

BEVERLY AND KAMINURIAK
CARIBOU MONITORING AND
LAND-USE CONTROLS

1982

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1. The first part of the paper is devoted to the study of the properties of the function $f(x)$ defined by the equation

$$f(x) = \int_0^x \frac{1}{1+t^2} dt$$

for $x \in \mathbb{R}$. It is shown that $f(x)$ is an odd function and that $f(x) \in C^1(\mathbb{R})$. Moreover, it is proved that $f(x)$ is a strictly increasing function and that $f(x) \in C^2(\mathbb{R})$.

2. In the second part of the paper, we study the properties of the function $g(x)$ defined by the equation

$$g(x) = \int_0^x \frac{1}{1+t^4} dt$$

for $x \in \mathbb{R}$. It is shown that $g(x)$ is an even function and that $g(x) \in C^1(\mathbb{R})$. Moreover, it is proved that $g(x)$ is a strictly increasing function and that $g(x) \in C^2(\mathbb{R})$.

References

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ABSTRACT

Barren-ground caribou (Rangifer tarandus groenlandicus) movements were monitored by aerial reconnaissance from 14 May to 12 July 1982 in relation to the Caribou Protection Areas and land-use activities. The Caribou Monitor advised the Department of Indian Affairs and Northern Development (DIAND) Land-use Inspectors on cow-calf distribution in areas of proposed land-use activity. The Beverly cows were observed on the calving ground by 15 May. Peak calving was observed by 10 June in the central area of the calving ground. Post-calving movements began by 14 June. By 12 July most caribou had left the Beverly Caribou Protection Area. Peak calving on Kaminuriak calving grounds was observed on 4 June. Post-calving aggregations were formed by the last week in June. During the monitoring period eight land-use sites were released from controls within the Beverly Caribou Protection Area and two land-use sites were released within the Kaminuriak Caribou Protection Area. The Caribou Protection Measures and the Monitoring Program acted to prevent potentially harmful contact between caribou and land-use activities.

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INTRODUCTION

In 1982, the Beverly and Kaminuriak barren-ground caribou herds were monitored for the fifth consecutive year to observe calving and post-calving distributions. The objective of the monitoring program was to provide DIAND with information for releasing areas inside the Caribou Protection Areas (Fig. 1) in the absence of caribou cows (Appendix I, 1b). The Caribou Monitor advised DIAND on the release of areas for land-use operations between 15 May and 31 July 1982.

The 1982 Caribou Protection Measures (Appendix I) were used to regulate land-use operations within the caribou calving and post-calving areas and to protect caribou during spring migration and throughout the summer at designated water crossing sites. The 1982 Caribou Protection Areas encompass the known traditional calving grounds¹ and post-calving areas of the Beverly and Kaminuriak herds, which were summarized and delineated by Darby (1980). The measures were designed to minimize or eliminate disturbance of caribou from land-use activities during calving and post-calving periods. Measures applied to land-use operations in 1978 and 1979 are outlined by Darby (1978, 1980), in 1980 by Cooper (1981) and in 1981 by Clement (1982).

1 In this report, "calving ground" and "calving grounds" follow the definition by Fleck and Gunn (1982) wherein a calving ground is the area where caribou concentrate to calve in any one year and calving grounds include all the areas where caribou of each herd have been known to calve.

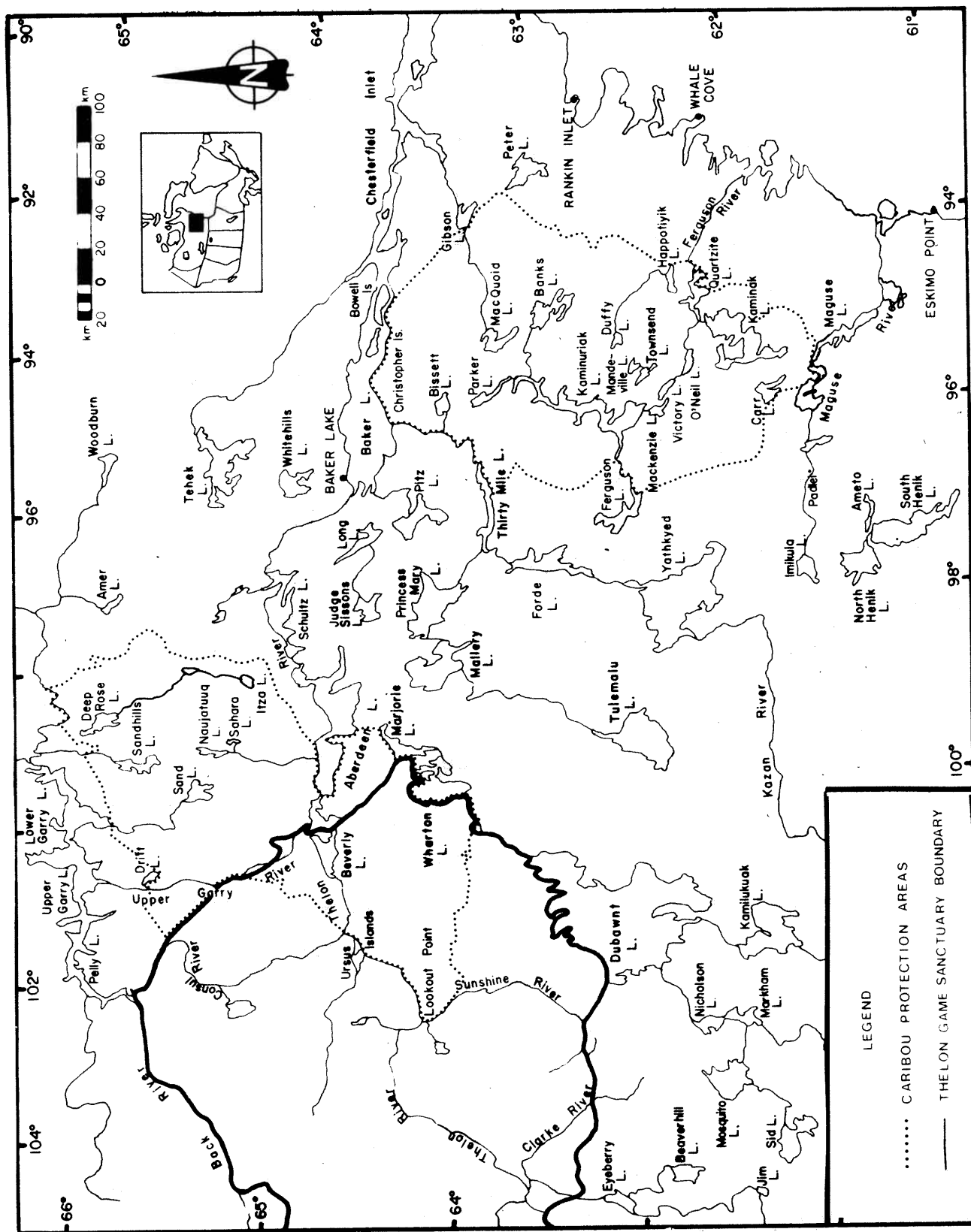


Figure 1. The area of the 1982 Caribou Monitoring Report.

