# WOOD BISON
# GROUND SURVEYS ON CAEN LAKE, MACKENZIE BISON SANCTUARY, 4-5 AUGUST 1983

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## ABSTRACT

Ground classification studies of wood bison, undertaken on 4-5 August 1983 on Caen Lake, Mackenzie Bison Sanctuary, revealed 131 animals, 16.8% (n=22) being calves. Ten groups were located, ranging in size up to 35 bison. The animals were in general quite approachable and could be readily distinguished into 5 male and 4 female age categories. Ground classification work on wood bison on Caen Lake should be continued on a regular basis.

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## INTRODUCTION

Wood bison (Bison bison athabascae) have increased prolifically within the Mackenzie Bison Sanctuary, west of Great Slave Lake, since their introduction into the area in 1963 (Department of Renewable Resources 1983). With the population expanding in both numbers and range, utilization of the resource by northerners can be expected to commence within a few years. Aerial surveys, undertaken from once to five times annually in the past decade, have produced minimum total counts and given some indication of calf production (Department of Renewable Resources 1983). However, to effectively manage the bison herd, the sex and age composition of the population plus a more precise indication of calf production and survival must be known. This can be accurately determined only by ground based surveys.

To my knowledge, ground classification surveys of wood bison within the Sanctuary have only been carried out by Chowns (1983a) during January, February and March 1981. Due to the large herd sizes encountered and the somewhat skittish reaction of the animals once the observers were detected, an excessive number of bison were unclassified, rendering interpretation of the data regarding sex ratios and age category proportions difficult (Chowns 1983a).

Caen Lake is located in the western portion of the Sanctuary, adjacent to the Yellowknife Highway (Fig. 1). For the purpose of this paper, "Caen Lake" describes the vegetated flats surrounding the shallow body of water located near the centre of the lake bed. Since the mid-1970's bison have been observed on the lake bed in increasing numbers, at most times of the year. Aerial surveys in March and July 1983 located 40 and 304 bison, respectively, on Caen Lake (Graf pers. comm.).

