SURVEILLANCE OF THE BISON FREE MANAGEMENT AREA, JANUARY - JUNE 1992

C. GATES, B. ELKIN, L. KEAREY, AND T. CHOWNS

DEPARTMENT OF RENEWABLE RESOURCES

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ABSTRACT

A Bison Free Management Area (BFMA) was established in the southwestern Northwest Territories in 1987 to reduce the risk of infection of the Mackenzie and Nahanni wood bison populations with bovine tuberculosis and brucellosis, diseases which are present in bison herds in the Slave River Lowlands, Wood Buffalo National Park and adjacent areas. Two methods were employed to determine the presence and distribution of bison in and around the BFMA: 1) aerial reconnaissance was carried out during January, February and March; 2) public participation was requested employing written brochures, notices and highway signs, production of a television advertisement and through radio interviews.

At least 44 bison were detected in the BFMA during the period January-June 1992. No bison were seen during winter surveillance flights, but the sign of one animal was reported by a member of the public in January. All other reports of bison were obtained during the snow-free period. Nine bison were killed and tested for tuberculosis and brucellosis. Disease test results were negative.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

A misguided decision to introduce more than 6,000 plains bison (*Bison bison bison*) into the protected range of the wood bison (*B. b. athabascae*) in Wood Buffalo National Park (WBNP) in the 1920's resulted in hybridization between the two subspecies and the introduction of two cattle diseases, tuberculosis (*Mycobacterium bovis*) and brucellosis (*Brucella abortus*), into bison herds in the region (Tessaro 1988). In 1963 and 1965 bison were captured from a small herd in a remote location in northwestern WBNP to serve as nuclei for a wood bison recovery program. The 1963 salvage project provided 18 head, including 12 adult females, 4 adult males and 4 calves, which were released into the wilderness near Fort Providence, NWT. Before shipment, the salvaged bison were tested twice over a 7 month period for brucellosis and tuberculosis, with negative results. The released stock have since given rise to a healthy herd which numbered 1,665 in 1992 (Gates unpubl. data), and occupies an area exceeding 8,000 km^2 (Gates and Larter 1990, Gates et al. 1991). Testing since 1982 has indicated that brucellosis and tuberculosis are not present in the Mackenzie herd; sera from 163 bison have tested negative for brucellosis and pathology and histopathology on 51 bison has indicated that tuberculosis is absent (Tessaro and Gates, in prep.).

Twenty three bison captured in 1965 were shipped to Elk Island National Park in central Alberta. The herd established

from that salvage project is now maintained at about 300 head and has provided brucellosis and tuberculosis free stock for several reintroduction projects including the Nahanni herd. In 1980 and 1989, 28 and 12 bison respectively were released near Nahanni Butte, NWT. The Nahanni herd now numbers about 60 head which are assumed to be brucellosis and tuberculosis free, although limited testing has been done since their introduction.

The existence of diseased herds of bison in the Slave River Lowlands and in the vicinity of Wood Buffalo National Park poses an obstacle to the reintroduction of additional healthy herds (ie. free from risk of infection with tuberculosis and brucellosis) in the region and jeopardizes the health of two tuberculosis and brucellosis free herds reestablished and free-roaming in the area. In addition, management agencies appear to be unwilling to promote the growth and expansion of resident diseased herds. The issue of eradication of the two diseases from infected herds was the subject of review by a specially appointed task force (Bison Disease Task Force 1988) and the federal Environment Assessment and Review Process (Northern Diseased Bison Environmental Assessment Panel, 1990) and it is currently being addressed by the Northern Buffalo Management Board. The Board is seeking to develop a long term management solution to the problem.

In recognition of the continuing risk of infection of the reestablished healthy herds in the NWT while a solution to the disease problem is being developed, the Government of the

Northwest Territories implemented a project in 1987 to reduce the risk of contact between infected and disease free bison. This report summarizes the results of that project for the period January to June 1992. Results of the project up to 1991 were reported in Gates and Gray (1992).

METHODS

In December 1987, a zone was established south of the Mackenzie River and north of the Mackenzie Highway between Mills Lake, near Fort Providence, and Hay River, from which bison are to be excluded by active management. The Bison Free Management Area (BFMA) was increased in size in 1990 to include the area north of the NWT border and south of the Mackenzie River, lying between the Trout River in the west and the Buffalo River and western boundary of WBNP in the east (Fig. 1). The management objectives of the project were:

1) to prevent the establishment of bison herds in the BFMA;
2) to remove any bison that may be detected in the BFMA and to test them for bovine brucellosis and tuberculosis;
3) to prevent the entrainment of traditional use of the area by bison.

The objectives serve the goal of reducing the risk of contact between bison infected with tuberculosis and brucellosis and healthy bison in the Mackenzie and Nahanni herds.

Aerial Surveillance

Aerial surveillance was carried out monthly during January to March in the BFMA when snow cover and light conditions were favourable for detecting bison sign from the air. The zone between the Mackenzie River and Mackenzie Highway which has been identified as the area most likely to serve as an expansion area

