

## Status of woodland caribou in Ontario: 1996

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*Abstract:* Over 20 000 woodland caribou were reported in Ontario during 1966, the highest figure ever published. Photographic counts of the Pen Islands herd, bordering Manitoba, have shown constant increases from 2300 in 1979 to 10 800 in 1994. Elsewhere in Ontario, estimates have been declining, from 13 000 in 1965 to 11 000 in 1989 to under 10 000 in 1996, a trend that may or may not be real because of differing survey methods. On the Hudson Bay Lowlands (excluding the Pen Islands caribou) 8600 were reported in 1965, 7200 in 1989, 5500 in 1996, an apparent decline. The transitional forest populations has remained stable. Estimated caribou numbers inhabiting the true boreal forest have dropped from nearly 4000 in 1965 to 2700 in 1996, but this decrease was not confirmed by careful within-district breakdowns of sub-populations by habitat types and may be an artifact of classification from districts to regions. The sharpest decrease was reported for the Central Region, north east of Lake Superior, where estimates dropped from 500 in 1965 to 475 in 1989 and to 68 in 1996. Individual caribou bands approach recognized minimum numbers for isolated populations, and even totals by sub-population remain low: over 1 300 in commercial forests, about 500 in potentially commercial forests, and 8-900 in parks. Due to small numbers in widely dispersed band-locations, the potential for human disturbance affecting these forest dwelling caribou is substantial.

**Key words:** *Rangifer tarandus caribou*, population, trends.

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### Introduction

Extensive areas, dense forests, and small, widely-spaced bands make estimating numbers of caribou in Ontario difficult. Present methods remain imprecise, yet attempts must be made in order to determine current status. Woodland caribou once ranged south to about 46 degrees latitude in Ontario, but by 1993 their contiguous range extended southward only to about 50 degrees (Cumming & Beange, 1993). Most authors (DeVos & Peterson, 1951; Cringan, 1957; Simkin, 1965; Darby *et al.*, 1989; Cumming & Beange, 1993) have assumed related decreases in caribou numbers, and ascribed them directly or indirectly to expanded human activities in the forest. Thus the question of caribou numbers addressed in this paper has immediate implications for caribou management and conservation, and for forest management in Ontario. Overall estimates, although useful for global planning, may conceal changes within component populations that

might require management response. Thus, in addition to compiling total numbers for Ontario, this paper breaks down the overall figure into estimates for individual populations, and suggests management implications.

### Methods

Woodland caribou currently range over the Precambrian Shield in Ontario from Hudson Bay to Lake Superior, an area that grades from open muskeg to full boreal forest. Ahti (1967) classified this area into 7 regions and Simkin (1965) provided population estimates for 6 of these. I have used them once more in this paper so that comparisons with previous estimates would be possible. Coastal Tundra Belt and the Sub Arctic Lichen Belt (combined by Simkin, 1965) constitute the Hudson Bay Lowlands; Ahti (1967) considered the latter the best lichen range in Ontario. To the south lies an

ecotone between the muskegs of the north and the true boreal forest of the south, recognized by (Ahti, 1967) as the Northwestern Region and the Eastern Swamp Region. In the boreal forest itself he identified the Western Rock Region, the Nipigon-Superior Region, and the Central Region.

Cumming & Beange (1993) showed a northern limit to commercial forests in Ontario. This line includes as commercial the three southern regions, except for the northwestern corner of the Western Rock Region; on the other hand, it includes as commercial a small southern corner of the Northwestern Region, and a belt along the southern boundary of the Eastern Swamp Region. Thus the regions cannot be assigned exactly to the non-commercial/commercial split but the included and excluded areas approximately balance so summaries proclaim the three southern regions as commercial forest.

The information for this paper was collated from estimates of caribou numbers provided for 13 districts of the Ontario Ministry of Natural Resources (OMNR) by district biologists and other management personnel. OMNR personnel in each district were asked to examine, revise, and return tables with previous estimates by district (Cumming & Beange, 1993). New tables were returned to each respondent for corrections and modifications. Finally, telephone calls and Faxes helped to sort out problem areas. Unfortunately, district boundaries have changed and personnel moved so that exact comparisons among districts are not always possible. Compilations provided estimates for larger areas with fewer boundary problems, and for the province as a whole.

