprehensive for the entire area in recent years. Previously, several researchers documented the presence of some portions of the population. Following up reports by canoeists and outfitters, and with the added impetus of a 1978 proposal for a major logging road, Harold Cumming carried out the first scientific aerial surveys in the late 1970s and early 1980s, identifying some of the winter habitats north of the CNR line (Cumming & Beange, 1987). However, Cumming carried out few investigations to the west or south. These surveys had considerable influence upon the Ontario Parks Council and the Minister of Natural Resources in establishing the original 1983 park boundary. Likewise, surveys in 1989 (Bergerud, 1989) were limited to the extant park area, plus some area south of the park, but north of the CN rail line. Bergerud's (1989) population estimate (mean) was 171 animals in the extant park. Random aerial surveys from 1990 to 1993 (Hyer, 1997) showed that there were actively used winter habitats and corridors in the Wapikaimaski, Aldridge, and Loop Lake areas south of the CNR and north of the Kopka River. Also, a travel corridor from the Armstrong airport and Jojo Lake winte-

ring range extending north via the Pikitigushi River to the Ogoki River was documented at this time (Hyer, 1997).

Additional studies on caribou populations and habitats in the Wabakimi area were conducted by OMNR, both during the years that OMNR was considering a boundary change and while the WPBC was deliberating. These surveys added many valuable data on winter habitat (much of which appeared to be unoccupied), and on caribou winter presence, including March migration routes (1992-94) and linkages between Wabakimi animals and those in the Brightsand, Kopka, and Savant Lake areas. Since the announcement of the park expansion in April 1995, additional work in the summers of 1995 and 1996 has identified yet more critical habitats outside the announced expansion areas to the west, south and east. Collared animals have confirmed that in 1995 and 1996 caribou wintering south of the tracks used Wabakimi habitats north of the CN line in all seasons (R. Gollat, pers. comm., 1996).

Incorporating the caribou habitat value in Wabakimi expansion deliberations

Assessment Protocol

The total area under consideration consisted originally of 65 AUs ranging in area from 1600 to over 50 000 hectares, and averaging ca. 17 500 hectares. This included five AUs representing the original

park. The larger AUs were generally to the north (Fig. 2), where caribou habitat values were considered relatively low.

Information on caribou habitat values was compiled for the entire study area. This included information on winter habitat sightings, traditionally used wintering areas, summer sightings, calving sites, and documented and suspected travel corridors (between winter and summer range). The information came from a variety of sources using various techniques, e.g. winter caribou surveys, incidental caribou sightings during moose surveys, caribou research projects, calving site surveys on specific lakes, incidental reports of caribou sightings from forest users, Timber Management Plan values maps, and published and unpublished reports (e.g., Cumming 1987; Bergerud, 1989). Data coverage was not uniform, making quantitative comparisons difficult - the study area spanned four administrative districts and five Wildlife Management Units as defined by OMNR. Much of the information was recent, due to an increasing interest in caribou inventory and management in recent years. Little information was available for winter habitat utilization for large portions of the study area, particularly to the north and the east; specific winter caribou surveys were conducted in these areas to collect data using general transect survey methods (Timmermann, 1993b).

The overall value of each AU as currently utilized caribou habitat was evaluated - habitat potential, current or future, was not ranked. In some cases, the habitat was provided in only a portion of the AU, but the entire AU received the same ranking. An effort was made to provide consistent judgements across all AUs. AUs were ranked according to the following qualitative scale:

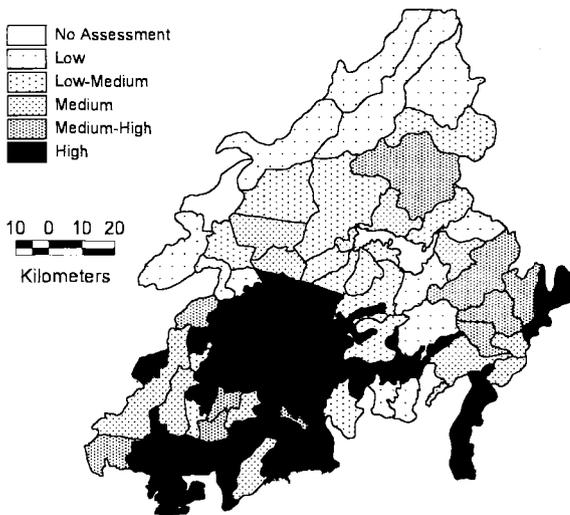


Fig. 4. Caribou habitat values ranked for each assessment unit within the study area of the Wabakimi Park Boundary Committee.