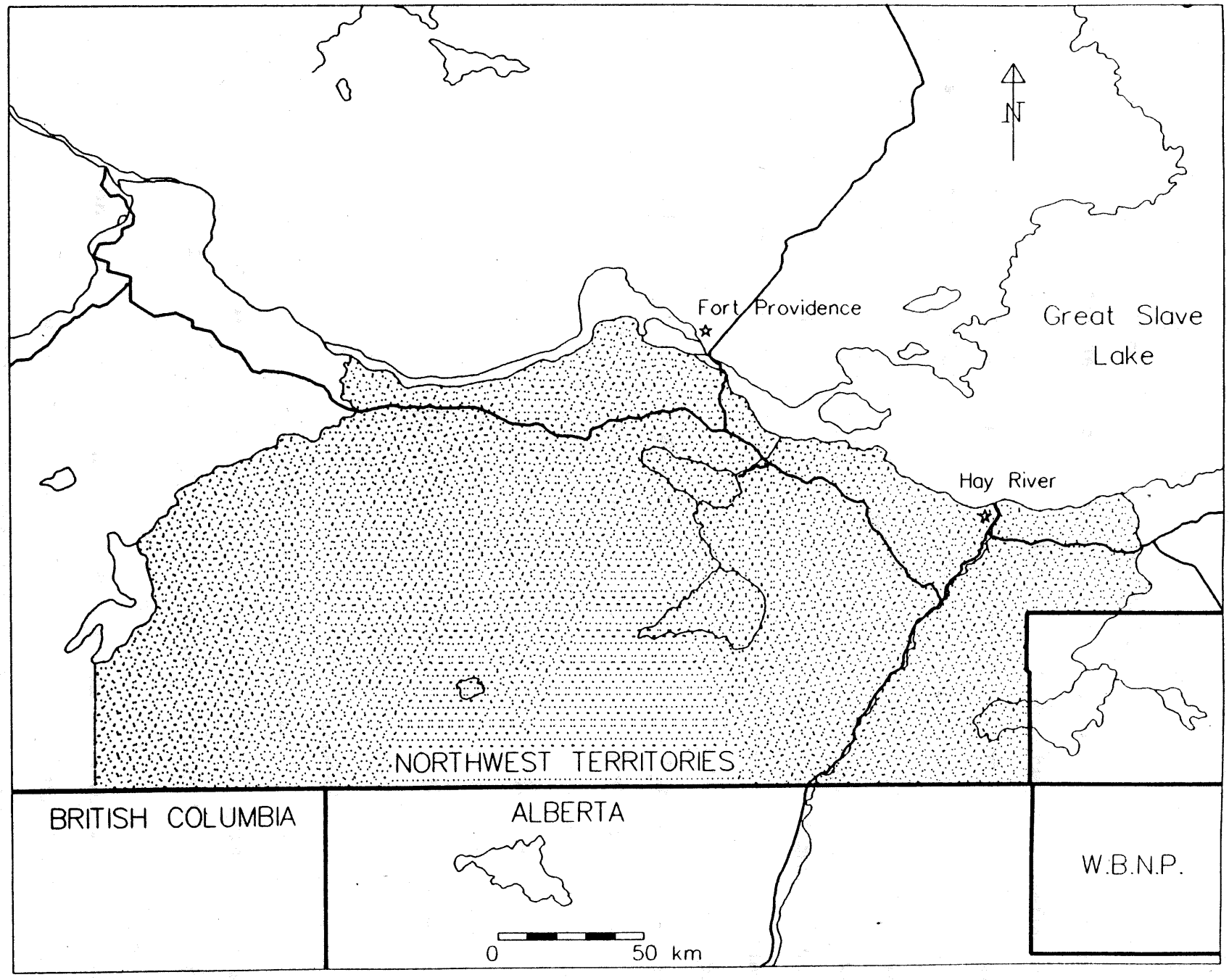


Figure 1. Location of the Bison Free Management Area (BFMA).

for the Mackenzie Bison population was searched using systematically spaced transects at approximately three km intervals. This spacing allowed visual overlap for detecting animals and tracks between transects. A combination of systematically spaced transects and spaghetti reconnaissance was used to survey the Hay River area which included the area between Kakisa River and Hay River, Hay River and Buffalo River along the south shore line of Great Slave Lake, and the vicinity of Buffalo Lake. Flight paths are illustrated in Figures 2a, b, and c. Aerial reconnaissance was carried out only during clear sky conditions in order to maximize contrast for sighting tracks in the snow. In order to search the area thoroughly, the flight path was deviated from upon detecting animals or sign. All sightings of large mammals were recorded on a 1:250,000 NTS map.

Records were maintained on a database file (Dbase III+) integrated with a computer mapping program (Quikmap, Environmental Sciences Ltd, Sidney, B.C.).

Public Involvement

Information on the occurrence of bison in the BFMA and in adjacent areas west of Wood Buffalo National Park was solicited from the public, pilots, and other agencies that had staff travelling or flying in the BFMA. In April 1991 the Department of Renewable Resources published an information brochure and a notice bulletin which were circulated to Renewable Resources offices and to the NWT/Alberta border crossing office. The