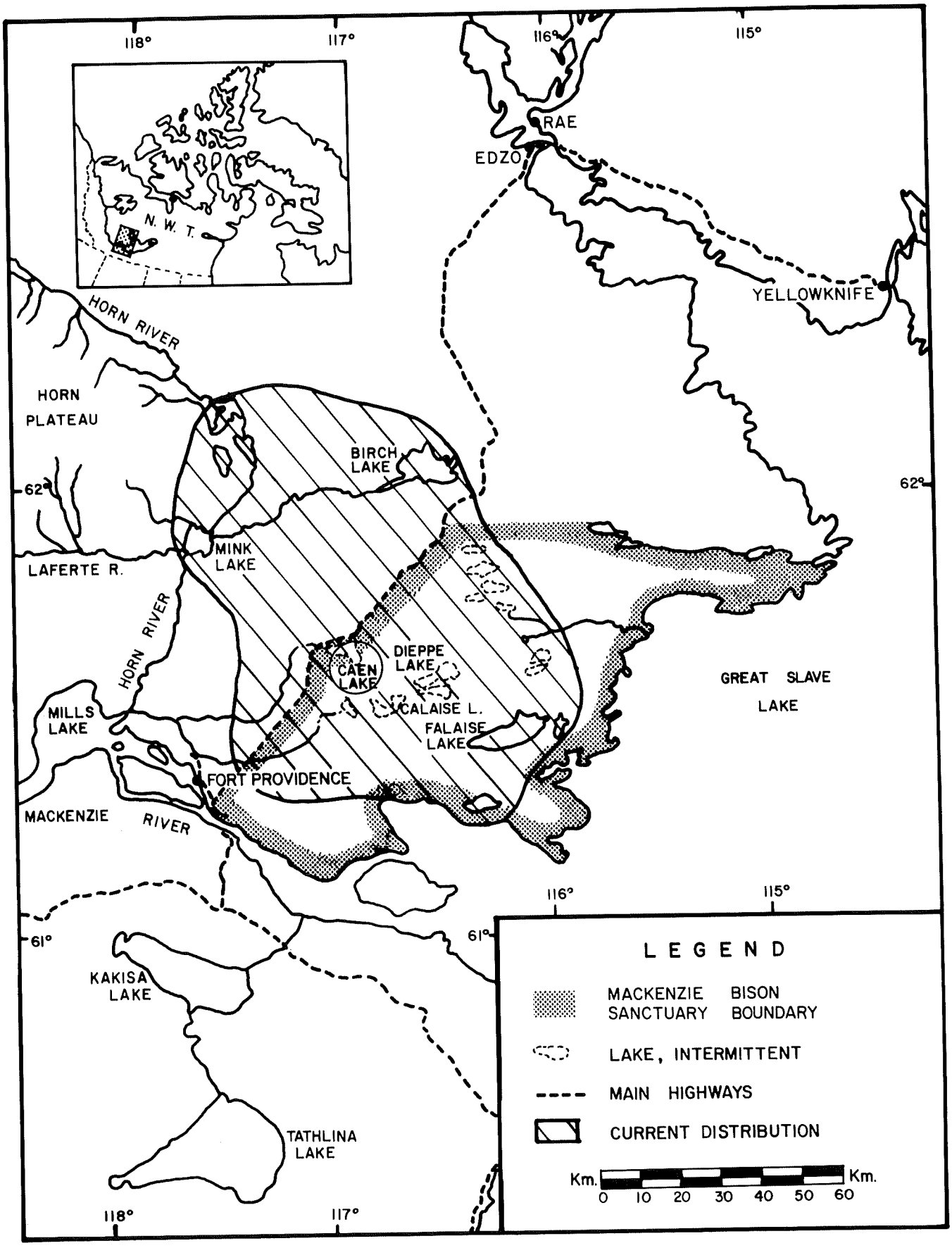



Figure 1. Location of Caen Lake in the Mackenzie Bison Sanctuary, N.W.T., and wood bison distribution in 1983.

To evaluate the feasibility and effectiveness of ground based surveys, I spent 4-5 August 1983 on Caen Lake classifying wood bison. This report summarizes those observations.

## METHODS

Travelling on foot, the lake bed was partly surveyed on 4 August 1983, and encircled the following day. The 5 August survey covered all of the lake bed with the exception of the extremities of the south-eastern "bay" (Fig. 2). Bison were located by searching with a pair of 5x35 binoculars and a 20x-40x spotting scope. Groups were detected at distances of up to 3 km. Bison sightings were plotted on a 1:50,000 topographical map.

Bison were always approached downwind, and where possible, behind cover of vegetation. At distances ranging from 75 to 100 m, groups were scanned by spotting scope systematically from one side to the other. Some individual bulls and bull groups were approached to within 20 m. Animals were classified into age and sex categories as they entered the field of view. For documentation purposes and for subsequent reexamination, photographs were taken with a Nikon 35 mm camera with a 500 mm mirror reflex lens.