Field survey methods differed widely among districts due to the diversity of habitat conditions and caribou numbers. Pen Islands caribou, living mainly in open country, were counted from aerial photographs (Abraham & Thompson, 1998), undoubtedly the most reliable method used by anyone contributing information. Elsewhere in open country, transects similar to those initiated by Simkin (1965) have been continued by Thompson (1986) and others, but in forested country such methods are not possible. Direct aerial counts of caribou on randomized plots, such as those carried out for moose in Ontario since 1956 (Cumming, 1958; Bisset & McLaren, 1995) are not feasible for caribou, nor do they make sense for a species so scarce and widely distributed, but moose surveys occasionally contributed knowledge about caribou by locating ran-

domly selected survey plots in places where aircraft otherwise would seldom fly, but where caribou were found.

Less reliable methods can provide some ideas of caribou numbers in places where preferable methods are not possible. Caribou can be counted when they move onto frozen lakes during March and April; however, because observed proportions of the bands can seldom be guessed, the counts provide only minimum estimates, perhaps supported by other information (e.g., Cumming & Beange, 1987). When tracks are few, numbers of animals can be determined, but in larger track complexes this becomes impossible.

Recently, increased efforts at determining use of forest stands by caribou for forest planning have located new caribou bands in several districts. Subsequent efforts to follow movements with the ARGOS satellite tracking system (Craighead & Craighead, 1987) have provided increasingly accurate ideas about numbers.

## Results

Compiled 1996 data totaled 20 757 caribou (Table 1), the highest estimate ever published for Ontario (compared with 1300-3000 estimated by DeVos & Peterson, 1951; 7200 by Cringan, 1957; 12 555 by Simkin, 1965; and 15 682 by Darby *et al.*, 1989). The largest component population, the Pen Islands herd estimated at 10 798 animals (Table 1), contributed over half the caribou in Ontario. Having increased steadily in numbers from 2 300 in 1979, they also represent the only Ontario population that is unquestionably growing, or immigrating (Abraham & Thompson, 1998).

Apart from these Pen Island caribou, district estimates ranged from 12 to 4500 caribou (Table 1). With this great variation, total numbers have little meaning. Even district comparisons are difficult as they may change dramatically over time for reasons that are not always clear. Some, like those for Cochrane District (32 for 1996 v.s. 373 by Darby *et al.*, 1989) may be due to movements of caribou across borders (see note Table 1). Others districts, as with Dryden (25 v.s. 7), report changed numbers due to shifts in district boundaries. Many district estimates appear to vary greatly because numbers of caribou are so few that counts change from year to year. A few estimates are identical with those of Darby *et al.* (1989) because no new estimates are available from remote areas where expense and

Table 1. Estimates of woodland caribou numbers in Ontario for 1996 by Ministry of Natural Resources districts.

District <sup>a</sup>	Bases of estimates					Comments on current estimates and reasons for changes from Darby <i>et al.</i> (1989)
	Caribou estimates by district	Flights, ground observations, photographs to count caribou	Flights for moose surveys	Reports from the public	General knowledge of OMNR personnel	
Cochrane	32	X	X			373 ± 345 Movement between Ontario and Quebec <sup>b</sup>
Dryden	25	X				7 (entered as Ignace) Also share some animals with Thunder Bay
Geraldton	950	Winter, summer			X	2709 Difference unexplained
Hearst	12				X	22
Kapuskasing	24				X	80
Kenora	50	X		X	X	37 Moving among Woodland Caribou Park, commercial forests, and Manitoba
Moosonee (Penn Islands)	4534 10798	10% survey Photographs				4528 ± 1075 4800 Based on Thompson (1986) Population increase
Nipigon	178	X			X	278 New boundaries
Red Lake (WPLUP)	275 500					570 Movement between Ontario and Manitoba Based on OMNR (1982)
Sioux Lookout (WPLUP)	720 1750	X			X	1750 Based on OMNR (1982)
Terrace Bay (Slate Islands)	35 375	Summer ground observations		X	X	476 Population crash, partial recovery, on Slate Islands
Thunder Bay	375	X			X	0 Discovery of new bands, changes in boundaries
Wawa	124	X	X	X	X	52 Some small bands up, some down
Total	20757					15682

<sup>a</sup> District names, personnel and estimates as of August, 1996.