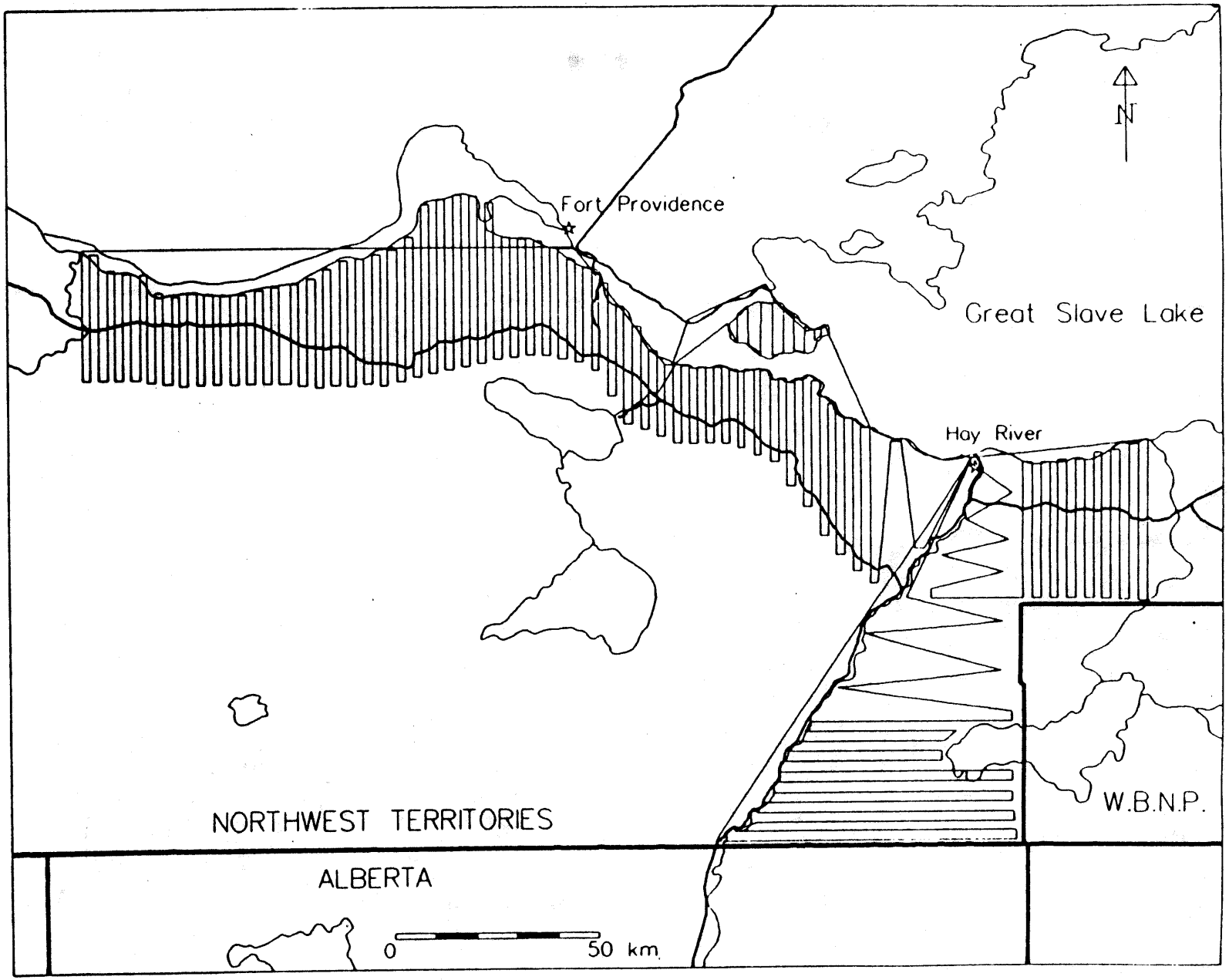


Figure 2. Surveillance flight paths flown in the BFMA during 1992 in a) January

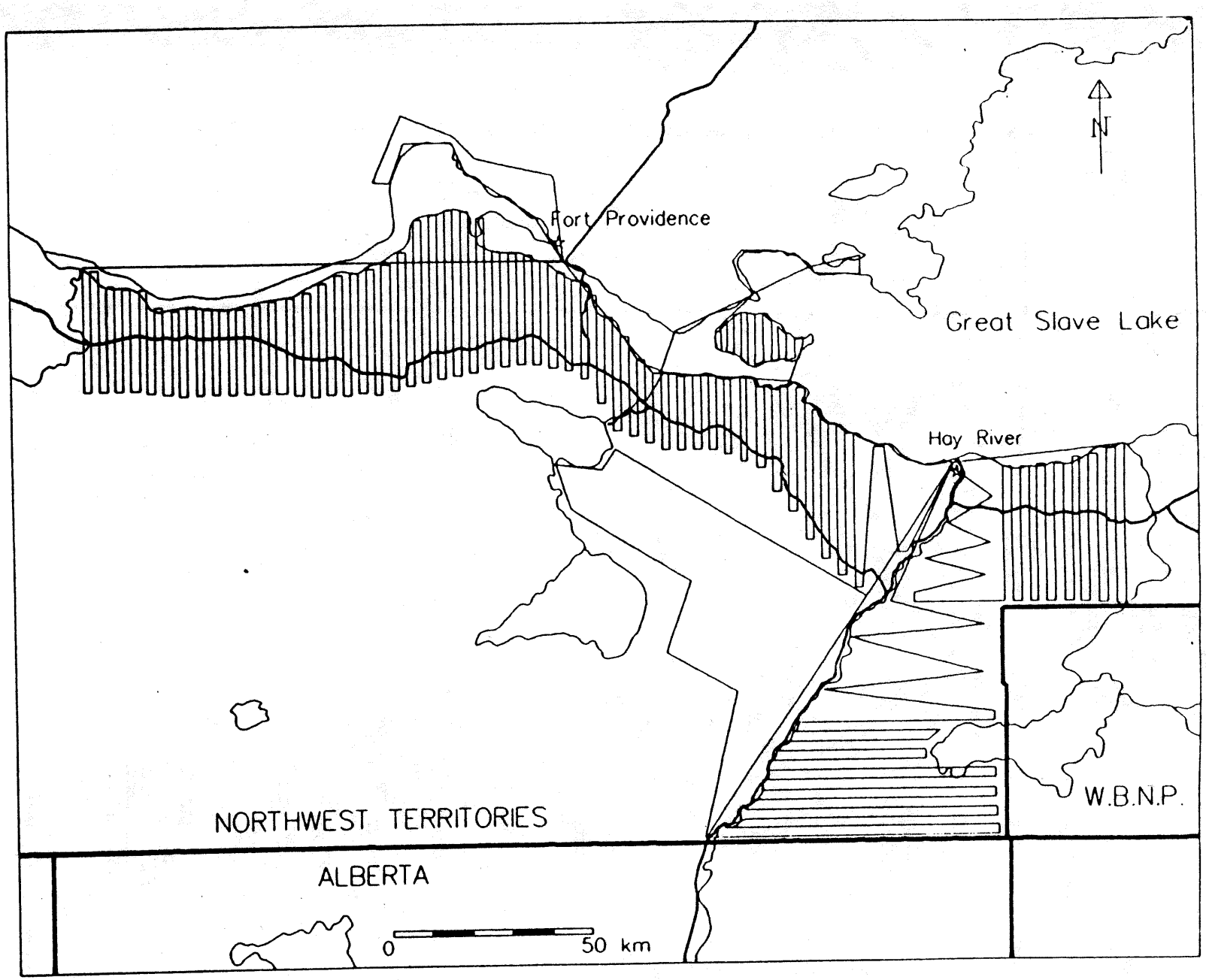


Figure 2. Surveillance flight paths flown in the BFMA during 1992 in b) February

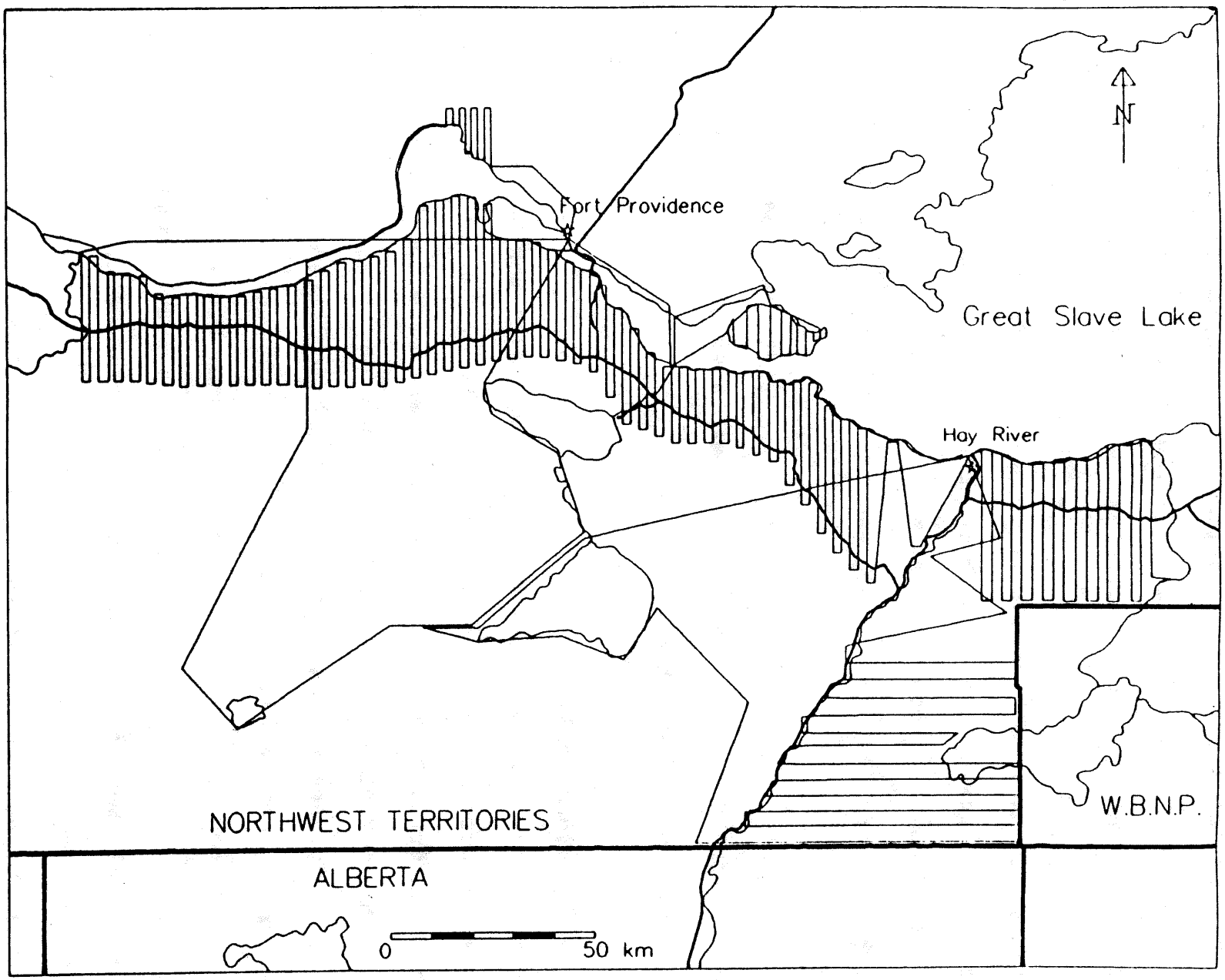


Figure 2. Surveillance flight paths flown in the BFMA during 1992 in c) March

public was requested to report sightings of bison in the BFMA to a Renewable Resource or RCMP office. Radio interviews with participating staff provided another means of advertising the program.