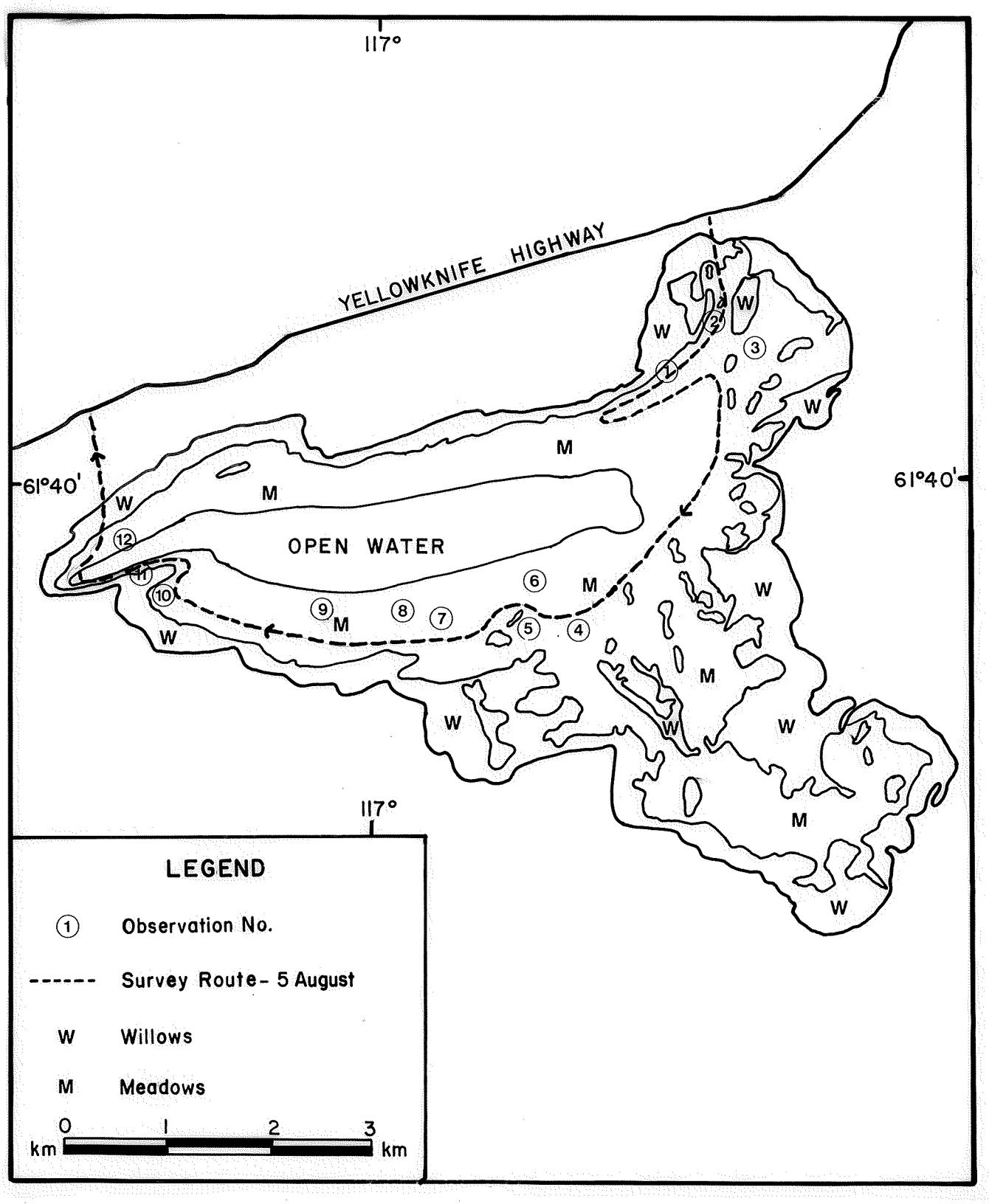



Figure 2. Location of wood bison groups observed on Caen Lake, 4-5 August 1983.

The techniques outlined by Fuller (1959) were used to distinguish the following age classes: males; yearling (1-2 yr), spikehorn (2-4 yr), young adult (4-7 yr), and adult and aged (≥7-8 yr); females; yearling (1-2 yr), young adult (2-7 yr), and adult and aged (≥7 yr). Calves (unsexed) and yearlings were recognized by body size. Thus the various age and sex categories were distinguished by a combination of the following criteria: horn size, shape and condition, body conformation, and absence or presence of a penal sheath.

Horn condition frequently distinguish young adults from adult and aged animals in both sexes. In males the tips become blunted and shredded at 7 or 8 years of age. Similarly, in adult and aged cows the entire curvature of the horn may fracture 12 to 15 cm from the base, resulting in the retention of a stub about as long as the bony core (Fuller 1959).

## RESULTS

Both days of the survey were mostly sunny with light west winds and midday temperatures of approximately 22°C. Visibility was excellent and only hampered slightly over long distances by "heat waves" in the spotting scope.

On 4 August only the northern portion of the lake bed closest to the highway was surveyed (Fig. 1). A mixed group of 21 bison was observed and partially segregated (Table 1, Obs. No. 1). A group of six males - five bulls and one spikehorn - was also located. Both groups were believed to be accounted for during the 5 August survey, and are therefore discounted in further discussions of age and sex categories.