This report summarizes information obtained on spring and summer movements of caribou in relation to the 1982 Caribou Protection Areas and includes an account of an exchange of information and the cooperative effort between the land-use operators, other DIAND land-use personnel, and the Caribou Monitor.

MONITORING AREA AND METHODS

The monitoring area included the calving and post-calving ranges of the Beverly and Kaminuriak herds (Fig. 1). Figure 1 and all tables contain references to lakes and rivers for which there are local names that are not officially recognized.

The Caribou Monitor followed procedures outlined in Appendix II and techniques described by Darby and Williams (1979). Areas were monitored for the presence of cow and cow-calf concentrations prior to, during, and after calving in an effort to detect movements or continued occupancy in order to respond to specific concerns of DIAND. Information obtained during the N.W.T. Wildlife Service calving ground survey was used in assessing requests for release between 8-12 June for the Beverly caribou and 3-10 June for the Kaminuriak caribou.

Monitoring flights were conducted in a DeHavilland Beaver on wheel-skis or tundra tires, and by Bell Jet Ranger 206B helicopter. Monitoring was conducted at an altitude of 300 m above ground level (agl) and at air speeds up to 170 km/h in the Beaver. Thirteen monitoring flights (51.6 h) were flown during the 1982 program. Twelve flights (40.3 h) were flown to monitor the Beverly caribou and one flight (11.3 h) was flown to monitor the Kaminuriak caribou.

The Caribou Monitor and the Baker Lake Wildlife Officer organized the flights, observed and recorded the caribou sightings in conjunction with the Assistant Caribou Monitor. As well, observations of human activity were documented. The pilot made incidental sightings. Observations were recorded on a standard

form and plotted on 1:250,000 scale topographic maps originally and then transferred to summary maps (Appendix III).

During the spring migration some heavily used trails were followed to determine the location of the caribou. The trails of migrating caribou are visible from the air, particularly on moist ground, snow or on new vegetation growth. During the post-calving period calves were used to indicate the presence of cows.

Discussions with Inuit hunters, pilots, biologists and exploration company personnel supplemented the information base by providing additional data on caribou distribution and movements. Following each flight, the Monitor verbally reported observations to the DIAND Land-use Inspector in Baker Lake and followed-up with a written report. In addition, three monthly summary reports were submitted. All reports are on file at the N.W.T. Wildlife Service Area Office in Baker Lake.

RESULTS AND DISCUSSION

Beverly Caribou Movements and DistributionSpring Migration Toward the Calving Ground

On 14 May caribou were observed immediately north of the Thelon River between Beverly Lake ($64^{\circ}36'N$, $100^{\circ}30'W$) and Ursus Islands ($64^{\circ}15'N$, $101^{\circ}45'W$) (Table 1). Trails were followed along the Thelon River south to Lookout Point ($64^{\circ}09'N$, $102^{\circ}34'W$) where numerous trails were seen crossing the ice. In an area to the southeast, trails crossing the Sunshine River ($64^{\circ}00'N$, $102^{\circ}00'W$ to $64^{\circ}08'N$, $102^{\circ}30'W$) were followed north to a large concentration which spread over several kilometers. As well, scattered groups of cows were observed in the same area, all east of the Thelon River (Fig. 1).

During a flight on 15 May, the Monitor observed cows and small groups of unclassified caribou on the ice of Upper Garry Lake ($65^{\circ}53'N$, $100^{\circ}43'W$) and west towards Pelly Lake ($96^{\circ}55'N$, $101^{\circ}20'W$). A few northeast-southwest trails were observed on the ice of Lower Garry Lake ($65^{\circ}52'N$, $99^{\circ}36'W$) (Fig. 2).

On 19 May trails crossing Ursus Islands were followed north and northeast across the Upper Garry River (approximately $65^{\circ}20'N$, $100^{\circ}43'W$). Cows in varying group sizes were observed moving northward. The largest concentration was observed on Drift Lake ($65^{\circ}31'N$, $100^{\circ}35'W$) east of Upper Garry River. Small groups of mixed caribou were observed on the ice of Garry Lake ($65^{\circ}50'N$, $100^{\circ}29'W$); some caribou were moving southward, while others were

Table 1. Caribou monitoring flights for the Beverly Caribou Protection Area, 1982.

Date	Hours flown	Areas to be flown	Purpose of flight	Results and recommendations	Land-use permits in areas surveyed
14 May	6.2	Ursus Islands, Lookout Point	To locate concentrations of migrating cows	Vanguard located 24 km north of Thelon River (between Ursus Islands and Beverly Lake)	Canadian Nickel N81C456
15 May	4.0	Sand Lake area to Garry Lakes	To locate migrating cows in response to request for release	Caribou observed north of Sand Lake, but not to the south; recommended release	Canadian Nickel N81C456
16 May	2.5	Thelon River, Sand Lake	To locate cows and determine movements in response to request for release	Flight aborted due to inclement weather	Canadian Nickel N81C456 NWT Wildlife Service N81H495
19 May	6.4	Thelon River, Sand Lake	To locate cows and determine movements in response to request for release	Caribou located north of Ursus Islands to north-west of Sand Lake; no caribou observed south of Sand Lake; recommended release	NWT Wildlife Service N81H495
8 June	2.4	Southeast of Sand Lake to south of Dop Lake	Response to request for release	No cows or calves observed; recommended release	Westmin Resources N80C412
19 June	2.1	Itza Lake	To obtain data from NWT Wildlife Service	Trip aborted due to inclement weather	NWT Wildlife Service N81H495
21 June	4.0	64°58'N, 100°02'W (Fly camp)	Response to request for release	Release withheld due to large cow-calf concentration north and northwest of site	Westmin Resources N80C412
		65°04'N, 98°02'W (Fly camp)	Response to request for release	Recommended release	Westmin Resources N80C412