Highway signs were strategically positioned in May 1991 at four locations between the NWT/Alberta border and the Mackenzie River. The signs were located in pairs, one sign on each side of the highway. They requested travellers to report bison sighted in the BFMA.

A one minute video on management of the BFMA was produced for television by the Department of Renewable Resources and was broadcast beginning January 23, 1992.

Removal and Disease Testing

All reports of bison or bison sign provided to the Hay River Renewable Resource office were followed up with ground or air relocation efforts. On two occasions when bison were located, the animals were shot and blood serum and tissues were collected for disease testing. Postmortem examinations were conducted, and all internal organs were examined grossly for lesions. Tissues sampled for laboratory evaluation included lung, kidney, liver, spleen, testes and epididymis and the following lymph nodes: retropharyngeal, mediastinal, bronchiolar, prescapular, poplyteal, prefemoral, superficial inguinal, renal, hepatic, and internal iliac. Serology, histology and bacteriology were performed at the Animal Pathology Laboratory, Agriculture Canada,

Saskatoon.

Blood serum was analyzed for Brucella antibodies using the buffered plate antigen test, standard tube agglutination test, compliment fixation test, and enzyme-linked immunoassay. All fresh tissues were examined grossly for lesions. Organ tissue, retropharyngeal, mediastinal and bronchiolar lymph nodes were fixed in buffered formalin and were examined for histological lesions. Fresh or frozen tissue was cultured if a lesion was found.

Dead bison were slung by helicopter to Hay River where they were butchered. The meat was donated to the Hay River Native Band and the Hay River Hunters' and Trappers' Association.

RESULTS

Aerial Surveillance

Neither bison nor bison sign were detected in the BFMA during winter aerial surveillance but bison were seen on the north shore of the Mackenzie River in January, February, and March (Fig. 3a, b, c). Moose (n=656) and woodland caribou (n=246) were common (Fig. 3 a, b, c). Wolves (n=23) were observed on six occasions. Bison were observed by other staff during unrelated work throughout the winter in wet meadows along or near the north shore of the Mackenzie River. They were scattered in small herds between Mills Lake in the west, and Slave Point in the east.

Reported Sightings of Bison

Bison or bison sign were reported in or near the BFMA on 13 occasions between January and June 1992 (Figure 4). Only one sighting was made during the winter. In January, a trapper, Mr. T. Cayen of Hay River, observed the tracks of one bison at the mouth of McNally Creek on Great Slave Lake. He collected bison hair from a tree to confirm the observation. All other reports of bison and sign were made after snowmelt.

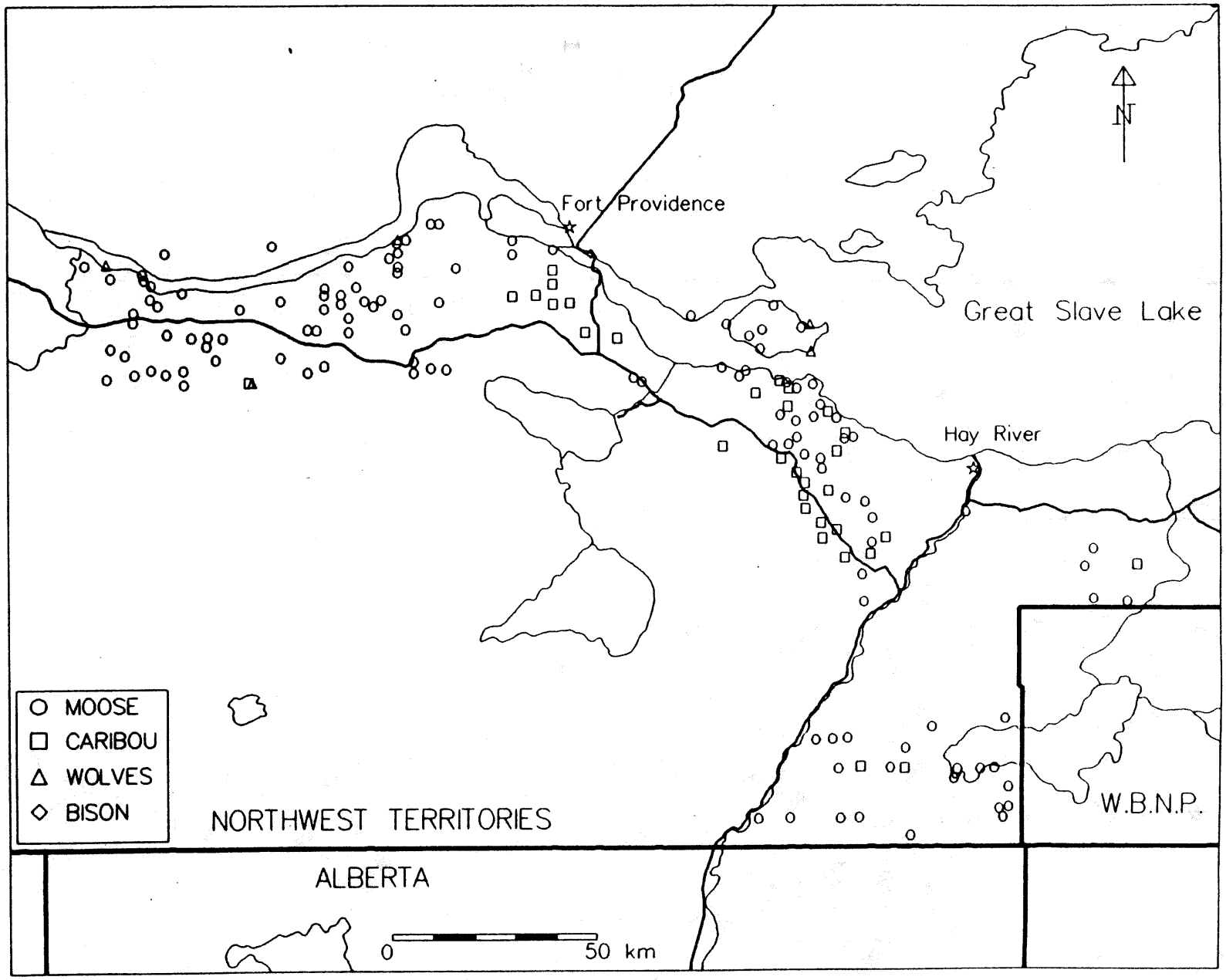


Figure 3. Observations of moose, caribou, wolves and bison recorded during surveillance flights in or near the BFMA in 1992 during a) January