On 5 August three groups containing bulls, cows and young, and four bulls-only groups or individuals were carefully classified (Table 1, Obs. No. 3-9), constituting 44 bison. Eight calves (18.2%) were located, representing a calf: cow ratio of 53:100. Enroute to a prearranged rendezvous on the highway late in the afternoon three more mixed groups were encountered (Obs. Nos. 10-12). Time restraints did not allow a proper classification to be undertaken; however, minimum calf counts were obtained. Out of 131 bison encountered on 5 August, 22 (16.8%) were calves.

While young adult, and adult and aged bulls could be differentiated in most cases, the categories are lumped in the results for greater consistency. Similarly, in some cases, differentiation between young adult, and adult and aged cows was nebulous; these categories are also combined.

Table 1. Age and sex composition of wood bison on Caen Lake, 4-5 August 1983

| Date | Obs. No. | Herd Size | Bulls (>4 yr) | Cows (>2 yr) | Spikehorn (2-4 yr) | Yrlg (Sex) (1-2 yr) | Calves (<1 yr) | Un-Known |
|---|---|---|---|---|---|---|---|---|
| 4 Aug. | 1 | 21 | 6 | 5 | 1 | 2 (1M,1F) | 3 | 4 |
| | 2 | 6 | 5 | | 1 | | | |
| 5 Aug. | 3 | 5 | 4 | | 1 | | | |
| | 4 | 1 | 1 | | | | | |
| | 5 | 2 | 1 | | 1 | | | |
| | 6 | 3 | | 2 | | | 1 | |
| | 7 | 22 | 6 | 9 | 1 | 2 (1M, 1F) | 4 | |
| | 8 | 1 | 1 | | | | | |
| | 9 | 10 | 1 | 4 | | 2 (1M,1?) | 3 | |
| | 10[1] | 31 | 14 | 7 | 1 | 2 (?,?) | 3 | 4 |
| | 11[1] | 21 | | | | | 4 | 17 |
| | 12[1] | 35 | | | | | 7 | 28 |
| TOTALs | | | | | | | | |
| Obs. Nos. 3-9 (%) | | 44 | 14 | 15 | 3 | 4 (9.1) | 8 (18.2) | |
| Obs. Nos. 3-12 (%) (Calves only) | | 131 | | | | | 22 (16.8) | |

[1] Total herd size and minimum calf counts only obtained.

## DISCUSSION

Field classification of wood bison into age and sex categories has not been attempted extensively in the Northwest Territories, due mainly to a lack of free-roaming animals. With the Mackenzie Bison Sanctuary herd expanding rapidly and bison being introduced in the Liard Valley in 1980, there is a definite need to refine the accuracy of field classification counts, to provide information that will enhance the management of the species.

There is little published literature on the changes in the form of horns in bison. Fuller (1959) gives a written description of the changes but does not provide sketches or pictures. Fuller's descriptions are based on animals obtained from Wood Buffalo National Park from 1950 to 1955. These animals are hybrids of plains (B.b. bison) and wood bison and thus the changes in horn shape with age may not accurately reflect the same changes in the pure wood bison inhabiting the Sanctuary. Similarly, most pictorial references to horn growth are obtained from plains bison (Allen 1876, McHugh 1958, Meagher 1973, Dary 1974).

Based on horn size, shape and condition, body conformation, and the absence or presence of a penal sheath, as described by Fuller (1959), the five male and four female age classes can be readily identified in the field. In many cases close examination of the horn tips is necessary to distinguish young adult from adult and aged bulls; at great distances these differences

may not be discernable. Young adult cows are differentiated from adult and aged cows mainly by the length of the basal portion of the horns; distinction between the two is also sometimes difficult over long distances. Therefore, if classification into the two adult age classes is not possible, then the animals should be at minimum lumped into "mature" bulls (>4 yr) and "mature" cows (>2 yr).

From field observations and subsequent study of the slides obtained, I have attempted to diagramatically show the development of horn characteristics of male and female wood bison observed on Caen Lake (Fig. 3).