Table 1. (continued)

Date	Hours flown	Areas to be flown	Purpose of flight	Results and recommendations	Land-use permits in areas surveyed
		65°08'N, 98°35'W (Fly camp)	Response to request for release	Recommended release	Westmin Resources N80C412
		65°26'N, 97°41'W (Fly camp)	Response to request for release	Recommended release	Westmin Resources N80C412
25 June	4.3	Big Lake, Itza Lake	To determine presence or absence of cows in relation to camps	No caribou observed near camps - release still in effect	G.S.C.* N81N644 NMT Wildlife Service N81H495 Westmin Resources N80C412
		64°58'N, 100°02'W (Fly camp)	Response to request for release	Recommended release	Westmin Resources N80C412
28 June**	1.0	Drift Lake	Response to request for release	Recommendation for release withheld due to cow-calf groups within 16 km of camp site	Kidd Creek Mines N81C506
3 July	3.7	Sand Lake, Drift Lake, Deep Rose Lake	Response to request for release	Recommended release	Kidd Creek Mines N81C506
12 July	3.7	Sand Lake	Response to request for release	Recommended release	Uranerz Exploration N82J728
		Drift Lake	To determine presence or absence of cows in relation to camps	No caribou observed near camps - release still in effect	Union Oil Co. N80C242 Kidd Creek Mines N81C506
Total flying hours: 40.3					

* G.S.C. - Geological Survey of Canada.

** This flight was part of a 6.1 h flight with Baker Lake Land-use Inspector.

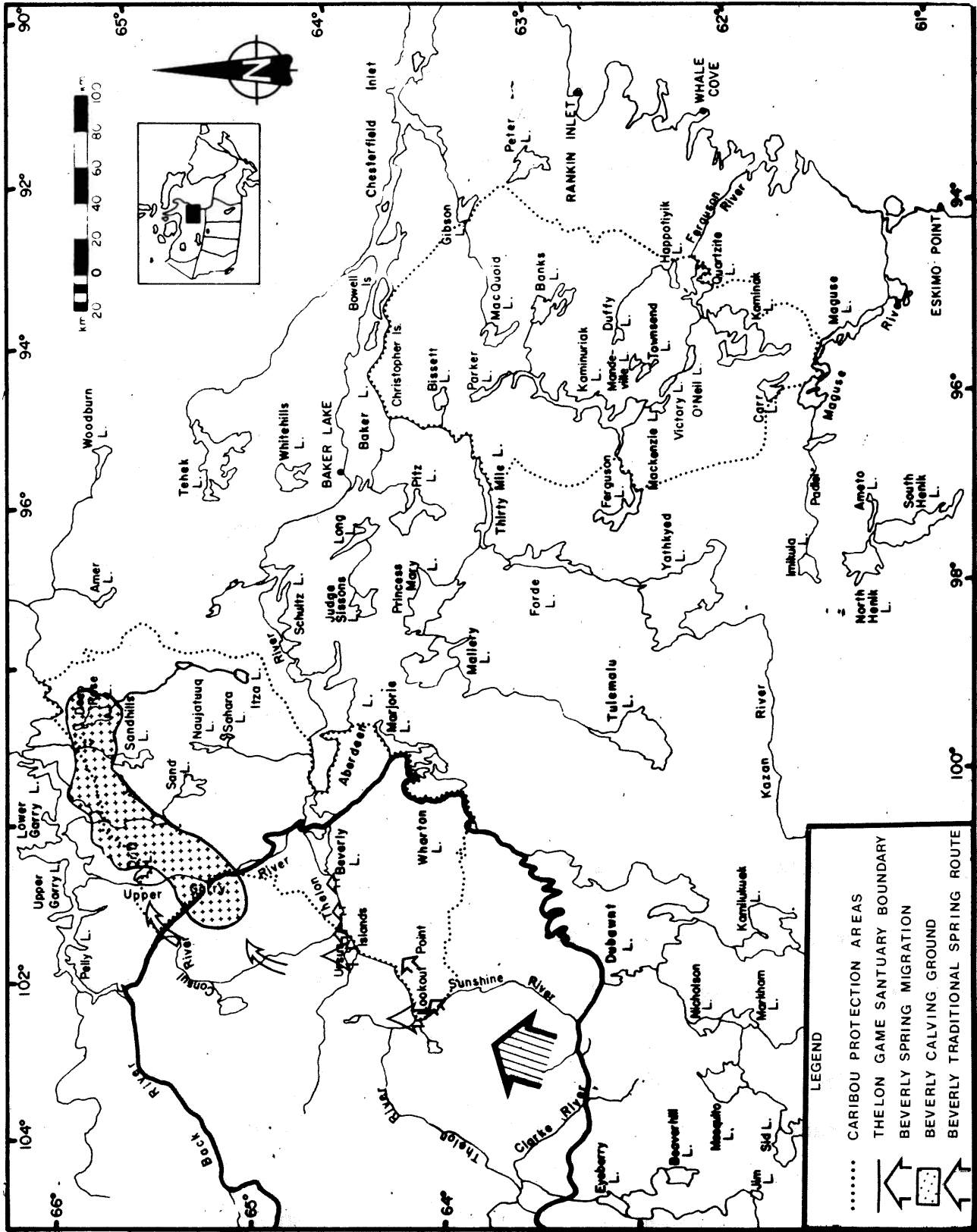


Figure 2. Locations of Beverly caribou observed during the 1982 spring migration and while on the calving ground.

lying down or milling about. Caribou singly, or in groups of two to 10 were also observed both north and south of the lake.

Beverly Caribou Calving Ground

On 19 May concentrations of Beverly cows were observed on the southwest section of the calving ground (Fig. 3).

During 8-12 June a census of the caribou on the Beverly calving ground was conducted by the N.W.T. Wildlife Service. The 1982 calving ground, approximately 4282 km² in area, extended in an arc from the northeast side of the Thelon Game Sanctuary, northeast to Lower Garry Lake and east to Deep Rose Lake (65°45'N, 98°40'W) (R. Decker, B. Stephenson, pers. comm.). Calving was observed further north than previously mapped (Fig. 2).

Calving in the central portion of the Beverly caribou calving ground peaked on 10 June and was almost completed by 13 June. (A. Gunn, pers. comm.).