<sup>b</sup> During the winter of 1996-97, 300 additional caribou were found in Cochrane commercial forest. Since a similar number had previously been reported for adjacent Quebec, caribou may move back and forth.

logistics prohibits annual estimates. Although most differences can be explained, they are so numerous that district by district comparison is not very fruitful.

To reduce difficulties in assigning counts to districts, estimates were collated within the 6 caribou habitat regions (Table 2) used by Simkin (1965). Even in these larger units, assigning estimates proved difficult, and at least some of the apparent differences may result from mis-classification of districts into the larger regions. To further reduce classification difficulties, regions were grouped in pairs according to habitat type.

The Sub-Arctic Lichen Belt appears to have progressively decreased from 6976 in 1965 to 3273 in 1996, only half of its former size (Table 2). The Eastern Swamp Region, on the other hand, is at least holding its own. However, the decrease in the first region is such that the two regions combined also show a progressive decrease. Estimates for the Northwestern Region have increased substantially, while those for the Western Rock region have decreased. These changes raise suspicions that the differences may be due to the difficulty in assigning districts to regions. Indeed, the combined total for these two regions shows no apparent trend.

In a similar way, the Nipigon-Superior Region shows gradually increased estimates while the Central Region has shown a remarkable decrease. In this case, the overall trend for the combined regi-

ons remains downward. Furthermore, the sum for the True Boreal Forest was also slightly downward. The totals for Ontario, excluding the Pen Islands herd, have also gradually decreased over this period (Table 2).

More precise comparisons can be made over a shorter term by comparing estimates for 1990 with those for 1996 (Table 3). These data show increases in estimates of caribou numbers: from approximately 800 to 1300 in the commercial forest, 400 to 480 in the potentially commercial forest, and 600 to 800 in parks and other protected areas. The total estimate for the commercial portion of the boreal forest doubled during those 6 years, probably due to increased effort at finding caribou bands.

## Discussion

Caribou near the Pen Islands may have migrated from farther north in the early 1970's (Abraham & Thompson, 1998), and they continue to move in and out of Manitoba, but they constitute the largest and fastest growing population in Ontario. Those on the Hudson Bay Lowlands, in contrast, may have been declining. For the Lowlands caribou, habitat disturbance has changed relatively little over hundreds of years, but they have been subjected to relatively heavy hunting, a possible cause for the apparent decline. Caribou in the transition zone face relatively little habitat disturbance and less hun-

Table 2. Comparisons of 3 sets of estimates (1965, 1989, 1996) in regions reported by Simkin (1965) (excluding Penn Island caribou).

Region	Simkin (1965)	Darby (1989)	Present (1996)
Sub Arctic Lichen Belt	6976	4528	3273
Eastern Swamp Region	1590	2709	1761
Total Hudson Bay Lowlands	8566	7237	5034
Northwestern Region	232	2320	2250
Western Rock Region	2857	44	1820
Total Western Transitional	3089	2364	4070
Nipigon-Superior Region	400	806	787
Central Region	500	475	68 <sup>a</sup>
Total Eastern Boreal	900	1281	855
Total commercial forest <sup>b</sup>	3989	3645	2675
Totals for Ontario	12555	10882	9959

<sup>a</sup> See note Table 1.

<sup>b</sup> Including the Western Rock Region, Nipigon-Superior Region, and Central Region.

Table 3. Estimates of caribou numbers for 1996 in the commercial portion of Ontario's boreal forest compared with those reported for 1990 by Cumming & Beange (1993). Increases were believed due mainly to finding additional caribou bands.

