BISON CONTROL AREA PROGRAM
ANNUAL REPORT OF SURVEY ACTIVITIES
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ABSTRACT

Bovine tuberculosis (*Mycobacterium bovis*) and brucellosis (*Brucella abortus*) are endemic in bison (*Bison bison*) herds in and around Wood Buffalo National Park, and the adjacent Slave River Lowlands. In 1987, the Bison Control Area (BCA), along with a surveillance program, was created to minimise the risk of disease transmission to the disease-free Mackenzie and Nahanni–Liard herds in the Northwest Territories. During the 2003-2004 surveillance season, we used a Cessna 172 or 210, depending on aircraft availability in Fort Smith, NT., to fly 11 shoreline patrols along the northern boundary of the BCA on a weekly basis from 4 January 2004 to 14 April 2004. Total survey time during shoreline patrols was 30.9 hours. We used a Cessna 337 to fly one semi-comprehensive aerial survey of BCA zone I on 18 and 19 February 2004; total survey time was 10.7 hours. On the 22nd and from the 25-29 March 2004 we used a Cessna 337 and flew a total of 36.3 hours to complete the annual comprehensive survey of BCA zones I and II. In total, we flew 74.6 hours to systematically survey the BCA during the 2003 – 2004 surveillance season and did not observe any bison (or their sign, i.e., fresh tracks and/or feeding craters) within the BCA during our surveillance flights. Although we did not directly observe any attempts by bison (i.e. fresh tracks) to cross the Mackenzie River during surveillance flights, the Fort Providence Area Office received information about bison tracks across the Mackenzie River towards Meridian Island on 5 February 2004. A Renewable Resource Officer (E. Landry) followed the tracks to the south shore of Meridian Island and found that the tracks headed back to the north shore, indicating that the bison did not enter the BCA.

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INTRODUCTION

Free-ranging bison (*Bison bison)* in and around Wood Buffalo National Park (WBNP) and the Slave River Lowlands (SRL) are infected with bovine tuberculosis and brucellosis (Tessaro *et al*. 1990, Joly and Messier 2001) (Figure1). These northern bison herds contracted the two cattle diseases when 6,673 diseased plains bison were translocated from National Buffalo Park at Wainright, Alberta to WBNP between 1925 and 1928 (Fuller 2002). Risk of infection to healthy free-ranging bison as well as commercial cattle and bison herds has been a chronic management problem ever since (see Connelly *et al*. 1990, APFHRAN 1999, RAC 2001). Recent results from Jolly and Messier (2004) showed that bison within WBNP have overall apparent prevalence rates of 49% and 31% for tuberculosis and brucellosis respectively. These results suggest that the diseases will continue to persist in the affected bison in and around WBNP and supports the need to mitigate the risk of infection to the Mackenzie wood bison herd (Tessaro *et al.* 1993, Nishi 2002), the presumed disease free Hay-Zama herd located in northwest Alberta, and the Nahanni-Liard herd located near the Mackenzie Mountains (Gates *et al.* 1992a) (Figure 1). The diseased bison in and around WBNP also present the most important limiting factor to the reestablishment of other healthy free-roaming herds in the region that could contribute to the resource-based economies of surrounding communities (Gates *et al.* 2001b).

In March 1996, because of ongoing concerns of the commercial bison industry, the Canadian Bison Association requested the Animal, Plant and Food

Health Risk Assessment Network (APFRAN), Canadian Food Inspection Agency to conduct a formal risk assessment. The objective was to determine the risk of infection with tuberculosis and/or brucellosis from bison in WBNP and surrounding area during a 12 month period, for each of three “at risk” groups: commercial cattle, commercial captive bison and disease-free, free-ranging bison. In January 1999, APFRAN completed the risk assessment and concluded that disease-free, free-ranging bison had the highest probability of becoming infected with bovine brucellosis and/or tuberculosis (APFRAN 1999).

Because the APFRAN (1999) disease risk assessment was not based on terrain and habitat variability, a follow-up research project was initiated to compile local knowledge on bison movement and distribution around WBNP, define the relative influences of biophysical and management factors, and integrate quantitative and local qualitative data on biophysical factors into a bison movement model (Gates et *al*. 2001a, Mitchell 2002). The research focused on bison movements and distribution in the region in order to provide a model and maps for informing the development of disease risk management measures and to update the APFRAN risk model. Main results suggested that the highest likelihood for bison dispersal occurred in corridors that were parallel to the Peace River in the area of Fort Vermillion, and with the broadest network of corridors between High Level and WBNP.

Additional results from Gates and Wierzchowski’s (2003) movement corridor analysis indicate that potential movements of bison between WBNP and the Mackenzie Bison Range are most likely to occur in the northern section of

surveillance Zone I in the BCA. Gates and Wierzchowski (2003) recommended that in addition to the active surveillance of BCA Zone I, aerial surveillance of the area between Buffalo Lake and Highway #5 should be conducted to ensure that the disease-free Mackenzie herd does not come into contact with infected bison that may occupy this area. Due to the propensity of bison to use meadows near lakes and rivers, they also suggested that aerial reconnaissance of the northwestern shore of Buffalo Lake may be worthwhile.

Because of the ongoing risk of disease transmission from WBNP bison to the Mackenzie and Nahanni bison herds, continuation of shoreline and surveillance surveys is critically important for early detection of bison in the control area.