Beverly Caribou Post-calving Movements

Reports of post-calving activity were reported to the Monitor as a result of flights conducted by A. Gunn and K. Jingfors (pers. comm). On 14 June cow-calf concentrations started forming, with some heading in a south and southwest direction. Groups of caribou (ranging from 100 to a few thousand) reached a plateau north of Sand Lake (65°15'N, 99°37'W) by 21 June (Fig. 3).

On 21 June the Monitor crossed the calving ground north and west of Sand Lake where groups of cow-calf concentrations

Figure 3. Locations of post-calving Beverly caribou observed during the 1982 Monitoring Program.

consisting of several thousand animals were observed. Some animals were observed moving in a southerly direction while others were stationary.

On 28 June the monitor examined the southern portion of the calving ground (Fig. 3); only an estimated few hundred caribou were observed. The flight continued into the north and north-eastern section of the calving ground where only 31 caribou were observed, with 25 animals observed south of the Lower Garry Lake and six on an island near the eastern shore of Deep Rose Lake. The Monitor was advised that several individual groups of caribou had gathered west of Sand Lake into post-calving aggregations and then moved out of the area in a southwesterly and westerly direction (R. Mulders, pers. comm.).

By 29 June the caribou north of Sand Lake had moved out of the area, and except for an estimated few thousand caribou still remaining in the Deep Rose Lake area, there were no caribou in the northeastern section of the calving ground (A. Gunn, pers. comm.).

No caribou were observed during the monitoring flight of 12 July in the Sand Lake and Upper Garry Lake areas and south to Beverly Lake.

Kaminuriak Caribou Movements and Distribution

A spring composition count was conducted by the N.W.T. Wildlife Service in late March and early April. In addition, a survey of the Kaminuriak caribou calving ground was completed in June and the location of the calving ground was reported to the Monitor (C. Gates, pers. comm.) (Fig. 4).

Figure 4. Locations of Kaminuriak caribou during the 1982 spring migration and while on the calving ground.

During the first week of July large concentrations of caribou were reported to the Monitor by personnel of Urangesellschaft Canada Ltd. as having moved through the area of their campsite on the southern shore of Thirty Mile Lake ($63^{\circ}36'N$, $96^{\circ}46'W$). For several days caribou were observed crossing the Kazan River ($63^{\circ}36'N$, $97^{\circ}02'W$) moving east and southeast. There were some caribou that moved south across the western end of Thirty Mile Lake and mixed in with other caribou from the south and Kazan River areas (K. Atkinson, pers. comm.) (Fig. 5).

On 13 July the passengers of a DC-3 enroute to Baker Lake ($64^{\circ}19'N$, $96^{\circ}03'W$) observed a large concentration of caribou heading south as they flew over an area just east of Kaminuriak Lake ($63^{\circ}00'N$, $95^{\circ}40'W$). This concentration was reported to be about 10 km in length (Fig. 5).

No caribou were observed during a monitoring flight on 17 July in the Schultz Lake ($64^{\circ}45'N$, $97^{\circ}30'W$) area and in the vicinity of Thirty Mile Lake, Bissett Lake ($63^{\circ}46'N$, $95^{\circ}20'W$) and Kaminuriak Lake (Table 2).

On 19 July caribou were reported north and south of Maguse Lake ($61^{\circ}37'N$, $95^{\circ}10'W$) and along the southern shores of the Maguse River ($61^{\circ}26'N$, $94^{\circ}24'W$) east to the Hudson Bay coast on 20 July. All were heading generally south or southwest (Fig. 5).

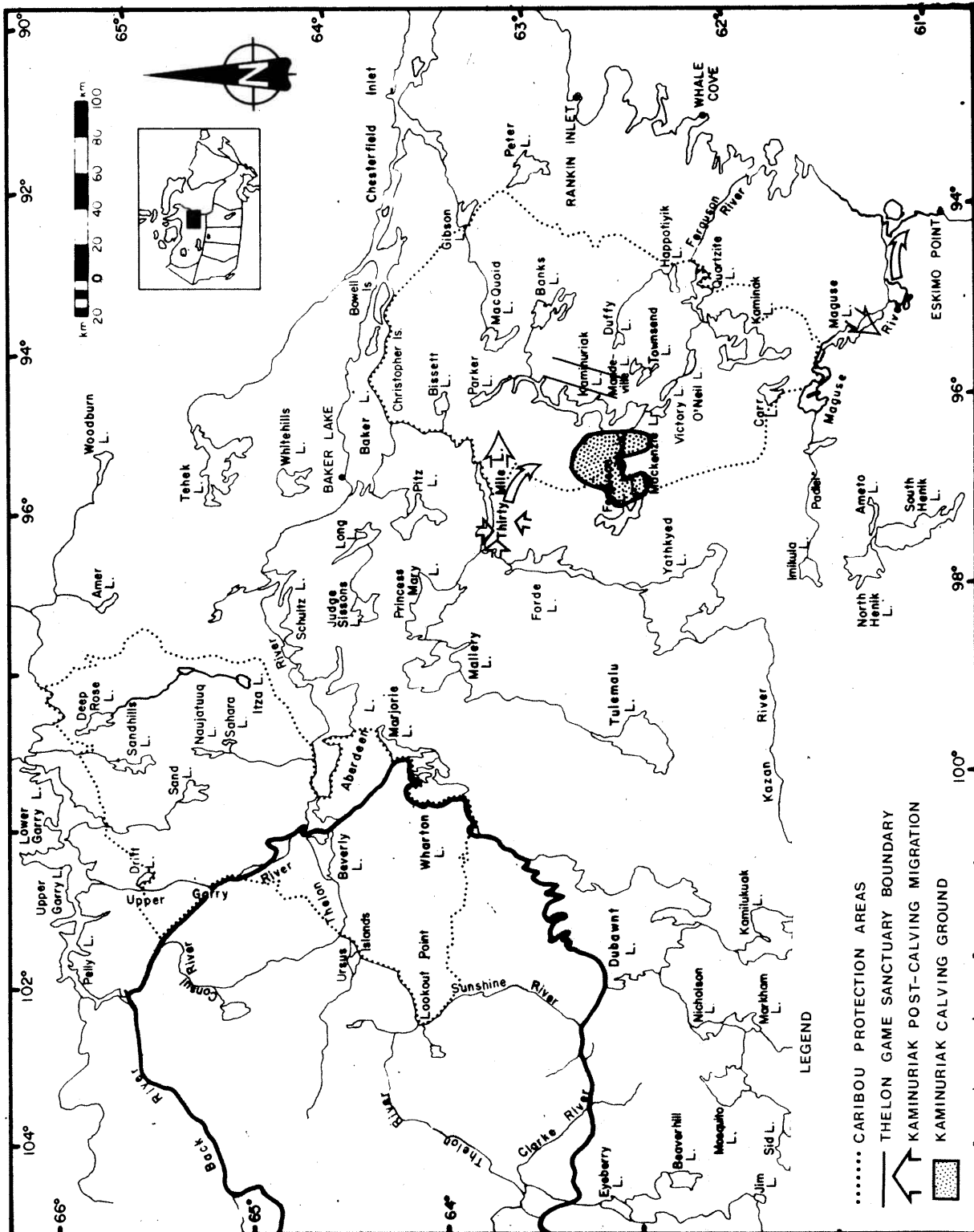


Figure 5. Locations of post-calving Kaminurik caribou.