	Reported for 1990 <sup>a</sup>	Current 1996
In current commercial forests	828	1328
In potential commercial forests	400	481
In parks and undisturbed islands	600	839
Total estimate for boreal forest area of Ontario	1828	2648 <sup>b</sup>

<sup>a</sup> Cumming & Beange, 1993.

<sup>b</sup> The difference from Table 2 is due to a finer breakdown among habitat categories within districts.

ting; they seem to be holding their own. In the more southerly portions of the true boreal forest, habitat disturbance has been widespread. Although changes in distribution suggested substantial declines prior to 1965 (Cumming & Beange, 1993), the evidence for continuing decline is less clear. The Central Region reported fewer caribou than previously, but in more westerly regions, discovery of new caribou bands offset any losses in numbers.

The further breakdown of Boreal Forest caribou into 3 sub-populations (Commercial, Potential Commercial, and Protected) provided similar advantages. Caribou estimates for the true boreal forest after an apparent decline from 1965 to 1989 showed an apparent increase, not only in the totals, but also for commercial forests, potentially commercial forests (i.e. may be designated commercial in the next few years) and in parks. However, most of the increase appeared to be in commercial forests where increased efforts at identifying stands supporting caribou revealed previously unknown bands. Parks continue to harbor substantial numbers (total 839-964 caribou, with over 600 of these supplied by Wabakimi and Slate Islands parks.

### Implications for management

Thomas (1998) maintains that estimates of caribou (*Rangifer tarandus*) numbers contribute little toward setting management goals. This view may be true for barren-ground caribou, but for woodland caribou with their modest, widely separated bands, the importance of dispersion information (how many

and where) can scarcely be doubted. Management goals for very small caribou herds, such as 25-30 Selkirk caribou shared between British Columbia and neighboring states (Freddy 1979) must differ widely from those for very large ones, e.g. the 800 000 George River herd (Couturier *et al.*, 1996). In Ontario the question is, "Which populations should be managed toward which goals?"

The growing Pen Islands herd is probably being under-harvested; management goals might include increased hunting to approach a sustained yield. Other caribou in the Hudson Bay Lowlands show some evidence of decrease since 1965. In this situation, management must involve decisions regarding allowable surpluses, effects of snowmobiles, whether legal hunting by non-natives should be introduced, and similar concerns. Thus, management of both the Pen Island population and the remaining Hudson Bay Lowland caribou should aim at sustained yield, but from opposite directions. Caribou in the transition forests show continuing good populations and are threatened by neither hunting nor habitat disturbance. Little management is necessary at the present time.

Management of caribou in the true boreal forest faces other problems. Caribou are occasionally hunted by aboriginal people, but they prefer moose (Hamilton, 1984), and legal hunting has not been permitted since 1929. On the other hand, caribou bands have been lost along the southern limits of their distribution throughout this century, apparently due to habitat change (Cumming & Beange, 1993). There is widespread agreement that this northward retreat must be stopped to retain any caribou in the commercial forest. The currently higher estimates of caribou numbers relieve concern to some extent, but do not remove it. The 50:500 rule (50 animals for short term survival, 500 for the long term, Soulé, 1987) must be at least doubled, perhaps tripled, for a caribou population to include the many non-breeding animals. At double the estimates by Soulé (1987), there remain plenty of caribou in the boreal forest as a whole for long term survival. But these caribou are widely dispersed in bands not exceeding 500, most 150 or less. They probably always have been (Simkin, pers. comm.). In the past genetic exchange among caribou bands was assured by movement of individuals between bands. Radio telemetry has supported this idea by showing that caribou travel extensively, visiting other caribou bands with which they do not regularly associate (Cumming & Beange, 1987), and this finding has