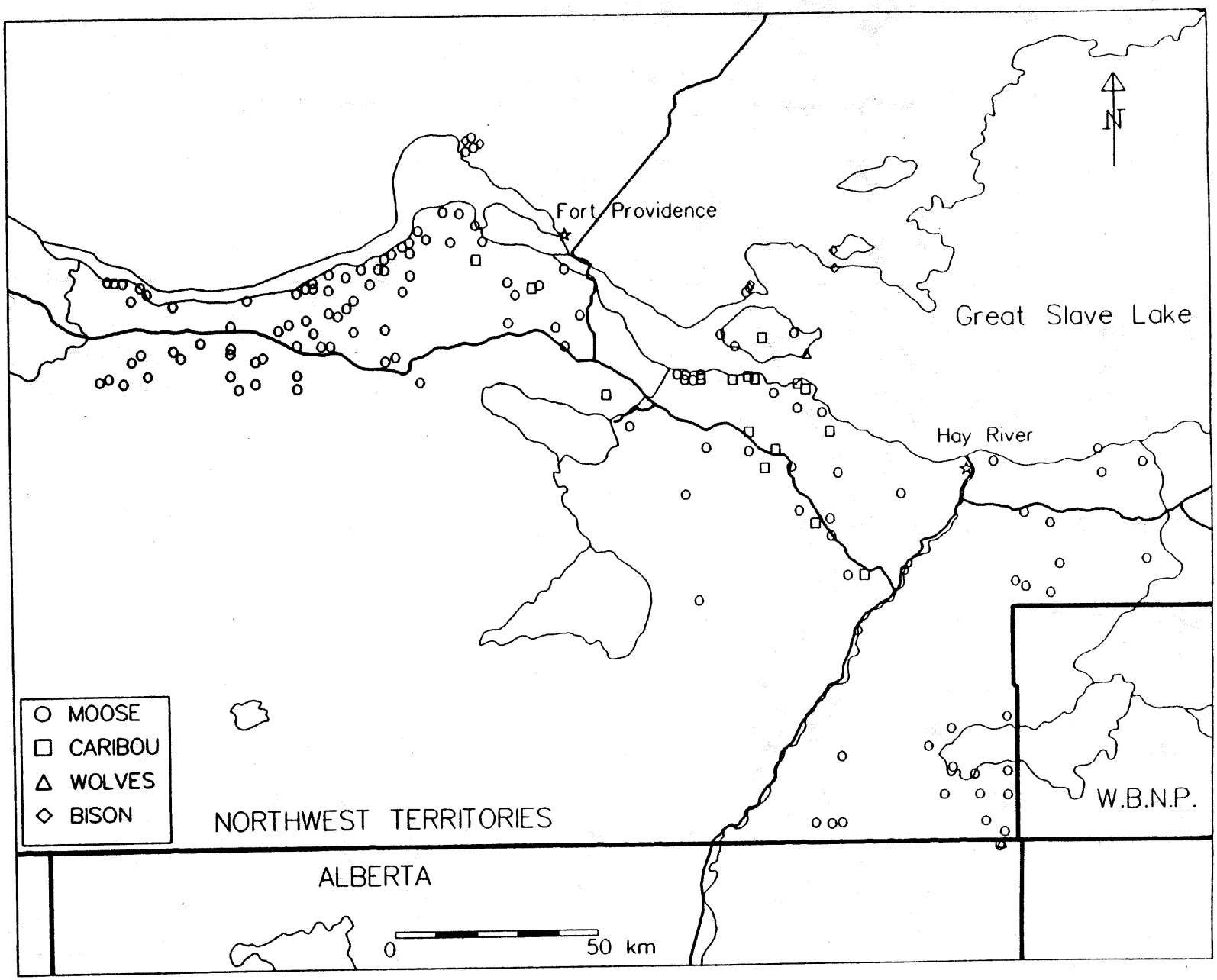


Figure 3. Observations of moose, caribou, wolves and bison recorded during surveillance flights in or near the BFMA in 1992 during b) February