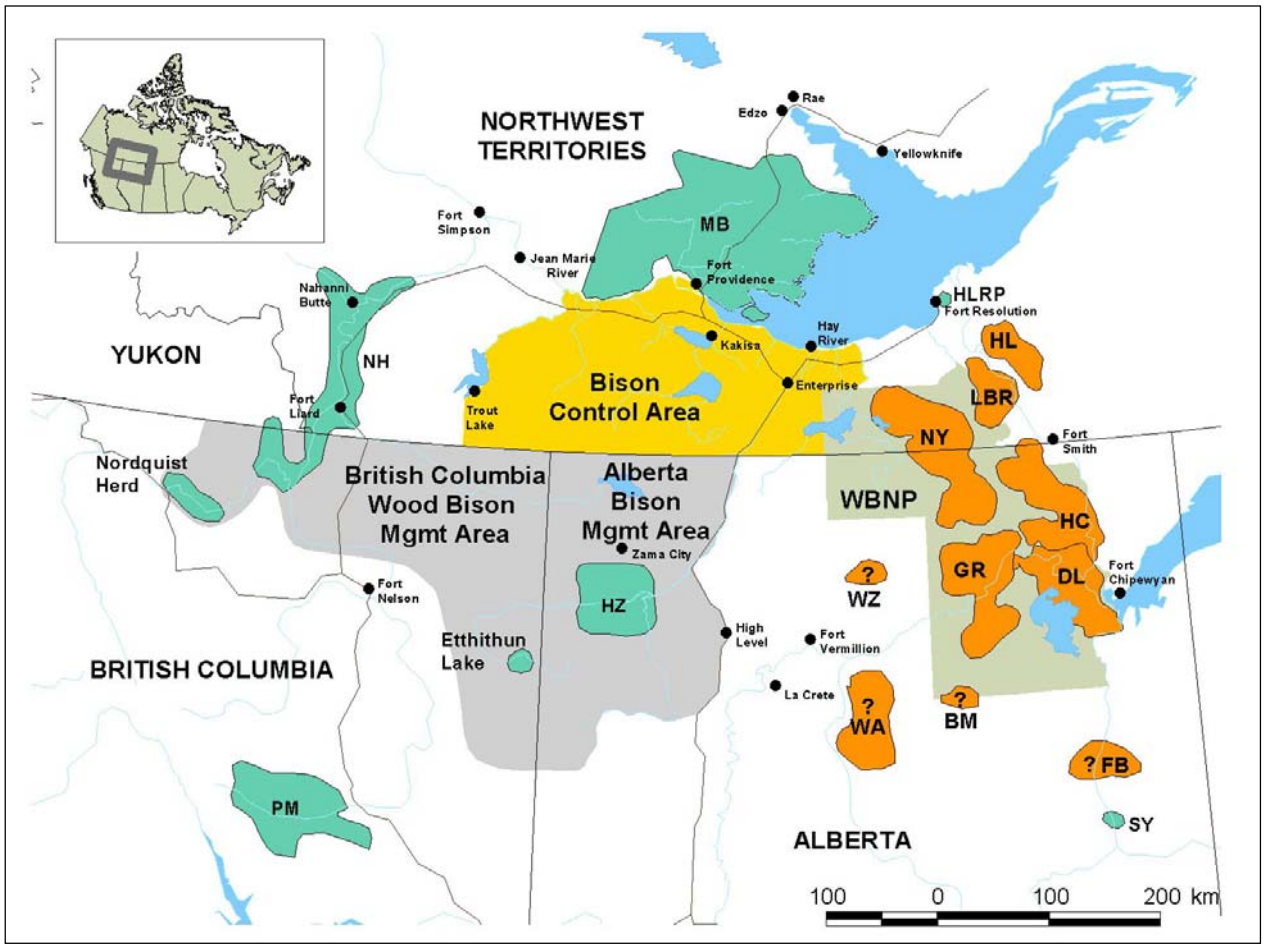

Figure 1. Distribution of bison herds in Northern Canada.

Note: Bison herds considered to be infected with bovine tuberculosis and brucellosis are shown in light grey; HL = Hook Lake, LBR = Little Buffalo River, NY = Nyarling, HC=Hay Camp, GR=Garden River, DL=Peace-Athabasca Delta, FB=Fire Bag, WZ=Wentzel, WA=Wabasca, BM=Birch Mountain. Bison herds considered to be disease-free are shown in dark grey; MB = Mackenzie, NH = Nahanni, PM= Pink Mountain, HZ = Hay Zama, SY = Syncrude/Fort McKay. The delineation of home ranges originated from various research (Reynolds & Hawley 1987, Joly & Messier 2001, Harper et.al 2000, Wood Buffalo National Park, Resources, Wildlife and Economic Development, British Columbia Ministry of Environment, and Alberta Environment.)

The Bison Control Area Program

In 1987, the Government of the Northwest Territories (GNWT) implemented a program to reduce the risk of contact between infected and disease-free bison (Gates and Gray 1992; Gates *et al* 1992b). The program entailed defining an area - The Bison Control Area (BCA) – from which bison are excluded through surveillance and active management. The BCA originally included lands south of the Mackenzie River, and North of the Mackenzie Highway between Mills Lake (near Fort Providence) and Hay River. In 1990, the BCA was expanded to encompass the area between the Alberta-NWT border and southern shoreline of the Mackenzie River; the western boundary was delineated by Trout River; the eastern boundary was outlined by the Buffalo River and western boundary of WBNP (Figure 2). Presently, the BCA encompasses
3 936 339 ha.

Since 1993, the Bison Control Area Program (BCAP) has been jointly funded by the Government of the Northwest Territories (Department of Resources, Wildlife, and Economic Development) and the Government of Canada (Parks Canada). Cost of surveying the BCA is jointly funded under a Memorandum of Understanding between the two agencies. This report summarizes the results of the Bison Control Area Program for the 2003/2004 surveillance season. (i.e. January 2004 - April 2004).

Figure 2. The Northwest Territories Bison Control Area and three surveillance zones.

Goals and Objectives

The specific goal of the Bison Control Area Program in the Northwest Territories is to reduce the risk of infection of the Mackenzie and Nahanni herds with tuberculosis and brucellosis. Our overall approach to achieve the goal of the BCA program is to conduct systematic aerial surveys with an extensive public communication program.

The objectives of the Bison Control Area Program are to:

- Detect and remove any bison in the BCA, and to prevent establishment of bison herds or individuals in this area[1];
- Continue surveillance of the bison control area; and
- Increase public awareness of the Bison Control Program.

[1] Wood bison (Bison bison athabascae) are considered a threatened subspecies of North American Bison by the committee on the Status of Endangered wildlife in Canada (COSEWIC); they are listed on Appendix II by the Convention on the International Trade In Endangered species (CITES). Because of the disease risk, any bison found in the BCA are considered nuisance wildlife under section 61 of the NWT Wildlife Regulations Act (Government of the Northwest Territories 1992). This regulation states that NWT residents may shoot any bison sighted in the BCA.

METHODS

We used a survey methodology from previous years (Gates and Gray 1992, Gates *et al*. 1992, Williamson *et al*. 1995, Antoniak and Gates 1996, Bohnet and Gates 1997, Boulanger *et al.* 1998, Tanguay, *et al*. in prep., Potvin *et al*. in prep., Jewell *et al*. in prep., Campbell *et al*. in prep.) to assure repeatability and comparability of search effort and resulting wildlife observations.

The Bison Control Area is stratified into three discrete zones (Figure 2). Active surveillance through aerial surveillance is conducted during winter months when sightability for bison and bison sign (i.e., tracks and/or feeding craters) is optimal. Survey effort and frequency of monitoring is allocated according to the presumed likelihood of bison moving into the area, i.e., the risk of invasion (see AFRAN 1999). Consequently, this survey design requires frequent (i.e., weekly) surveys of the shoreline areas that are closest to the range of Mackenzie bison herd and the range of bison in WBNP. Less frequent surveys (i.e., semi-comprehensive and annual comprehensive) are used to survey larger areas (BCA Zones I and II) in the BCA.

As part of this survey design, we flew three different types of aerial surveys to systematically survey the BCA throughout the surveillance season. The first type of survey was a weekly shoreline patrol of the high-risk area (Zone I). We continued to fly a standard shoreline patrol route as recommended by Tanguay *et al*. after the 1999-2000 season (Tanguay *et al*. in prep) (Figure 3). However, because our charter aircraft was based in Fort Smith, we flew additional

coverage of the south shoreline of Great Slave Lake between Hay River[2] and Point du Roche. This survey was conducted at approximately seven-day intervals and had a planned flight time of approximately two-three hours per patrol flight.