Table 2. Caribou monitoring flight for the Kaminuriak Caribou Protection Area, 1982.

Date	Hours flown	Areas to be flown	Purpose of flight	Results and recommendations	Land-use permits in areas surveyed
17 July	11.3	Shultz Lake, Thirty Mile Lake, Bisset Lake, Kaminuriak Lake	Response to request for release; to determine presence of post-calving cows; determine movements	Recommended release; no cows or calves observed	Aberford Resources N81J426 Noranda Exploration N80C379

LAND-USE ACTIVITIES

Release requests to DIAND are handled by their Keewatin District and sub-district offices. Most permittees contact DIAND in writing of their plans to request a release on an approximate date. First contact between the permittee and DIAND may occur weeks or months before the date for which release is requested. This is followed by telephone or radio messages closer to the date of the intended activity. Requests for release are concluded as soon as possible but all activities are subject to the uncertainties of weather and other factors that can result in unavoidable delays.

A total of 22 operations requiring land-use permits were reported within the monitoring area. Some land-use operations conducted outside the Caribou Protection Areas were observed while flying to and from areas of concern, or as part of a land-use inspection flight (Fig. 6, Table 3).

In addition, there were smaller operations, leases or other activities within the ranges of the two herds which did not require land-use permits. Some activities of a more permanent nature such as lodges are operated under land lease agreements. Keewatin Arctic Camp is located on the north shore of South Henik Lake ($61^{\circ}38'N$, $100^{\circ}40'W$) and has a tourist camp currently in the lease application stage at Outlet Bay on Dubawnt Lake ($63^{\circ}27'N$, $100^{\circ}40'W$). Other lodges include Dubawnt Camps Ltd., also on Dubawnt Lake, Siniktarvik Ltd. on Ferguson Lake ($62^{\circ}23'N$, $96^{\circ}49'W$) and Ekaluk Lodge on Schultz Lake ($64^{\circ}44'N$, $97^{\circ}50'W$). There are also some trapping and recreational leases near Baker Lake, Rankin Inlet and Eskimo Point.

Figure 6. Land-use permit locations within the ranges of the Beverly and Kaminuriak herds, 1982.

Table 3. Land-use activity summary of operations within the ranges of the Beverly and Kaminurik caribou herds, 1982.

Map ref.	Company	Type of land-use operation	Duration	Caribou herd	Permit number
1	Aberford Resources	c,d,e,f,h	July to September	K	N80C386
2	Aberford Resources	c,d,e,f,h	July to September	K	N82C662
3	A.G.I.P Canada Ltd.	e,f	June to July	B	N81C523
4	Anaconda Can. Expl. Ltd.	c,d,e,f,h	June to September	B	N80C277
5	Canadian Nickel Co. Ltd.	c,d,e,f	May to July	B	N81C456
6	Esso Minerals Ltd.	c,e,f,h	June to August	K	N80C219
7	Geo. Surv. of Can.	m	June to September	B	N81N644
8	Geo. Surv. of Can.	m	June to September	B	N82N675
9	Kidd Creek Mines Ltd.	c,e,f,h	July to September	B	N81C506
10	McMaster University	j,l	May to August	K	N82J731
11	Noranda Exploration Co.	c,e,f,h	May to August	K	N80C379
12	PNC Expl. (Canada) Co.	e,f	July	B	N82J726
13	Suncor Ltd.	b,c,d,e,f	June to August	K	N81C497
14	Union Oil Co. of Canada	c,e,f	July to August	B	N80C242
15	Uranerz Expl. and Mining	a,e,f	July to September	B	N82J728
16	U.G.*	c,d,e,f,h	June to August	B	N82C685
17	U.G.	c,d,e,f	June to August	K	N81C471
18	U.G.	c,d,e,f,h	May to September	K	N81C544
19	U.G.	c,d,e,f	July to August	B	N80C217
20	U.G.	c,d,e,f	June to September	B	N82C700
21	Westmin Resources	c,d,e,f	May to August	B	N80C412
22	NWT Wildlife Service	i	June	B	N81H495

Table 3. (continued)

#	Urangesellschaft Canada Ltd.
a	Air geophysics
b	Reconnaissance geochemistry
c	Ground geophysics
d	Ground geochemistry
e	Geology
f	Prospecting
h	Diamond drilling
i	Caribou research
j	Hydrology studies
l	Permafrost studies
m	Geological mapping
B	Beverly caribou
K	Kaminurik caribou

Other activities include short-term resident activities (fishing camps, hunting camps), some government activities (calving ground surveys, water survey sampling, etc.), small research projects (e.g. university botanical studies) or tourist activities such as boating, canoeing or kayaking on the Thelon, Kazan and Back Rivers (K. MacInnes, pers. comm.).

Three exploration companies were involved in camp cleanups as well as exploration activities.

Land-use Permits on the Beverly Caribou Protection Area

Canadian Nickel Co. Ltd. N81C456

On 14 May DIAND received a request for release to relocate the camp from Sahara Lake ($65^{\circ}02'30''\text{N}$, $99^{\circ}02'\text{W}$) to Dop Lake ($65^{\circ}02'\text{N}$, $98^{\circ}14'\text{W}$). A conditional release was granted on 14 May to examine the snow and landing conditions. On 15 May the request for release was approved based on the Monitor's flights of 14 and 15 May.

Geological Survey of Canada N81N644

On 3 June G.S.C. contacted DIAND regarding information about caribou in the vicinity of Big Lake ($65^{\circ}11'45''\text{N}$, $98^{\circ}38'\text{W}$). The request for release was granted on 10 June based on information received from the calving ground census flights and a flight by the N.W.T. Wildlife Service on 8 June.