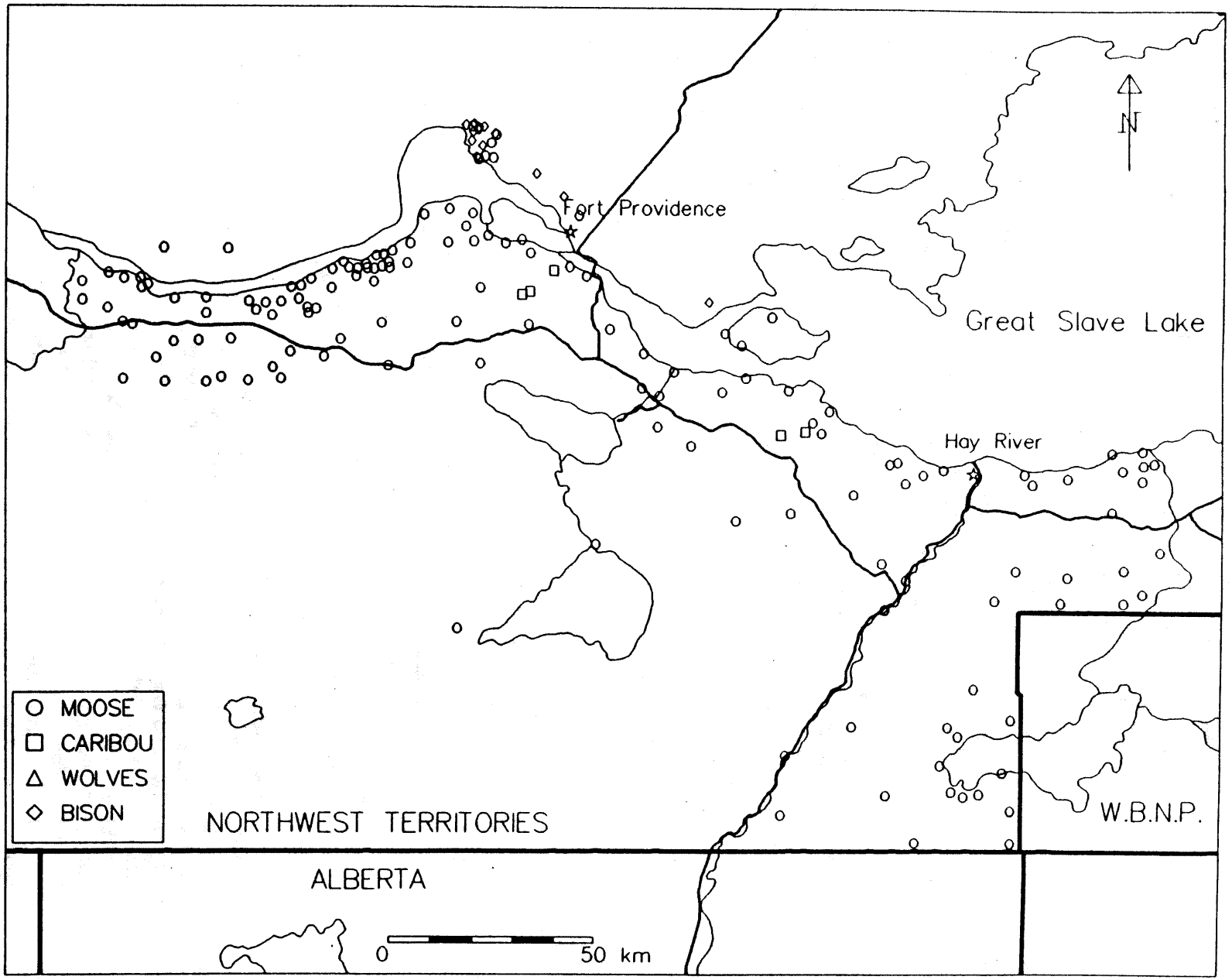
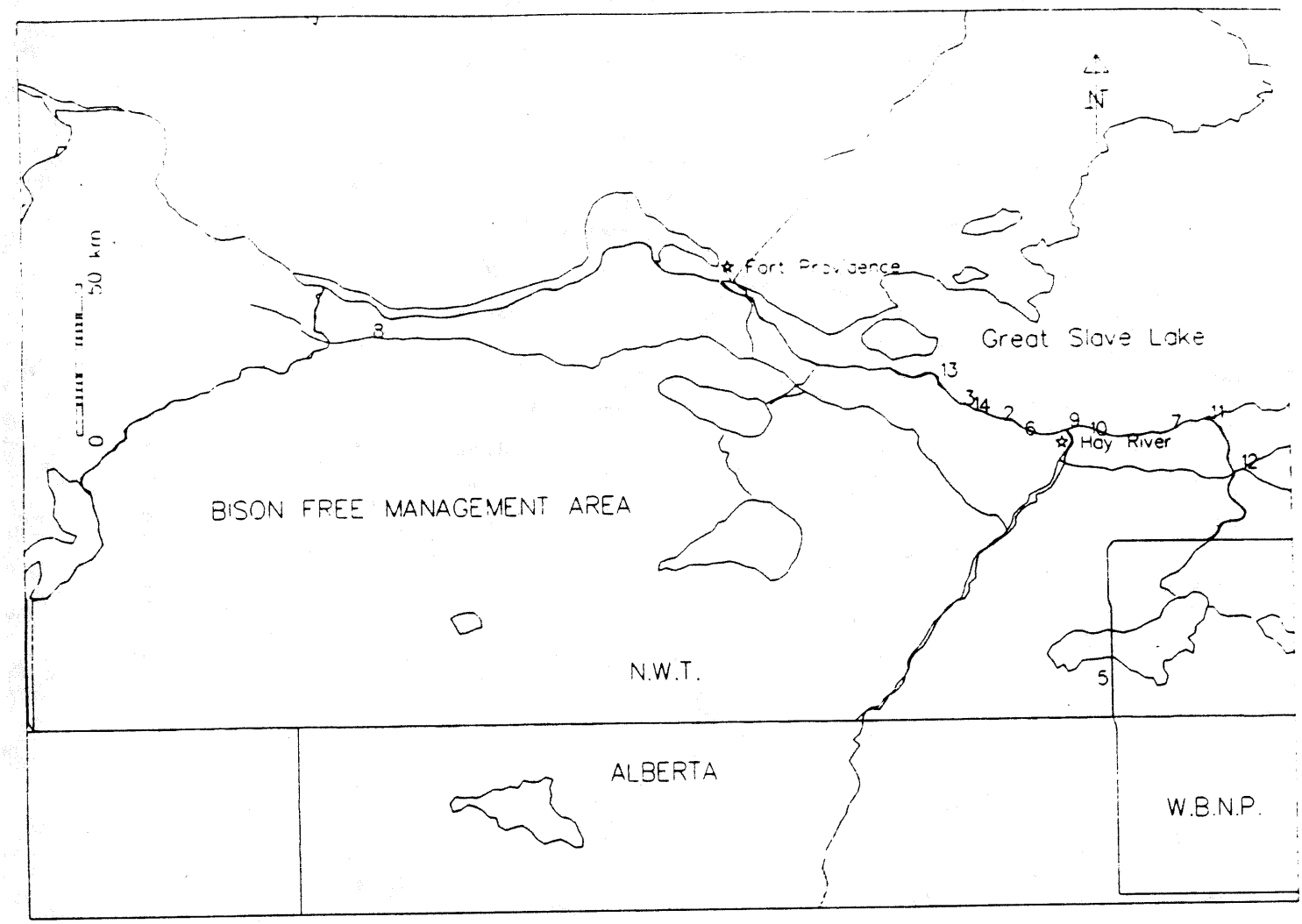


Figure 3. Observations of moose, caribou, wolves and bison recorded during surveillance flights in or near the BFMA in 1992 during c) March



Reference number	Date	Observation	Source
1	01/10/92	Tracks and hair of 1 bison	T. Cayen, Hay River
2	04/26/92	20 bison	T. Cayen, Hay River
3	05/17/92	7 bison killed	C. Gates, Fort Smith
4	05/17/92	1 bison killed	C. Gates, Fort Smith
5	05/21/92	Old bison dung and tracks	A. Helmer, Hay River
6	05/31/92	1 bison killed	T. Chowns, Hay River
7	06/03/92	1 bison	M.McCullum, Hay River
8	06/04/92	Tracks, not confirmed	G. Buggins, Hay River
9	06/10/92	1 bison	M.McCullum, Hay River
10	06/11/92	Tracks of 1 bison	D. Lasalice, Hay River
11	06/14/92	Fresh tracks of a herd	Dennis Strong, Jim McLean of Hay River
12	06/21/92	3 bison bulls	Brent Dievert, Fort Smith
13	06/22/92	Large number of bison on pt.	Japanese canoeists report to Ft. Prov. Band

Figure 4. The locations of bison or their sign reported in or near the BFMA between January and June 1992. Reference numbers refer to numbers on the map.

On April 26, Mr. Cayen observed 20 bison near the same location. On April 27, Mr. Cayen saw eleven of the bison moving back in the direction they had come from. Tracks seen from the air during a follow-up flight on April 28, indicated that the bison had travelled approximately 38 kms across the ice of Great Slave lake between Moose Point in the Mackenzie Bison Sanctuary and Point de Roche on the southwest shore of Great Slave Lake.