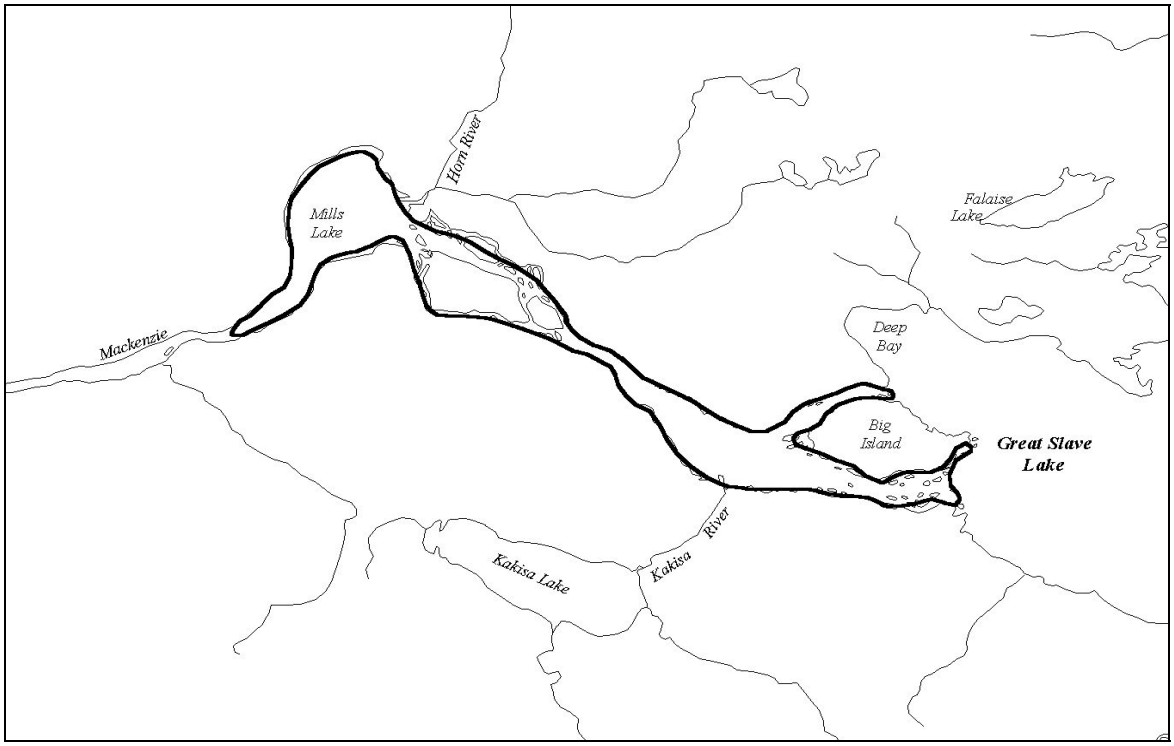

Figure 3. Standardized shoreline patrol route for the Bison Control Area.

The second type of survey was a one-time semi-comprehensive surveillance flight of Zone I; this survey was performed in February 2004. This survey covers a larger area and requires about 10-15 hours to complete. The final survey type was the annual comprehensive surveillance flight of Zones I and II. For this annual comprehensive survey performed in late March, we allocated

[2] Shoreline patrols were chartered out of Fort Smith during the 2003/2004-surveillance season due to the unavailability of appropriate aircraft in either Fort Providence or Hay River. The additional coverage of the south shore of Great Slave Lake beginning at Hay River - to the standardized patrol route typically took 15 minutes to patrol. To make more efficient use of ferry time, we requested that the pilot survey this area on route to Fort providence. This area was also surveyed with observers on a periodic basis.

approximately 40-45 hours of flight time. We did not conduct aerial surveys in Zone III of the BCA.

We adapted flight paths from previous surveys to plan our routing for aerial surveys in the 2003-2004 surveillance season. However, actual flight paths were flown in a flexible, meandering manner to allow for variations in terrain, and habitat, and to follow animal tracks as and when required. This allowed us to survey the area with greatest possible coverage given available flying hours. Shoreline patrols were flown in either a Cessna 172 or Cessna 210, depending on aircraft availability. Both the semi-comprehensive survey and the annual comprehensive survey flights were performed with a Cessna 337. A Renewable Resource Officer (Landry) and/or local community observers and pilot conducted all shoreline patrols, except for the final flight conducted on 14 April 2004, where the BCA Technician (Bidwell) accompanied the pilot on the final patrol. The survey crew for the surveillance flights of Zone I and the annual comprehensive survey of Zones I and II consisted of a pilot, the BCA Technician and two community observers. The technician sat in the front seat while the observers occupied the left and right rear seats of the aircraft. Survey aircraft were flown at approximately 250 to 300 metres above ground level at a speed of 140 - 160 km/hr.

Wildlife observations during weekly shoreline patrols were most often recorded on a NTS 1:250,000-reproduction map of the survey area. When available, a hand-held Garmin GPS was used and then downloaded into the Ozzie Explorer Mapping program (Des Newman, version: 3.90.2) where the data

could eventually be exported into ArcView 3.2a Geographic Information System (Environmental Systems Research Institute, 1992-2000). All observations of large mammals (*i.e.,* caribou, moose, and wolves) during the semi-comprehensive and annual comprehensive flights were recorded using ASPEN Global Positioning System Field Software (Trimble Survey and Mapping Products, 1998). The data collected using this method were also prepared and exported into ArcView 3.2a.

RESULTS

We attempted to conduct aerial surveys during optimum snow and light conditions; however, some flights were conducted in less suitable conditions in order to maintain adequate and regular surveillance (Appendix A).

Shoreline Patrols

Weekly shoreline patrols were initiated on 4 January 2004 and continued until 14 April 2004. (Figures 4.1-4.13 Maps) Total flight time for the 13 shoreline patrols was 30.9 hours (Table.1) with a mean duration of 2.4 (± 0.3 Standard Deviation) hours. On 14 April 2004 the last scheduled shoreline patrol flight was flown because the BCA Technician observed that, due to warmer temperatures in March, snow cover on land had receded substantially altering snow structure so that existing tracks were near impossible to discern from the air. River conditions also showed clear signs of spring thaw; ice cover on the river exhibited deteriorated conditions near shore (near Fort Providence) that would likely deter bison from crossing. Because of these observed conditions, we discontinued shoreline patrol surveys for the 2003/2004 season.

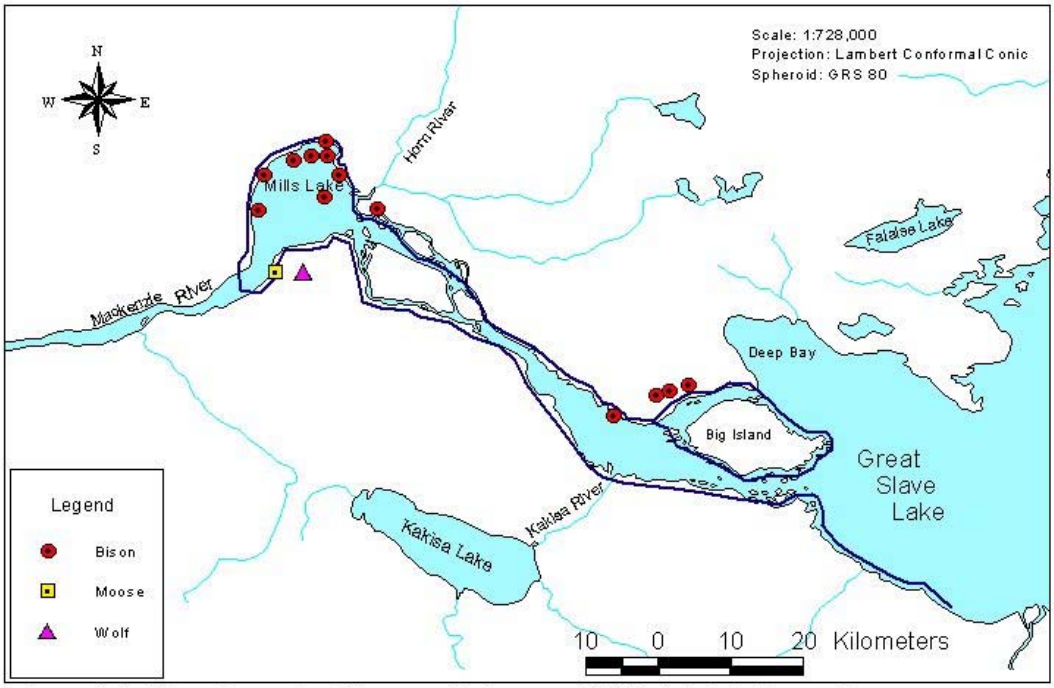

Figure 4.1 Shoreline patrol flown on 7 January 2004. 2.3 total hours flown on survey.