- High:
 - repeated winter use, or
 - essential calving lake, or
 - winter use and heavily used/linear travel corridor, or
 - favoured habitat type and demonstrated use;
- Med.-High:
 - a value judged to be mid-way between high and medium;
- Medium:
 - significant winter use, or
 - winter use and light/diffuse travel corridor, or

Table 1. Relative ability of four park concepts (G to J) and the proposed expansion to incorporate assessment units containing critical woodland caribou habitats. All figures include the area of the original park.

Park Concept *	Total Area (ha)	Area of AUs with High caribou habitat values (ha)	Area of AUs with M-H caribou habitat values (ha)	Area of AUs with Medium caribou habitat values (ha)	Proportion of critical caribou area within habitat is study the concept (%)
Original Park	155 700	123 250	0	32 420	23
Concept G	571 200	218 800	57 700	60 700	50
Concept H	763 600	284 400	80 400	134 700	74
Concept I	846 200	321 800	109 500	146 800	86
Concept J	1 038 600	312 500	153 300	149 000	91
Study Area	1 204 000	359 500	158 000	158 100	100
Expansion	891 500	243 500	114 500	118 700	71

* Original Park = Wabakimi Provincial Park as originally established in 1983.

Concept G = concept based on maintaining some high quality timber and mineral opportunities.

Concept H = concept based on tourism and recreation.

Concept I = concept based on landscape and biological diversity (including woodland caribou).

Concept J = concept based on maintaining ecological integrity.

Study area = total area considered by the Wabakimi Park Boundary Committee.

Expansion = territory included in the protected-area expansion announced by the Government of Ontario in April 1995.

- habitat type with occasional use;
- Med.-Low: – a value judged to be mid-way between medium and low;
- Low: – occasional or no winter use, and
- no known calving sites or travel corridors, and
- unfavourable habitat type.

litative assessments of the various concepts were also undertaken, to determine how well they incorporated specific habitat needs such as travel corridors to adjacent habitats, and linkages with Lake Nipigon (a major calving/summering lake). Concept I was judged to meet these qualitative needs best, an expectable result since development of this option most closely considered all seasonal caribou habitat values.

Assessment outcomes

The ranking of caribou habitat values for all the AUs resulted in a ranking classification as follows: high - 18 AUs; medium-high - 8 AUs; medium - 10 AUs; medium-low - 14 AUs; and low - 15 AUs (Fig. 4). Three AUs were split and each section was ranked separately, because of the clumped spatial distribution of caribou habitat features.

Caribou habitat values for each of the four refined concepts (concepts G, H, I, J - Fig. 5) were compared to determine how well each concept incorporated caribou habitat values. Critical caribou habitat was considered to include the medium, medium-high and high rankings. The four park concepts incorporated from 50 to 91% of the critical caribou habitat considered to be within the approximately 1.2 million hectare study area (Table 1). Some qua-

As part of the selective scientific review, responses were received from ten of 24 invited scientists. Five reviewers commented specifically on caribou habitat considerations relative to park expansion, and most were supportive (see summary in Table 2). Reviewers generally did not comment specifically on the relative merits of the various park concepts, but rather provided comments on caribou habitat protection and biodiversity conservation.

Subsequent to the development of the four concepts, the WPBC created two additional concepts (K and L) for OMNR to consider. These two concepts were further assessed by OMNR to determine their ability both to protect park-related values and provide resource-development opportunities. Caribou habitat concerns were again considered in this assessment, with regard to how they supplemented the caribou habitat incorporated within the