While field classification is useful in separating animals into general age and sex categories, the limitations must be recognized. There is apparently a degree of individual variation among bison that may make classification of an animal difficult at times. Reynolds (pers. comm.) noted that even with known age wood bison in Elk Island National Park, identification to age class by horn characteristics is sometimes inaccurate. However, careful field observation should be able to provide classification into gross age categories, giving a good indication of percent calves and yearlings, calf:cow ratios, and adult sex ratios, information that is needed to better understand and manage the population.

MALE[1]

Calf (<1 yr)

- small lateral horns/stubs
- small body size
- reddish coat colour to ca. 3 mo.

Yearling (1-2 yr)

- still relatively small size
- penal sheath present

Spikehorn (2-4 yr)

- small body size in comparison to adult bulls

Young adult (4-7,8yr)

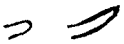
- large size
- base of horn thick, tapers quickly
- no shredded horn tips

Adult and aged (>7,8 yr)

- generally same as young adult except horn tips blunted and shredded

FEMALE

Calf (<1 yr)



- small lateral horns/stubs
- small body size
- reddish coat colour to ca. 3 mo.

Yearling (1-2 yr)

- still relatively small size

Young adult (2-6,7 yr)

- more uniform diameter to horn, narrow base
- posterior deflection of tips
- horn curves inward and backward

Adult and aged (>6,7 yr)

- horizontal portion of horn elongates
- no enlargement of basal diameter
- horn tips seldom fray, entire horn may fracture 12-15 cm from base

[1] penal sheath is evident in all males >1 yr

Figure 3. Differentiation of sex and age classes (Fuller 1959) in wood bison, Mackenzie Bison Sanctuary.

One hundred and thirty-one bison were located on the portion of Caen Lake surveyed. This count and the 304 obtained on 15 July 1983 (Graf pers. comm.) represent the greatest number of animals observed on the lake to date (Table 2). Bulls began appearing on the lake in 1974 (Jacobson 1974) and were the predominant age/sex category until the late 1970's (Stephenson 1980). Larger, mixed groups have been observed more frequently in the past 2 years of aerial surveys.

Twenty-two calves were observed, representing 16.8% of all bison counted. This is somewhat greater than the count obtained during the 15 July 1983 aerial survey where 12.8% of the whole herd in the Sanctuary were calves and the calf count on Caen Lake was 14.8% (Graf pers. comm.). Calves were easily discernable in the ground survey, with their small size and still reddish-brown coats. Nubs of horns up to 2-3 cm in length were visible in most instances.

Of the 44 animals carefully classified (Obs. Nos. 3-9), the adult male:female sex ratio (Comparily bulls $>$4 yr: cows$>$2 yr) was 93:100 (n=29); however, the sample size was restricted. If spikehorn bulls are considered, the ratio males$>$2 yr:females$>$2 yr was 113:100 (n= 32). It was not possible to adequately classify the last three groups, totally 87 animals, to determine an overall adult sex ratio for the animals on the lake bed.

Table 2. Bison counts on Caen Lake since 1979[1]

| Survey | No. Bison | No. Groups[2] | No. Singles | Bison/Group Mean | Bison/Group Range | Bison/Group S. Dev. | Source |
|---|---|---|---|---|---|---|---|
| 31 March 1979 | 24 | 7 | 3 | 3.43 | 1-9 | 3.05 | Hawley et al. 1980 |
| 11 June 1979 | 17 | 10 | 7 | 1.70 | 1-5 | 1.34 | " |
| 14 March 1980 | 17 | 4 | 0 | 4.25 | 3-7 | 1.89 | " |
| 27 February 1981 | 12 | 5 | 0 | 2.4 | 2-4 | 0.89 | Chowns 1983b |
| 3 June 1981 | 12 | 3 | 0 | 4.00 | 2-7 | 2.65 | " |
| 29 July 1981 | 1 | 1 | 1 | 1.00 | -- | -- | " |
| 31 August 1981 | 53 | 5 | 1 | 10.60 | 1-25 | 9.91 | " |
| 12 November 1981 | 8 | 2 | 0 | 4.00 | 2-6 | 2.83 | " |
| 1 March 1982 | 14 | 4 | 0 | 3.50 | 2-5 | 1.29 | " |
| 15 June 1982 | 16 | 2 | 0 | 8.00 | 6-10 | 2.83 | Chowns 1982 |
| 26 March 1983 | 40 | 4 | 1 | 10.00 | 1-34 | 16.02 | Graf pers. comm. |
| 15 July 1983 | 304 | 13 | 0 | 23.38 | 2-79 | 26.85 | " |
| 5 August 1983 | 131 | 10 | 2 | 13.10 | 1-35 | 13.06 | This report |

[1] All surveys were conducted aerial except for 5 August 1983.