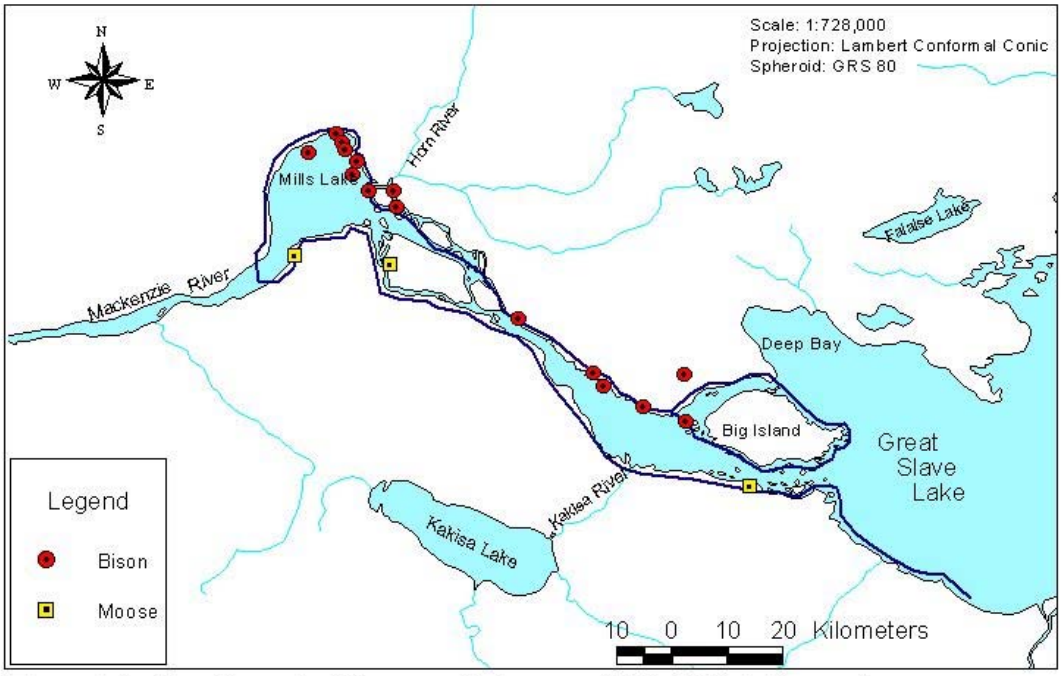

Figure 4.2 Shoreline patrol flown on 14 January 2004. 2.2 total hours flown on survey.

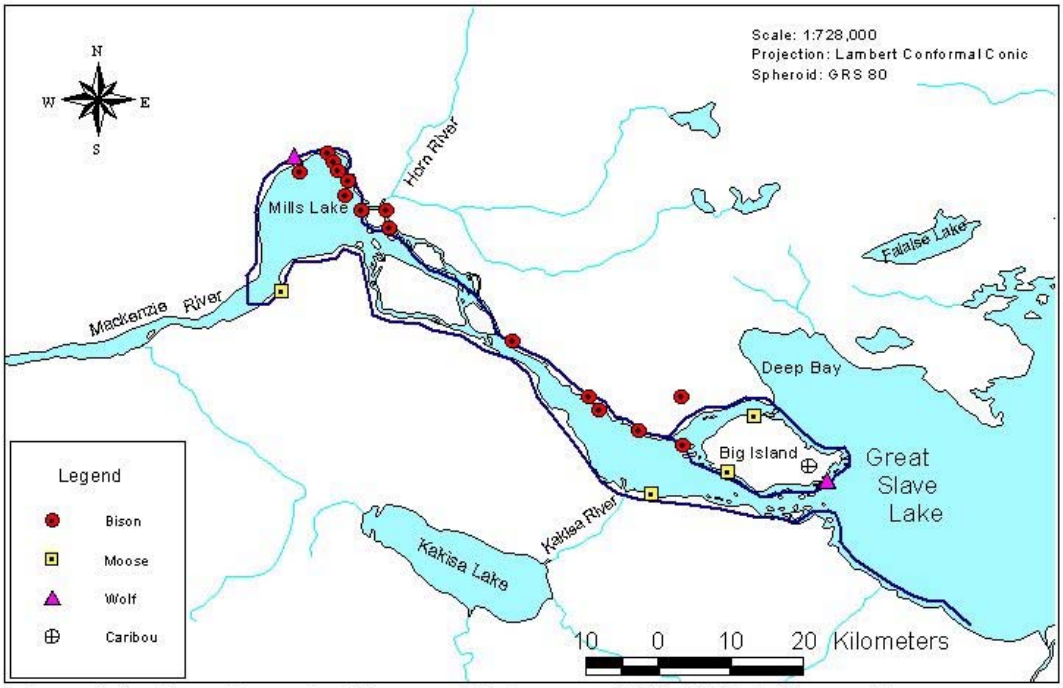

Figure 4.3 Shoreline patrol flown on 21 January 2004. 2.2 total hours flown on survey.

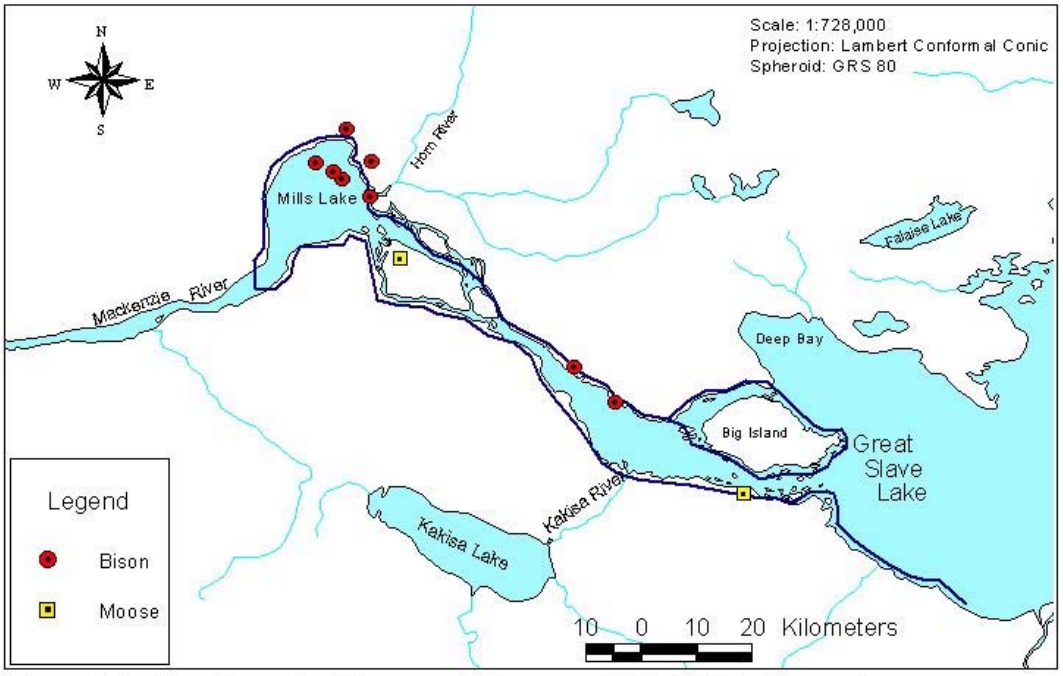

Figure 4.4 Shoreline patrol flown on 29 January 2004. 2.0 total hours flown on survey.