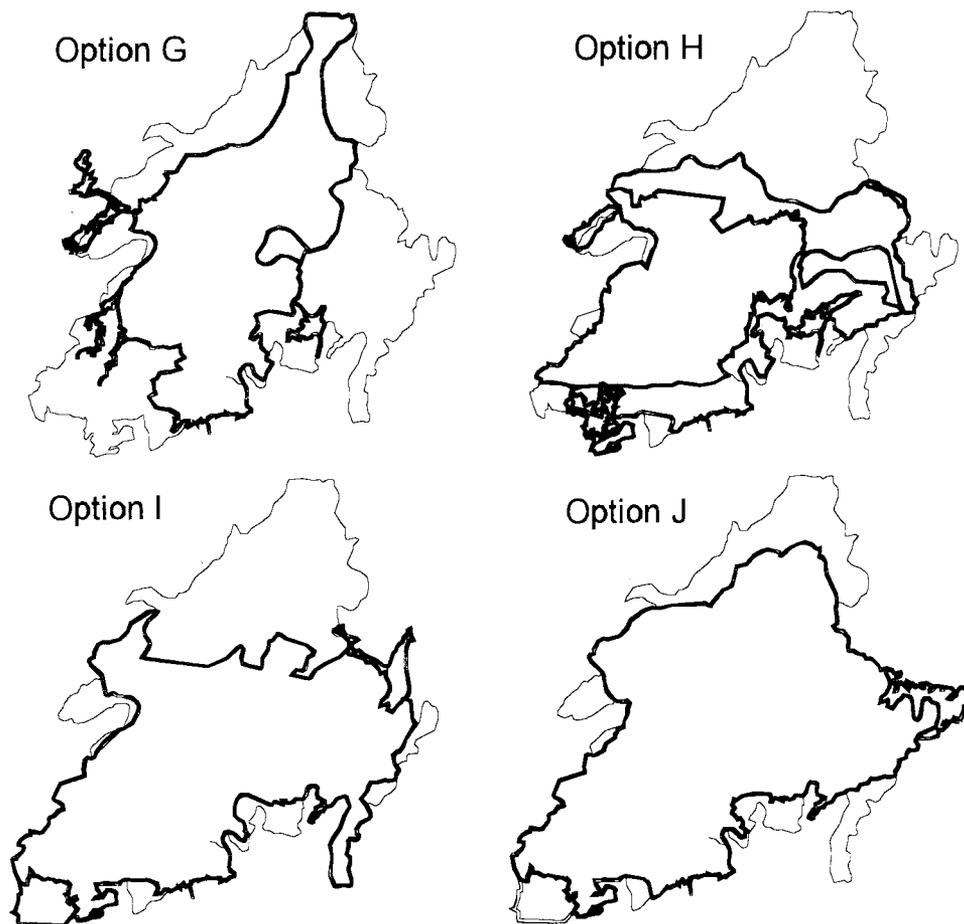


Fig. 5. Phase-2 options for protected-area expansion as determined by the Wabakimi Park Boundary Committee.

existing park. The 577 100 ha Concept K added about 150 000 ha of critical (i.e., seasonal high-value) habitat to the existing park, and with the current park represented about 45% of such habitat within the study area. Concept L, which was over a million hectares, added almost half a million hectares of critical habitat to the existing park, and along with the current park represented almost 95% of the critical habitat within the study area.

In April 1995, Minister of Natural Resources Howard Hampton announced that Wabakimi Park was being expanded to an area of approximately 891 500 ha (Fig. 6). This included 475 000 ha of critical woodland caribou habitat, or 71% of the critical habitat identified within the study area.

Influence in boundary redefinition

In the process of developing and assessing park expansion options, the WPBC moved through three

distinct phases. In the first phase, six options were used to stimulate response, but without conclusion. In second phase, four refined options emerged, and these moved the process ahead encouragingly. The final phase found general consensus on a minimum core expansion, but consensus could not be reached on a single new boundary. Caribou values remained key in all three phases.

Indeed, caribou were always central to all the WPBC deliberations, for two reasons. First, the evidence is clear that whatever factors may be implicated in the continuing northward regression of caribou range, the northern boundary of continuous caribou habitat coincides with the northern timber cut line. Consequently, the provincial policy that no species of flora or fauna be allowed to decline permanently in total numbers across the province as a result of forest management dictated that Wabakimi be considered an important caribou refu-

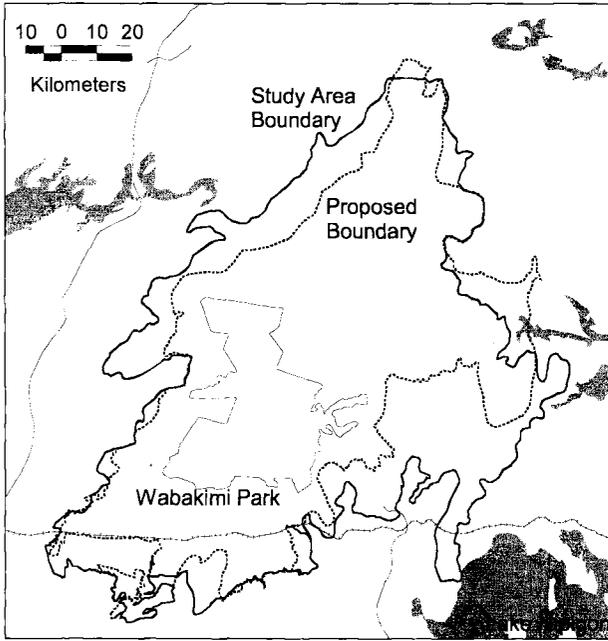


Fig. 6. Proposed boundary of a protected-area expansion at Wabakimi as announced by the Government of Ontario in April 1995.

gium. Protected areas are important in maintaining woodland caribou within Ontario's forests, as approximately one third of the documented caribou within the boreal forest are found within parks (Cumming & Beange, 1993). Second, park expansion advocates understood well the importance of public opinion associated with such a policy where an animal as appealing as the caribou is concerned.