Kidd Creek Mines Ltd. (formerly Texasgulf Inc.) N81C506

A request for release to operate in the Drift Lake area was received by DIAND on 28 June. The Monitor participated in a land-use inspection flight on 28 June. The Monitor recommended not to grant a release because caribou were observed in the vicinity of the campsite. A monitoring flight on 3 July resulted in a recommendation for release of Drift Lake. DIAND granted the release on 5 July.

Union Oil Company of Canada Ltd. N80C242

A request for release was received by DIAND on 7 July. Due to previous information gathered on 3 July and subsequent release of the Drift Lake area, an approval was granted on the same day.

Uranerz Exploration and Mining N82J728

On 7 July a request for release to go into Sand Lake around 16 or 17 July was made to DIAND. Based on the monitoring flight of 12 July, the Monitor recommended a release which was granted by DIAND on the same day.

Urangesellschaft Canada Ltd. N80C217

On 25 May, Urangesellschaft contacted DIAND and requested release of their permit area for 10 July. Based on information from previous flights and the fact that the camp was located within 25 km of the G.S.C. camp (released since 10 June), a

recommendation for release was made to DIAND. The release was granted 8 July.

Westmin Resources (formerly Western Mines Ltd.) N80C412

On 4 June Westmin Resources contacted DIAND for approval to occupy their base camp on Itza Lake (65°02'N, 98°27'W). Based on information received from the Monitor, a pilot and the N.W.T. Wildlife Service, the release was granted on 4 June. Further to the request to occupy their base camp, Westmin Resources initiated these requests for release:

Fly Camp #1

(64°56'N, 99°18'W) A request for release was received on 7 June. The 8 June flight resulted in a recommendation for release, which DIAND approved on 9 June.

Fly Camp #2

(65°20'N, 98°W) A request for release was received on 10 June and granted on 11 June as a result of monitoring and census flights.

Fly Camp #3

(65°26'N, 97°41'W) A request for release was received on 17 June and granted on 23 June as a result of the monitoring flight of 21 June.

Fly Camp #4

(65°08'N, 98°35'W) A request for release was received on 17 June and granted on 23 June as a result of the monitoring flight of 21 June.

Fly Camp #5

(65°04'N, 98°35'W) A request for release was received on 17 June and granted on 23 June as a result of the monitoring flight of 21 June.

Fly Camp #6

64°58'N, 100°22'W) A request for release was received on 17 June. A monitoring flight on 21 June resulted in a recommendation not to grant a release as caribou were observed in the vicinity of the campsite. A subsequent flight on 25 June resulted in a recommendation for release which was granted by DIAND on 28 June.

Camp Clean Up

(64°57'N, 99°48'W) A request for release of this site to clean up an old camp was received on 11 June. The release was granted on 15 June on the advice of the Wildlife Officer.

N.W.T. Wildlife Service N81H495

On 4 March, the N.W.T. Wildlife Service requested release to occupy their site at Itza Lake in late May. A recommendation for release was made on 19 May as a result of a monitoring flight. DIAND granted the release on 25 May.

Land-use Permits on the Kaminuriak Caribou Protection AreaAberford Resources (formerly Pan Ocean Oil Ltd.) N80C386

On 16 July Aberford contacted DIAND for approval to place two men into their camp on Bissett Lake. Some ground survey work was to be completed. The remainder of the crew would go in later. Based on approval received from the Monitor the request was granted that same day.

Noranda Exploration Company Ltd. N80C379

Noranda submitted a request for release to DIAND for an area south of Bissett Lake for 23 July. Based on a monitoring flight of 17 July, the request for release was granted on 20 July.

Summary of Land-use Activities

Eight permittees worked within the Beverly Caribou Protection Area and requested release for base camps and, in some cases, for fly camps. Releases for each permittee were recommended during the Caribou Monitoring Program (15 May to 31 July) by the Caribou Monitor. Six permit operations were outside the Beverly Caribou Protection Area. By 21 July, all requests for release had been granted for the various companies and agencies working within the Protection Area.

Eight companies received land-use permits and operated within the range of the Kaminuriak caribou herd. Two of these permittees requested a release within the Kaminuriak Caribou Protection Area.

The Caribou Monitor recommended release of these sites by 20 July.

This year the Monitor recommended deferred release of areas on two occasions. Kidd Creek's request (N81C506) was held in abeyance for 12 days and Westmin's application (N80C412) to operate fly camp #6 was withheld for 8 days. These deferrals are cited as instances where the Caribou Protection Measures operated to prevent potentially harmful contact between land-use operations and caribou.

ACKNOWLEDGEMENTS

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APPENDIX I

Caribou Protection Measures, 1982

CARIBOU PROTECTION MEASURES, 1982

1. (a) The Permittee shall not, without approval, CARIBOU PROTECTION AREAS
 conduct any activity between May 15 and July 31 within the Caribou Protection Areas depicted on the map certified by the Engineer as the "Caribou Protection Map 1980", annexed to this Land-use Permit.
- (b) A Permittee may, upon approval by the Land-use Inspector, operate within the said Caribou Protection Areas beyond the May 15 deadline set out in 1(a), provided that when monitoring information indicates that caribou cows are approaching the area of operation, the Permittee will implement 1(c).
- (c) On cessation of activities pursuant to 1(a) or 1(b), the Permittee will remove all personnel from the zone who are not required for the maintenance and protection of the camp facilities and equipment unless otherwise directed by the Land-use Inspector.
- (d) The Permittee may commence or resume activities prior to July 31 within those parts of the Caribou Protection Areas released by the Land-use Inspector for the reason that caribou cows are not expected to use those parts for calving or post-calving (Note 1).
2. (a) In the event that caribou cows calve outside of the Caribou Protection Areas, CARIBOU PROTECTION GENERAL
 the Permittee shall suspend operations within the area(s) occupied by cows and/or calves between May 15 and June 30.
- (b) In the event that caribou cows and calves are present outside of the Caribou Protection Areas, the Permittee shall suspend the following operations within the area(s) occupied by cows and calves between July 1 and July 31.
 - (i) airborne geophysical surveys at an altitude of less than 300 m above ground level.
 - (ii) slinging of fuel or equipment by helicopter at an altitude of less than 300 m above ground level (Note 2).