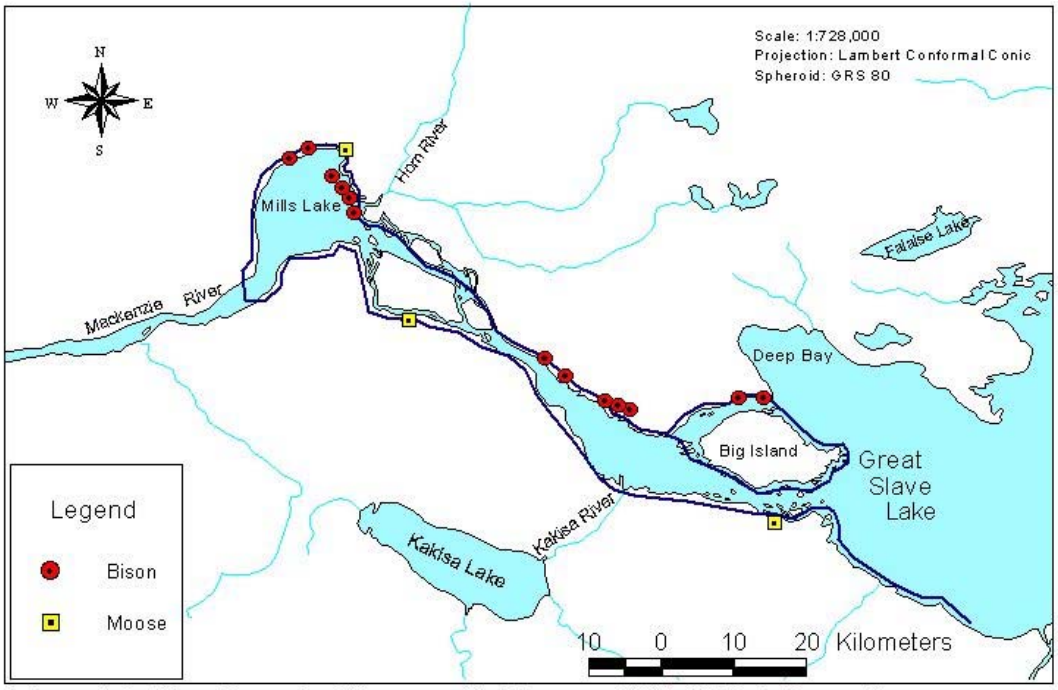

Figure 4.5 Shoreline patrol flown on 04 February 2004. 2.5 total hours flown on survey.

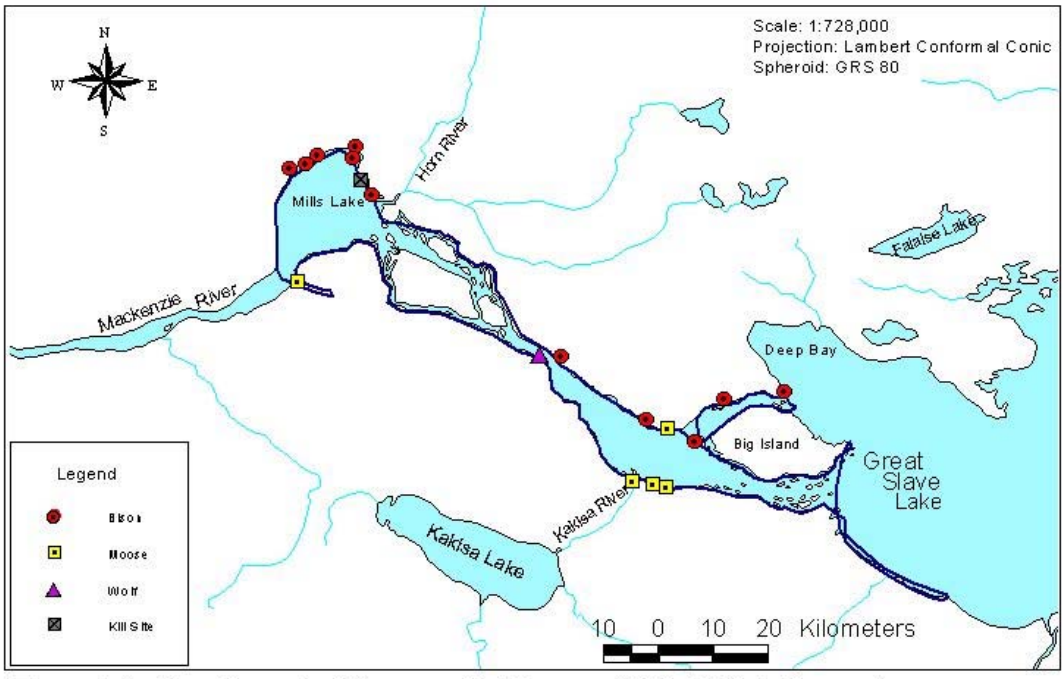

Figure 4.6 Shoreline patrol flown on 11 February 2004. 2.6 total hours flown on survey.

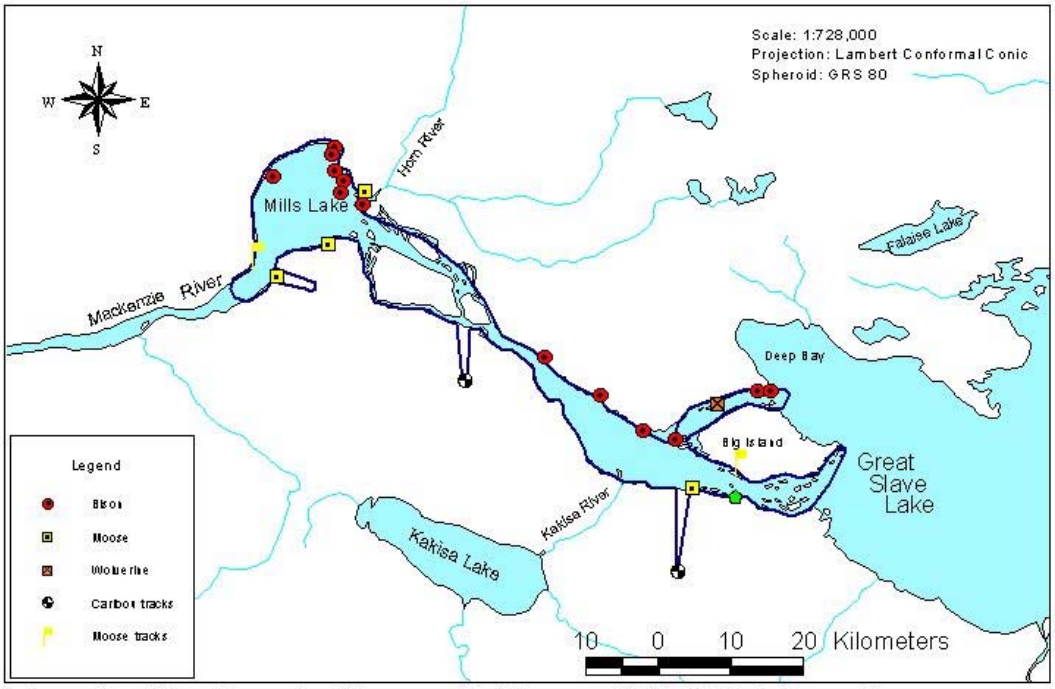

Figure 4.7 Shoreline patrol flown on 25 February 2004. 2.7 total hours flown on survey.

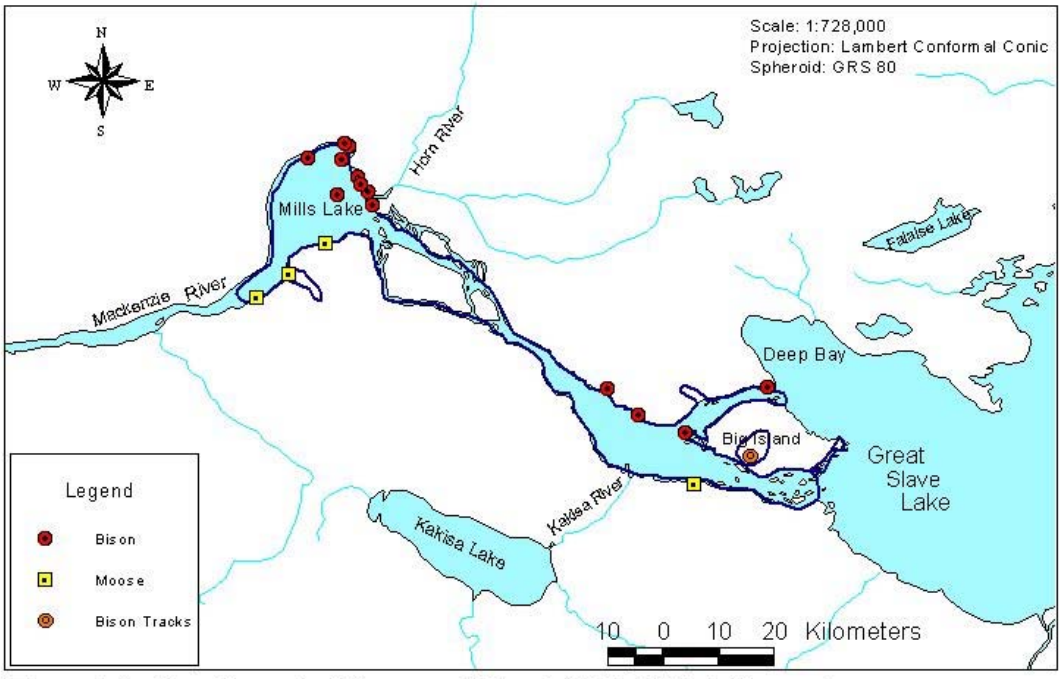

Figure 4.8 Shoreline patrol flown on 3 March 2004. 2.7 total hours flown on survey.