On May 16 a group of four or five bison and single bison were reported in the vicinity of Point de Roche west of Hay River by L. Buckmaster. The sightings were confirmed on the following day when Department personnel investigated and found a herd of seven and a single in the same area. Another bison was seen on May 31 in the Point de Roche area. A bison was seen on Vale Island in the Town of Hay River on June 10. Tracks indicated that the animal had arrived from the west, turned around at Vale Island and wandered back toward the west (A. Helmer, pers. comm.). An unspecified number of bison were seen on June 22 by Japanese canoeists on the south shore of the Mackenzie River at its mouth. Three bulls were seen on June 21 on the highway west of the Buffalo River just outside of the BFMA. Bison tracks were reported in four other locations in the BFMA in 1992 (Fig. 5).

Removals and Disease Test Results

All removals were carried out by Department staff. On May 17, eight bison were relocated and shot at two sites near Point de Roche on the shoreline of Great Slave Lake (Figure 4 map

reference numbers 3 and 4, and Figure 5). There were seven in one group and a single. They were all bulls ranging in age from approximately four years to 10 years old based on body size and horn conformation. All were lean but small amounts of perirenal and mesenteric fat indicated that they were in fair to good condition for the time of year. A single mature male was shot in the vicinity of Point de Roche on May 31.

Blood sera from the nine bison tested negative for Brucella antibodies. No gross or histological lesions were seen except for one small (4 mm), mineralized granuloma under the capsule of the liver of one bison. Histologically this lesion was not typical of tuberculosis and no acid-fast bacilli were present. The remaining tissues collected from this animal were normal. Unfortunately some of the key diagnostic lymph nodes (retropharyngeal, bronchiolar and mediastinal) for tuberculosis were not collected from a bison, shot on May 31.

DISCUSSION

1992 was the first year in which bison were seen in significant numbers in the BFMA; bison were removed from the area for the first time. Nine bison were killed and sampled but others were not relocated after being reported. Bison were never relocated in areas where only tracks were reported. Tracks were always a few days old when they were first seen and there were usually further time delays before they were reported and investigated. By the time an investigation could be mounted, the bison had several days to wander from the site. Similarly, delays because of reporting lags, foul weather or logistical delays after actual sightings of animals were made, allowed bison time to move away from the reported location. It was estimated that a minimum of 35 bison were not relocated in or near the BFMA between January and June 1992 based on the following assumptions:

- tracks of a herd represented a minimum of three bison;
- tracks of an unspecified number of bison represented one bison;
- a herd of unspecified size represented at least 3 bison.

Considering all occurrence reports, at least 44 bison were reported in or near the BFMA in the first half of 1992.

There are no significant barriers to bison movements into and through the BFMA. Even Great Slave Lake evidently does not constitute a barrier, as bison were seen crossing the ice over a distance of 38 km. The increasing number of bison moving into the

BFMA may be related to deteriorating habitat conditions in the Mackenzie Bison Range (MBR). Surface water accumulating since 1988 has flooded important habitat patches. We suggest that bison are dispersing into areas of less favourable habitat away from previous centres of abundance.

The bison removed from the BFMA in 1992 were mature males. Mature males are typically found in peripheral areas surrounding core areas of the Mackenzie population. Mature male bison are known to move long distances before or during the rut (Larter and Gates 1990). The risk of males returning to the MBR from the BFMA is high.

Based on post-mortem observations and laboratory tests, it appears that none of the nine culled bison were infected with tuberculosis or brucellosis. The Bison Disease Task Force (1988) estimated the average prevalence rate for each disease to be 36% in infected populations of bison in the WBNP area. The binomial probability of collecting nine disease negative bison from such an infected herd is 0.11 ($p=0.36^9$). This means that while it is more likely that they came from the MBR herd which is free of the two diseases, the possibility that they came from an infected herd cannot be ruled out on the basis of negative test results alone. However, given the observation of movements of bison from the MBR across Great Slave Lake there is a sound basis for suggesting that the culled animals were from the MBR rather than from WBNP.

The presence of bison west and north of WBNP (Figure 5,

Appendix A) presents the risk of disease transmission to healthy bison herds and precludes the possibility of reestablishing additional healthy herds in the region. The risk of disease transmission to the MBR herd is increasing as bison expand into the BFMA, forming a bridge of contact with the WBNP population. The maintenance of a bison free buffer zone is a daunting task given the ability of bison to move undetected over long distances. Similar difficulties were encountered during efforts to control bison movements out of Yellowstone National Park (Meagher 1989).

The effectiveness of conventional visual aerial surveillance is severely limited in the absence of snow. In 1992, all occurrences of bison in the BFMA were reported by members of the public. While this source of information was useful for recording the occurrence of bison, an effective buffer zone cannot be maintained solely based on opportunistic reporting. Other means need to be found to reduce or eliminate bison in the BFMA.