3. (a) During migration of caribou, the Permittee shall not locate any operations so as to block or cause substantial diversion to the migration. CARIBOU PROTECTION MIGRATION
- (b) The Permittee shall cease activities that may interfere with migration, such as airborne geophysical surveys or movement of equipment, until the migrating cows have passed.
4. (a) The Permittee shall not, between May 15 and September 1, construct any camp, cache any fuel or conduct any blasting within 10 km of any "Designated Crossing Site" as outlined on the map certified by the Engineer as the "Caribou Protection Map 1980", and annexed to this Land-use Permit. CARIBOU CROSSINGS
- (b) The Permittee shall not, between May 15 and September 1, conduct any diamond drilling operation within 5 km of any "Designated Crossing Site" as outlined on the map certified by the Engineer as the "Caribou Protection Map 1980" and annexed to this Land-use Permit.

Note

1. The Land-use Inspector's decision will be made on the basis of the existing caribou monitoring information.
2. Concentrations of caribou should be avoided by low level aircraft at all times.

APPENDIX II

Caribou Monitoring Procedures

GUIDELINES FOR THE CARIBOU MONITOR

Various decisions to be made by the Land-use Inspector will require input from the Caribou Monitor. Advice on releasing specific areas for exploratory activities before or after occupation by calving cows will no doubt be the most difficult to address. The guidelines below are given for guidance and consideration by the Monitor in order to assist him/her in interpreting potential caribou-man interactions.

a) Releases prior to arrival of calving cows.

Within Protection Areas, exploratory activities have to stop by 15 May unless a release from the Land-use Inspector is granted on the advice of the Caribou Monitor. The Monitor should only recommend approval for a deadline extension when the camp is located in a peripheral part of the Protection Areas that is usually the last to be occupied by pregnant cows. When the spring migration is being monitored, the Monitor should not try to predict the different dates of arrival for caribou at the individual camps since monitoring during the past three years has shown this to be impossible. Instead, the Monitor should be conservative. The Monitor should advise the Land-use Inspector to close down remaining camps in the Protection Areas on the same date, a minimum of three days before the cows are expected to arrive in the area of the camps.

b) Release of Land-use activities before and during calving outside Protection Areas

Although Protection Areas contain the calving grounds, calving may occur outside their boundaries. If the Monitor thinks that a segment of pregnant cows are moving toward an exploration site, he/she should immediately advise the Land-use Inspector that a problem is pending. Normally, three days are required to close down a camp. In some instances, however, it may be necessary to shut down a camp immediately should the pregnant cows be first observed closer than 5 km. If the caribou are more than three days travel away from any site when first observed, the Monitor should estimate the minimum time of travel to within 5 km of that camp and accordingly advise a closure date to the Land-use Inspector. (Caribou movement rates are based on 30 km per day.) In all instances, it is important to be conservative and to remember that the area of "suspended operations" moves in advance of the caribou.

(c) Releases of Land-use activities after calving in Protection Areas

Decisions allowing exploration activities to start up again that were shut down during calving will require the advice of the Caribou Monitor. Such advice should be provided by carefully checking the area around the activity site for herds of caribou. By careful evaluation of the camp site in relation to known areas of caribou use (i.e. water crossings) and in relation to number of caribou more than 5 km away, the Monitor can guess the possible direction of caribou movement. If there is not a segment within three days travel, the Monitor can advise a release for the activity site on the provision that the camp be closed should the caribou return to within 5 km before July 31.

(d) Releases of Land-use activities after calving outside Protection Areas

After June 30, only certain activities based from camps can be cancelled by movements of caribou. Particular attention should be paid to airborne geophysical surveys and slinging of loads by helicopter. The Monitor should use the same conditions as in (b).

APPENDIX III

Flight Report Forms and Maps

CARIBOU MONITORING FLIGHT REPORT FORM

Kaminuriak

Beverly

Date: _____

Aircraft _____ Pilot _____

Weather: Cloud _____ Temperature _____

Wind _____ Visibility _____

% Snow Cover _____ Lakes/Rivers Frozen _____

Comments _____

Survey Type: Reconnaissance _____ Transects _____ Other _____

Altitude(s) _____ Air Speed _____

Names and Duties of Observers:

1. Assistant Monitor _____

2. Observe only _____

3. Photograph _____

4. Others _____

Distance flown _____ Hours flown _____

Location(s): Maps used NTS 1:250,000 _____

Purpose of flight (Land-use Permit #'s): _____

_____Vegetation types: Trees _____, Treeless Tundra _____, Shrubby Tundra _____,
Dwarf Tundra _____, Tundra _____.Water Crossings Noted: _____
_____Human Activities Noted: _____