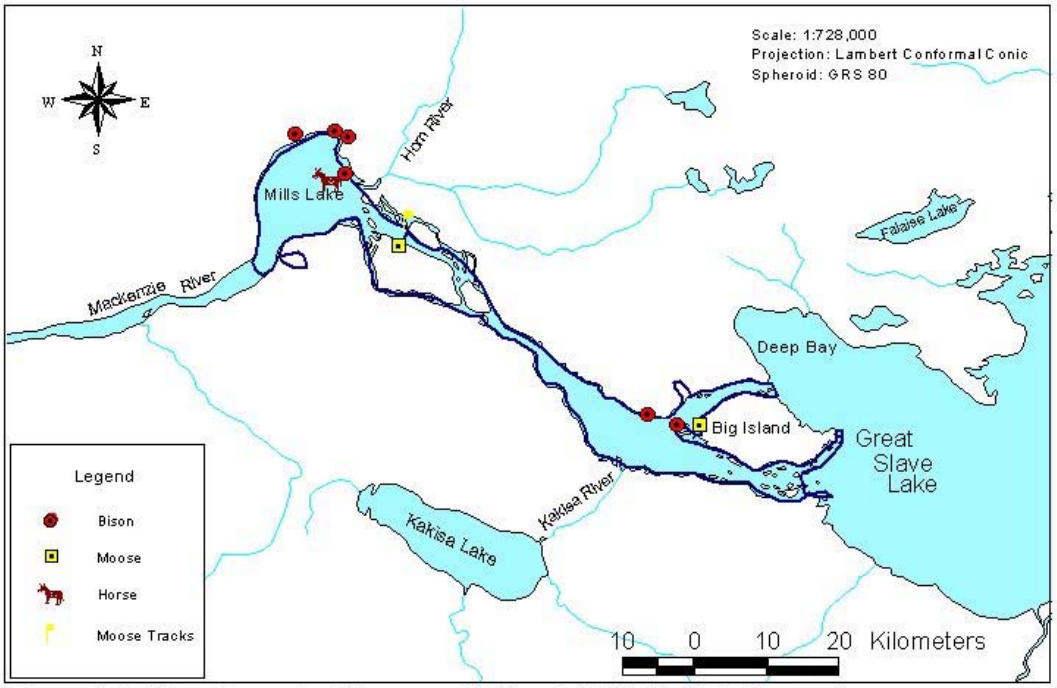

Figure 4.9 Shoreline patrol flown on 10 March 2004. 2.1 total hours flown on survey.

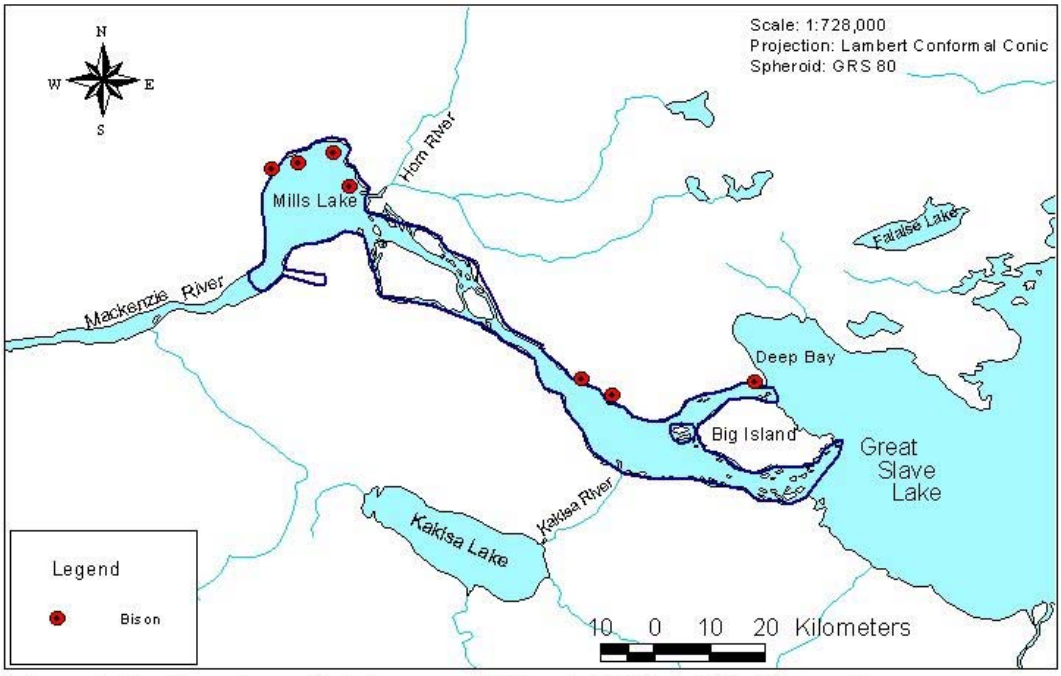

Figure 4.10 Shoreline patrol flown on 17 March 2004. 2.0 total hours flown on survey.

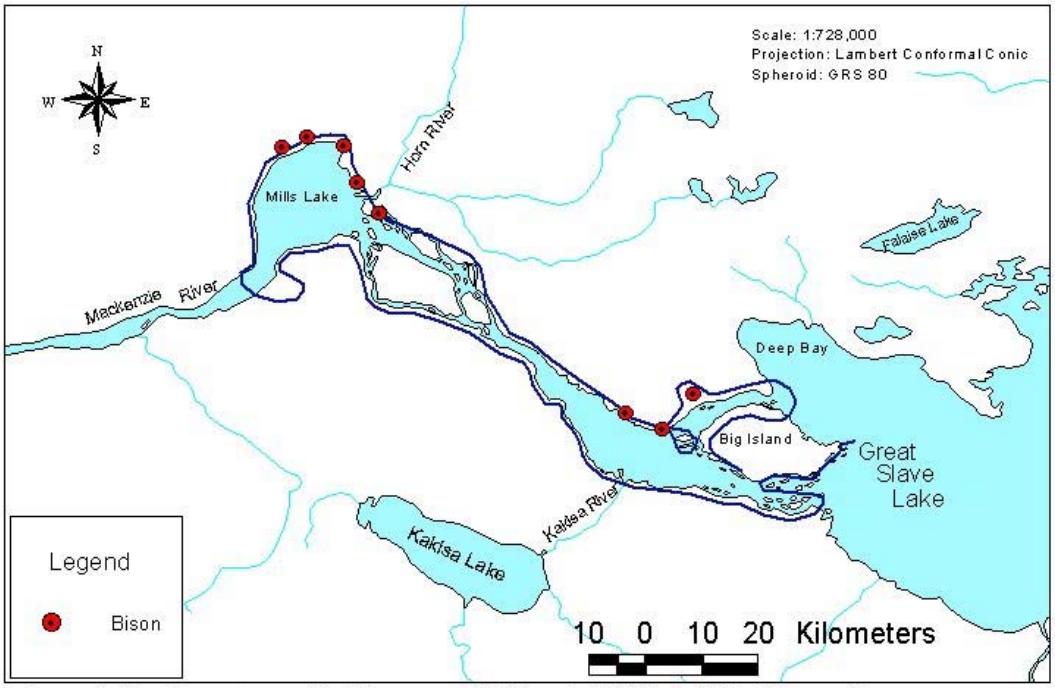

Figure 4.11 Shoreline patrol flown on 31 March 2004. 2.3 total hours flown on survey.