[2] "Group" means all units, including individual animals.

Most groups were approached from downwind. The mixed groups did not appear to be very wary. Despite little cover, I was able to approach to within 100 m in most cases. Upon detecting me, still upwind of my position, the animals would rise, if bedded, and stare. Much urination and defecation took place at this time. If the "critical distance" was encroached upon, one or two animals would generally break ranks and first walk, then run, heading for the nearest willows, followed closely by the rest of the group. Large bulls would generally position themselves closest to me and be among the last to leave. These observations are in general agreement with those noted by Chowns (1983a). The one group that I was forced to approach from upwind detected my scent before they saw me. This group immediately stampeded.

Individual bulls and bulls-only groups numbering up to six animals were extremely approachable, almost docile. I was able to approach in full view to within 20 m of some of these groups with no obvious aggressive or flight behaviour apparent. Most bulls were lying on the unvegetated marl flats encompassing portions of the lake bed. Much rolling was evident as was face rubbing into the ground. This may have been a means of relief from the persistent biting and sucking insects.

Chowns (1983a) had some difficultly in classifying the bison encountered in the winter of 1981 due to the large herd sizes. Late summer or fall surveys may be more condusive to accurate classification counts as the animals are typically in smaller groups, unlike winter or calving groups which tend to be large (Chowns pers. comm.) The multitudes of biting and sucking insects dictates that most animals will be in the open, seeking relief with wind, rather than in dense bush.

Ground surveys of a particular lake bed should take place on a single day if possible. Movement of animals, especially those that have been disturbed, could confound classification results if carried out for greater than a one day period. The mixed group of 21 bison located on the afternoon of 4 August (Obs. No. 1) had moved at least 5 km by the following morning.

I attribute at least part of the success of my ability to approach both mixed and bulls-only groups with such ease to the silent approach; not using motorized transportation. A snowmobile or all-terrain cycle might increase the wariness of the animals, rendering them less approachable. While a summer survey at Caen Lake on foot entails a lot of walking, I am confident that two experienced observers could have accurately classified all 131 bison I located on 5 August. An aerial reconnaissance to locate the groups for the ground crews (and at the same time obtain an aerial calf count for comparison purposes) would increase the effectiveness of the classification count.

## RECOMMENDATIONS

1. Due to the proximity to the Yellowknife Highway, Caen Lake is an ideal study site for ground observations to document calf productivity and survival, adult sex ratios and other parameters necessary to better understand the biology of the wood bison. Ground classification surveys should be continued on a regular basis.

2. The bison on Caen Lake should be protected from all forms of harvesting and the lake should be utilized solely as an area designated for non-consumptive utilization of bison (i.e. viewing of the animals in their natural state) and scientific study.

3. Simultaneous to a summer aerial survey of the Sanctuary, ground counts should be carried out at a site such as Caen Lake, or another major lake bed, to determine the accuracy of aerial surveys to locate and count calves.

4. All subsequent collections or harvests should document horn shape and size with tooth wear and eruption patterns to refine our ability to classify wood bison in the field.

5. To correlate accurate numerical ages for bison to field identification and dental characteristics, known-aged animals must become available. A program to tag young animals - calves and yearlings - to establish this known-aged base should be considered.

## PERSONAL COMMUNICATIONS

Chowns, T. Wildlife Officer, Department of Renewable Resources, Hay River, N.W.T.

Graf, R., Wildlife Management Biologist, Department of Renewable Resources Yellowknife, N.W.T.

Reynolds, H.W., Wildlife Biologist, Canadian Wildlife Service, Edmonton, Alberta

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