Comments on survey and caribou activity: _____

Submitted by: _____

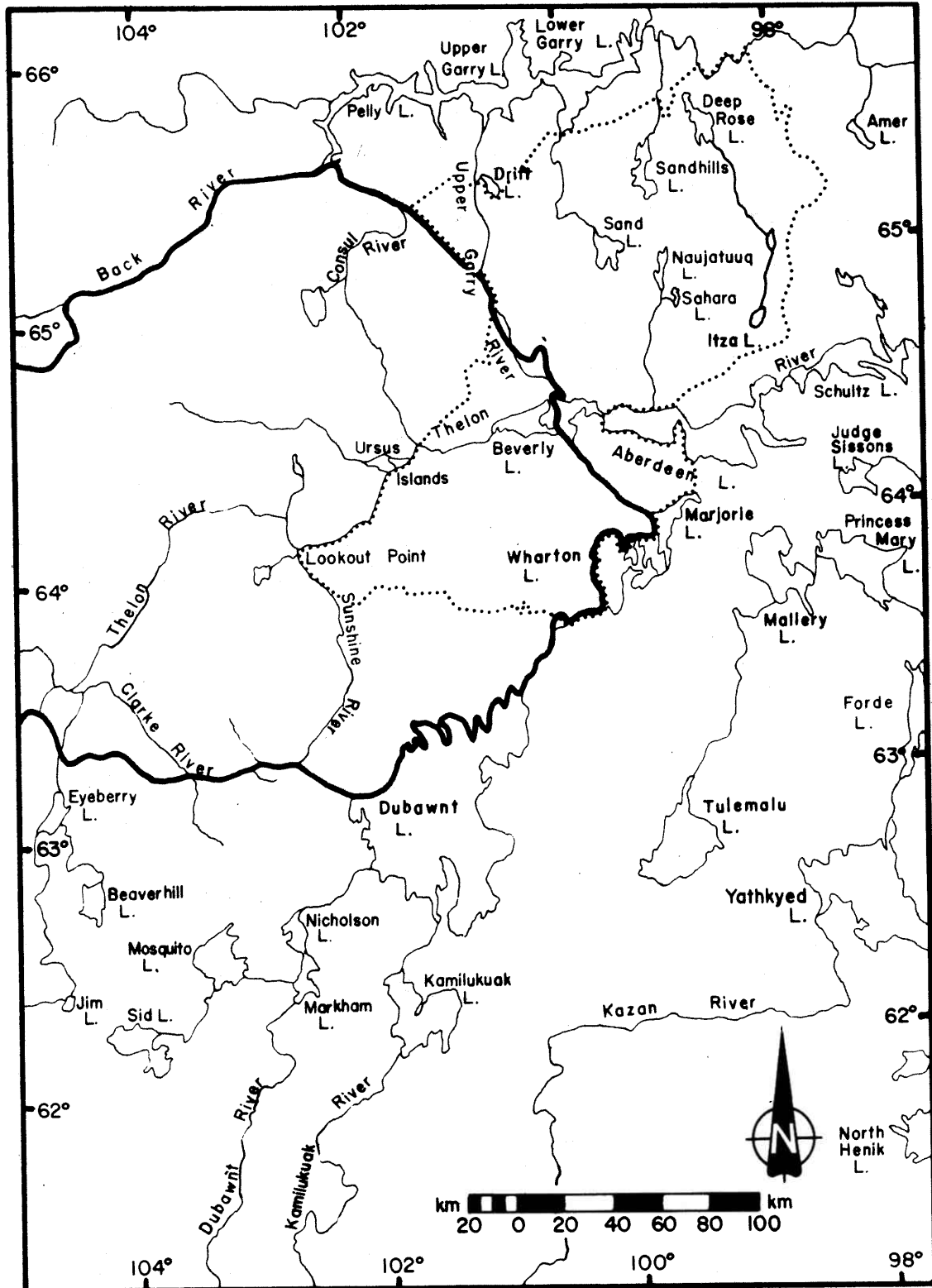
CARIBOU CLASSIFICATION FORM

Approximate Area

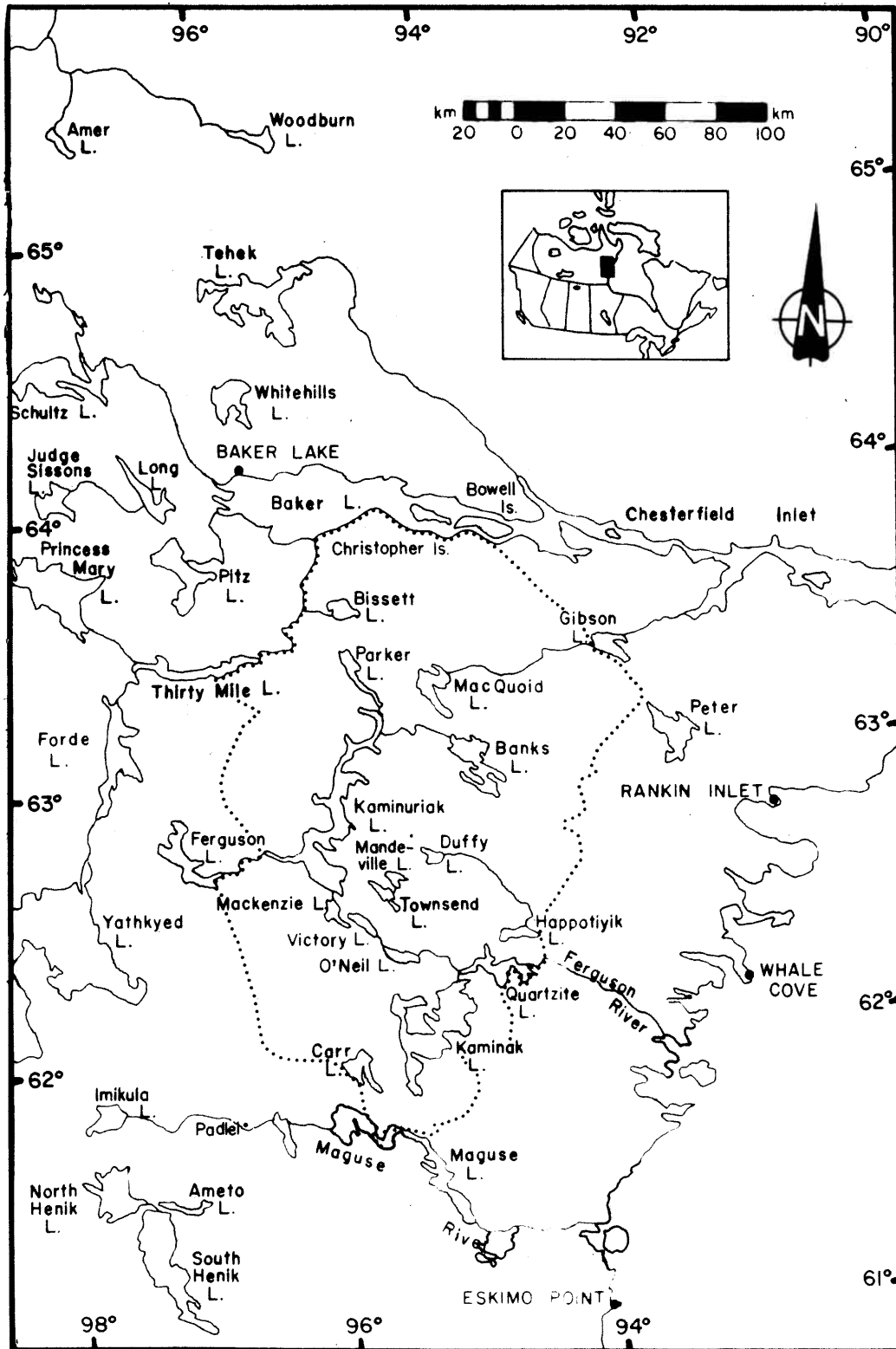
Date

Cows with Antlers	Others*	Cows with Calves	Unclassified	Mature Bulls	Group Number

*Other - juveniles, barren cows, antlerless pregnant cows, yearlings.



Caribou Monitoring Flight Summary Map—Beverly Caribou Protection Area.



Caribou Monitoring Flight Summary Map—Kaminurik Caribou Protection Area.