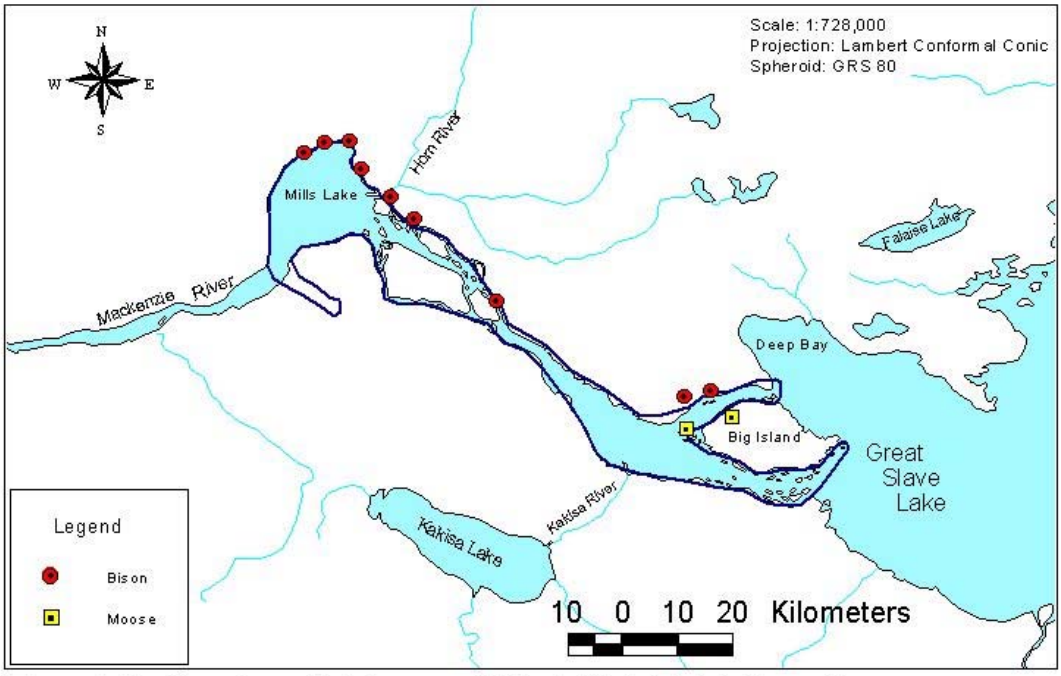

Figure 4.12 Shoreline patrol flown on 07 April 2004. 2.1 total hours flown on survey.

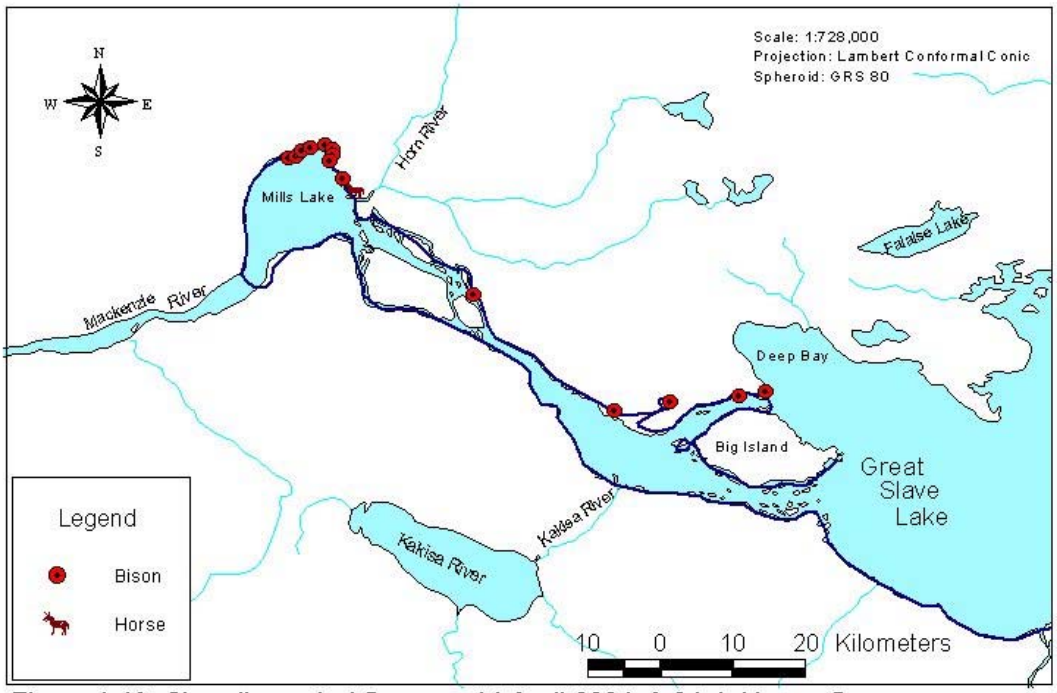

Figure 4.13 Shoreline patrol flown on 14 April 2004. 3.2 total hours flown on survey.

Surveillance Surveys

Unlike the previous year, we conducted just one semi-comprehensive surveillance flight of BCA Zone I. This survey was conducted from the 18-19 February 2004 (see Figures 5.1 and 5.2). The total time flown on the semi-comprehensive survey was 10.7 hours. The annual comprehensive surveillance flight of BCA Zones I and II was conducted from March 22, 25-29 (Figures 6.1 and 6.2) and required 36.3 hours to complete (Table 2). In total we spent 77.9 hours surveying the BCA in the 2003-2004 surveillance season (Appendix B).

Table 1. Summary of shoreline patrols in the Bison Control Area from January to April 2004[3].

Date	Ferry Hrs	Survey Hrs	Date	Ferry Hrs	Survey Hrs
07 Jan. 2004	4.0	2.3	03 Mar. 2004	3.9	2.7
14 Jan. 2004	3.9	2.2	10 Mar. 2004	3.4	2.1
21 Jan. 2004	3.9	2.2	17 Mar. 2004	3.8	2.0
29 Jan. 2004	2.9	2.0	31 Mar. 2004	1.7	2.3
04 Feb. 2004	3.8	2.5	07 Apr. 2004	3.7	2.1
11 Feb. 2004	3.7	2.6	14 Apr. 2004	1.5	3.2
25 Feb. 2004	3.8	2.7			
				Total ferry hours: **44.0**	Total survey hours: **30.9**

Table 2. Summary of Surveillance flights in the Bison Control Area from February to March 2004. A Cessna-337 aircraft was used to complete both surveillance surveys.

Date	BCA Zone	Hours Flown
18-19 Feb.2004	I (Semi)	10.7
22, 25-29 Mar.2004	I&II (Comp)	36.3
	Total Hours:	**47.0**

[3] The aircrafts used to fly the shoreline patrols were a Cessna-172 and a Cessna-210.