Space is believed by many biologists to be the most important overall caribou habitat requirement (Bergerud, 1992). Within that space must be certain forested sites in a sequence of age classes renewed over time by disturbance (traditionally wild-fire). As Table 1 shows, the larger the expansion option, the greater the inclusion of high-quality space for caribou. Option J, in addition, was aimed at providing sufficient area such that natural fire-disturbance regimes could operate and thus create a regional fire-renewing ecosystem. Preserving a remnant of the boreal forest as a benchmark area was also a key priority in Wabakimi expansion, but it may be only within such a large area that woodland caribou can survive over time.

We believe that the prospect of wide provincial, national and international interest in the caribou

issue had a profound effect upon the final expansion decision. Thankfully, promises of mitigation of area and wood supply losses brought the forest-products industry inside, as it is doubtful the companies would have moved based upon caribou and other park values alone. Most participants and observers would agree with the statement made by Paul Gagné, Avenor's CEO, at the April 1995 announcement of the proposed expansion of the Wabakimi protected area: "The expansion of Wabakimi will create a world-class park and ensure the continued protection of unique land forms and wildlife habitats indigenous to the region." We are happy to report that the expanded park was officially regulated in July 1997.

Conclusions

Caribou habitat was one of eleven key values that commanded much attention during the deliberations of the WPBC. It was fortuitous from a park-expansion point of view that several park values (as opposed to resource-use values such as timber harvest and mining) overlapped spatially in roughly the same areas surrounding the former, 155 000-ha Wabakimi Provincial Park. Moreover, areas with favourable seasonal caribou habitat were also generally important in terms of earth-science, canoeing and remote-tourism values.

WPBC members were firm in their conviction that a reasonable outcome could be achieved through a combination of principled consensus-building and rational analysis of alternative park sizes and boundary configurations. Analytical progress was strong once the WPBC worked out the assessment-unit approach and methods to assess the values objectively, either quantitatively or qualitatively. The caribou perspective was incorporated into the technical analysis along with all the other key values, and played a vital role in shaping the new Wabakimi protected area.

We offer the following advice for participants in future exercises where caribou (or any other featured species, for that matter) may be a vital value in creating protected areas:

1. Information will always be inadequate, and decisions will always have to be made despite inadequate information. As early as possible, assemble extant information, analyze it, identify

Table 2. Summary of key points raised by five scientific reviewers regarding woodland caribou habitat values.

Park expansion

Park expansion to the south required to include additional winter and summer habitat.

Boundary must include important habitat and linkages for seasonal migration.

Caribou should be given top priority in re-defining the park boundary - require a network of viable caribou areas across northern Ontario.

To ensure long-term viability of the caribou population, must protect an area of sufficient size to maintain natural fire patterns.

To ensure the long-term survival of the herd, it is important to incorporate landforms that will provide future habitat.

Adjacent land use

Ecologically sustainable land use should be implemented on the landbase outside the expanded park to maintain landscape linkages.

Human disturbance

Human use of islands not considered a problem.

Winter snowmobile access should be restricted in some critical areas to avoid disturbance of caribou.

Park management

May wish to consider less restrictive park management policies that allow for vegetation management to maintain caribou habitat (eg. Lightly stocked stands, prescribed burns).

May wish to consider option of directly managing other wildlife populations to aid in caribou survival, e.g. wolf control, moose hunting.

critical information needs, get the new required information, and use the assembled information base fully.

2. Simple analytical approaches are efficient, and likely sufficient for strategic decisionmaking. Detailed and site-specific information should be compressed into more-usable forms at a regional scale.
3. Hasty analytical work in support of important decisions should be avoided. Useful analysis, supported by careful information gathering and incisive discussion, takes time, not to mention the negotiations in which analytical results are used. The WPBC overran four process deadlines, requiring substantial amounts of time to reach its conclusions. The biophysically sensible and politically feasible outcome that was reached would have been elusive, if possible at all, in a more rushed exercise.

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