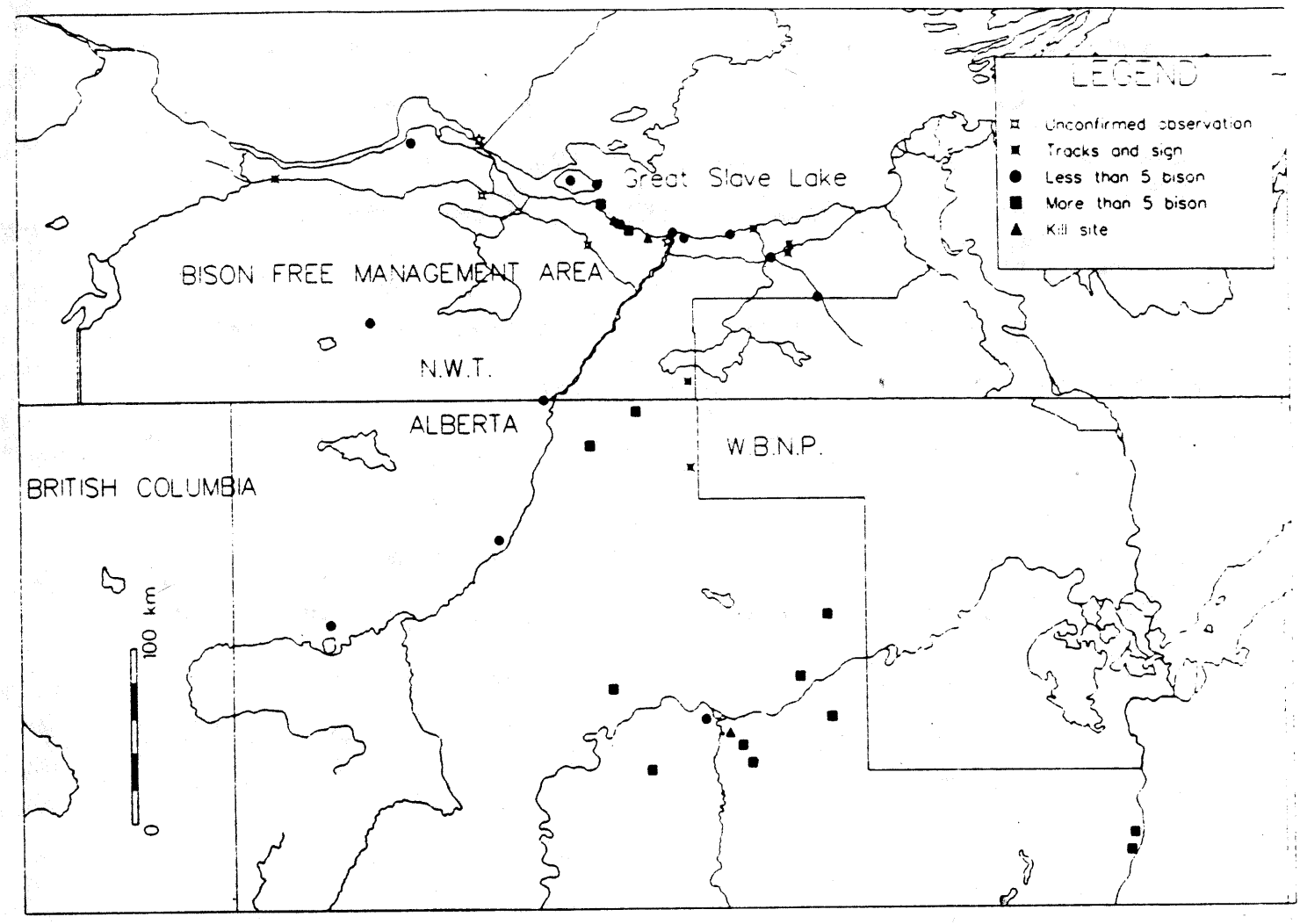


Figure 5. The locations of bison or their sign reported in the area west of Wood Buffalo National park and south of the Mackenzie River between 1976 and 1992.

RECOMMENDATIONS

1. Given the problem of detecting bison in the absence of snow, efforts should continue to broaden public participation in reporting bison observed in the BFMA.

2. Opening bison hunting in the BFMA with a requirement to promptly report kills would increase the probability of bison being removed from the area, yet still allow for limited disease testing.

3. Aerial surveillance of the BFMA should continue during the winter to assist in preventing the establishment of breeding herds in the area.

4. The use of aerial infrared scanning technology to improve detection of bison during the snow-free period should be investigated .

5. Reconnaissance should be done in northern Alberta to determine the distribution of bison near the BFMA. Bison should be sampled in northern Alberta and tested for exposure to tuberculosis and brucellosis.

ACKNOWLEDGEMENTS

We wish to thank A. Helmer and W. Lafleur for diligently recording reported bison sightings in the BFMA and for planning logistics for relocating and removing bison from the area. We are grateful to members of the Hay River Native Band for their patience while we conducted post-mortem examinations of bison that they were butchering. S. Tessaro expedited analysis of samples at the Animal Pathology Lab in Saskatoon.

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APPENDIX A

The locations of bison and their sign recorded in the area west of WBNP and south of the Mackenzie River between 1976 and June 1992.

Reference number	Date	Observation	Source	Location (UTM) ZN	North	East
1	06/15/76	1 bull	J. VanCamp - Fort Smith	11	6697508	407500
2	08/15/81	Small herd cows & calves	Alta.Forest Service, High Level	11	6644500	546500
3	08/15/82	2 bulls	Canadian Coast Guard, Hay River	11	6777550	512660
4	01/01/83	2 bulls'80,1bull'83,2bulls'82	R.Garlic, cited by R.Gainer	11	6570150	472400
5	01/01/84	20 bison	S.Tessaro, Saskatoon	12	6391774	471358
6	01/01/84	1 bull	Mr. Roberts	11	6468750	586700
7	01/01/84	5 bison '84,'85	C.Freisen, cited by R. Gainer	11	6439200	556300
8	03/15/84	1 bull	H.Reynolds, CWS Edmonton	11	6523800	379800
9	01/01/85	5 bulls	R.Gainer	11	6485000	534150
10	01/01/85	20 bison	R. Gainer	11	6471950	656530
11	09/15/86	2 bulls	2 anonymous hunters, not verified, Officer Helmer	11	6769660	467200
12	09/15/86	4 bulls	L.Antoine - Ft.Providence	11	6800230	431770
13	09/05/87	2 bison bulls	C.Roy/Mr.Mandeville - Hay River	11	6713000	642000
14	01/01/88	23 bison Feb'88,17 bison Mar89	S.Tessaro / R.Mcfetridge, Alberta Wildlife	11	6444400	613100
15	01/01/88	24 bison Feb'88,19 bison Mar89	S.Tessaro, R.Mcfetridge, Alberta Wildlife	11	6529950	652200
16	11/10/88	1 bull bison	L.Buckmaster, Hay River	11	6775100	526250
17	12/15/88	1 bull	S. Douglas, RRO II Fort Smith	11	6651000	497450
18	05/15/89	3 bulls	Tourists, not verified	11	6740500	521400
19	07/15/89	Bison tracks and feces	A. Helmer RRO II Hay River	11	6737500	626100
20	01/01/90	200 bison winter of 1990	Ken Orich, Alberta Forest Service, High Level	11	6454250	607550
21	02/15/90	19 bison	Dave Moyles, Alberta Wildlife Peace River	11	6494250	638500
22	03/15/90	8 bison shot	D.Moyles - Peace River	11	6461250	600250
23	07/15/90	Bison tracks and feces	A.Helmer RRO II Hay River	11	6742800	626550
24	08/15/90	10-12 bison	L. Schaerhorne - Steen River	11	6624250	521600
25	09/15/90	Bison tracks and sign	Stan Beaulieu	11	6612250	576500
26	01/01/91	65 fall'90 42 winter '91	W.Schaeffer, Ft. Smith	12	6401779	473518
27	01/10/92	Tracks of 1 bison	T. Cayen, Hay River	11	6753000	537000
28	04/26/92	20 bison	T. Cayen, Hay River	11	6749000	543000
29	05/17/92	7 bison killed	C. Gates, Fort Smith	11	6755000	535000
30	05/17/92	1 bison killed	C. Gates, Fort Smith	11	6752500	539500
31	05/21/92	Old bison dung and tracks	A. Helmer, Hay River	11	6662600	574500
32	05/31/92	1 bison killed	T. Maher, Hay River	11	6745000	553000
33	06/03/92	1 bison	M.McCullum, Hay River	11	6747500	596000
34	06/04/92	Tracks, not confirmed	G. Buggins, Hay River	11	6782300	362000
35	06/10/92	1 bison	M.McCullum, Hay River	11	6748000	566000
36	06/11/92	Tracks of 1 bison	D. Lanalice, Hay River	11	6745000	572000
37	06/14/92	Fresh tracks of a herd	Dennis Strong, Jim McLean of Hay River	11	6750933	607972
38	06/21/92	3 bison bulls	Brent Dievert, Fort Smith	11	6734800	617500
39	06/22/92	Large herd of bison on pt.	Japanese canoeists report to Ft. Prov. Band	11	6764250	528250