been confirmed by recent ARGOS tracking (Gollat, pers. comm.). However, if the large caribou bands, in and out of parks, become the only ones in the commercial forest, such exchange is no longer assured. To guarantee future presence of caribou in the forest, a network of small caribou bands must be retained among the larger aggregations to perpetuate genetic variety. Survival of even the larger bands and park caribou may depend on retaining these linkages. Caribou in the boreal forest must be managed with the goal of species richness: no species should be lost from the original ecosystem complex, least of all, these striking, large, and historically important woodland caribou. Managers might rely on parks for continuance of caribou presence in the commercial portions of the boreal forest of Ontario, but with Wabakimi and Slate Islands parks contributing over two thirds of the animals, numbers in the remaining parks appear too low for any confidence of survival even in the short term, and their wide spacing almost ensures island-like isolation. As for resource managers, it would be professionally unthinkable to manage the forests of northern Ontario in ways that would result in one of the most important indigenous species being lost from our forests. Every band saved by maintaining suitable habitat helps keep these caribou a step further from such a fate.

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## References

- Abraham, K. F. & Thompson, J. E. 1998. Defining the Pen Islands caribou herd of southern Hudson Bay. – *Rangifer* Special Issue No. 10 : 33–40.
- Ahti, T. & Hepburn, R. L. 1967. *Preliminary studies on woodland caribou range, especially on lichen stands, in Ontario*. Ontario Dept. Lands & For. Research Report Toronto. 134. pp.
- Bisset, A. R. & McLaren, M. A. 1995. *Moose population inventory plan for Ontario, 1996–1998*. Ont. Min. Natur. Res., N. W. Science & Techno., Thunder Bay, Ont. I.R.-02., 28 pp.
- Couturier, S., Courtois, R., Crépeau, H., Rivest, L. P. & Luttich, S. 1996. Calving photocensus of the Rivière George Herd and comparison with an independent census. – *Rangifer* Special Issue 9: 283–296.
- Craighead, D. J. & Craighead, J. J. 1987. Tracking caribou using satellite telemetry. – *Natl. Geogr. Res.* 3: 462–479.
- Cringan, A. T. 1957. History, food habits and range requirements of the woodland caribou of continental North America. – *Trans. North Am. Wildl. Conf.* 22: 485–501.
- Cumming, H. G. 1958. Geraldton district plan for a statistically sound aerial moose survey. pp 25–27 – *In: Minutes of the 22nd Fed.-Prov. Wildl. Conf., Ottawa*.
- Cumming, H. G. & Beange, D. B. 1987. Dispersion and movements of woodland caribou near Lake Nipigon, Ontario. – *J. Wildl. Manage.* 51: 69–79.
- Cumming, H. G. & Beange, D. B. 1993. Survival of woodland caribou in commercial forests of northern Ontario. – *Forestry Chronicle* 69: 579–588.
- Darby, W. R., Timmermann, H. R., Snider, J. B., Abraham, K. F., Stefanski, R. A. & Johnson, C. A.. 1989. *Woodland caribou in Ontario. Background to a policy*. Ont. Min. Natur. Res. Toronto. 38 pp. pp.
- DeVos, A. & Peterson, R. L. 1951. A review of the status of woodland caribou (*Rangifer caribou*) in Ontario. – *J. Mamm.* 32: 329–337.
- Freddy, D. J. 1979. Distribution and movements of Selkirk caribou, 1972–74. – *Can. Field-Nat.* 93 (1): 71–74.
- Hamilton, G. D. 1984. *Native use of moose and woodland caribou in the Cat Lake band area, northwestern Ontario*. MSc. Thesis, Lakehead University, Thunder Bay. 104. pp.
- OMNR. 1982. *West Patricia land use plan: proposed policy and optional plans*. Ont. Min. Natur. Res., Toronto. 368 pp.
- Simkin, D. W. 1965. *A preliminary report of the woodland caribou study in Ontario*. Ont. Dept. Lands & For., Res. Br. Section Report. Toronto. 75. pp.
- Soulé, M. E. (ed.). 1987. *Viable populations for conservation*. Cambridge, Great Britain, Cambridge University Press.
- Thomas, D. C. 1998. Needed: less counting of caribou and more ecology. – *Rangifer* Special Issue 10: 15–23.
- Thompson, J. B. 1986. *Population and harvest surveys for the Ontario Hudson Bay Lowland caribou*. Ont. Min. Natur. Res. Unpubl. report. 36. pp.