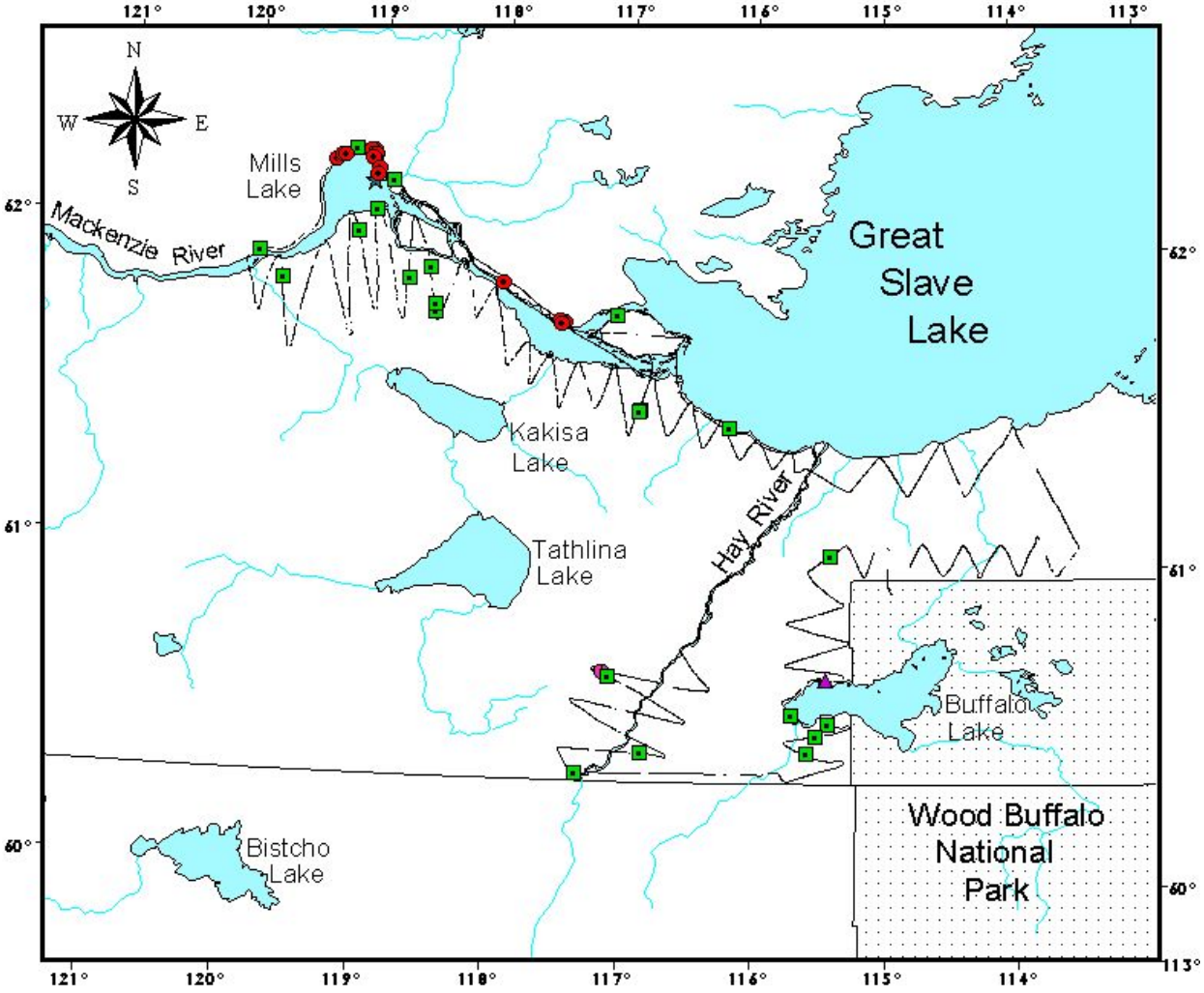

Figure 5.1

Flightline of survey aircraft and large animals observed during the February Semi-Comprehensive survey of the Bison Control Area, Zone 1. 18-19 February, 2004

Map Scale: 1:1,355,535
Projection: Lambert Conformal Conic
Spheroid: GRS 80

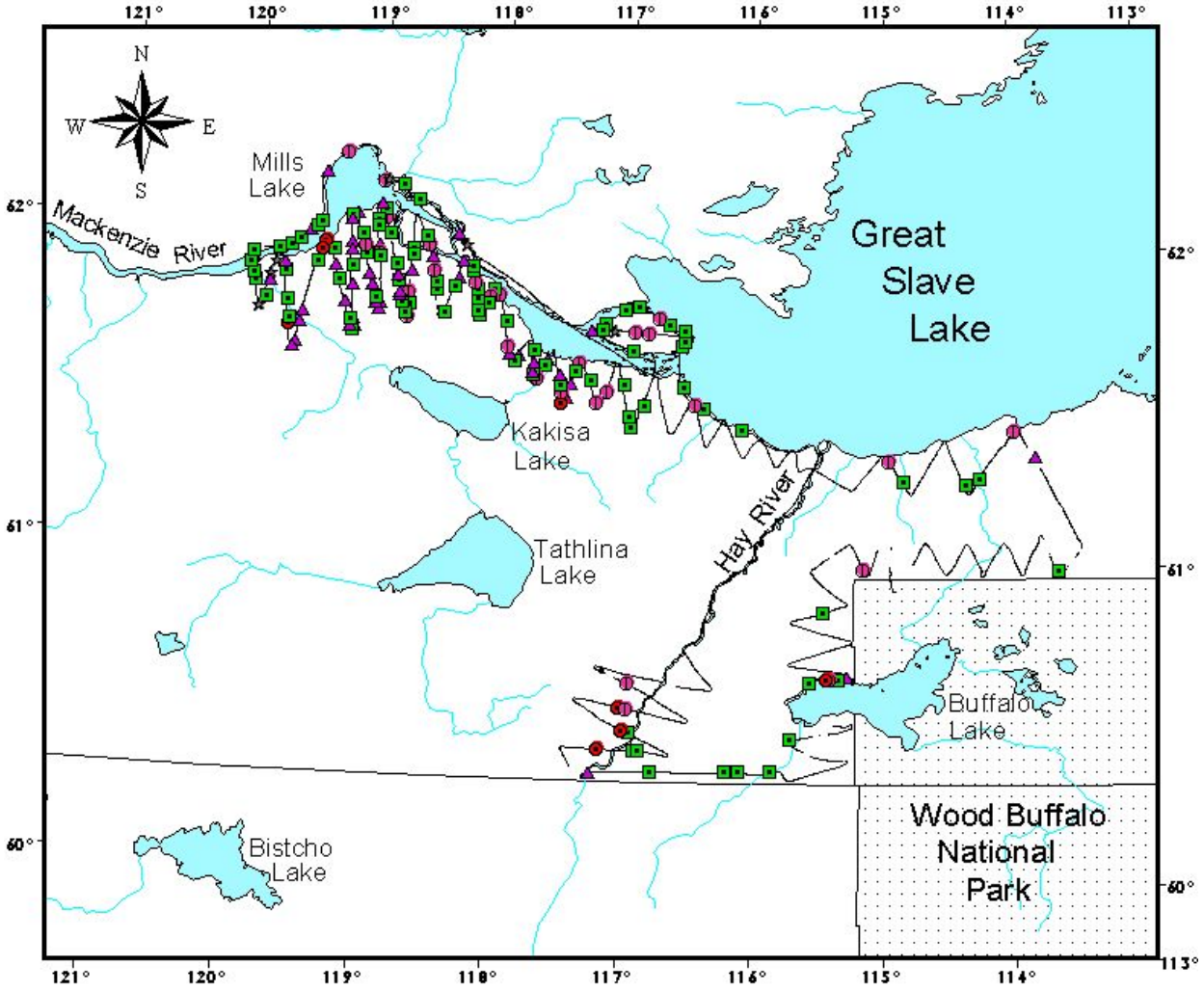

Figure 5.2

Flightline of survey aircraft and large animals tracks observed during the February Semi-Comprehensive survey of the Bison Control Area, Zone 1. 18-19 February, 2004

Legend

Tracks

- Bison
- Caribou
- Moose
- Unknown
- Wolf

Map Scale: 1:1,355,535
Projection: Lambert Conformal Conic
Spheroid: GRS 80

20 0 20 40 60 Kilometers

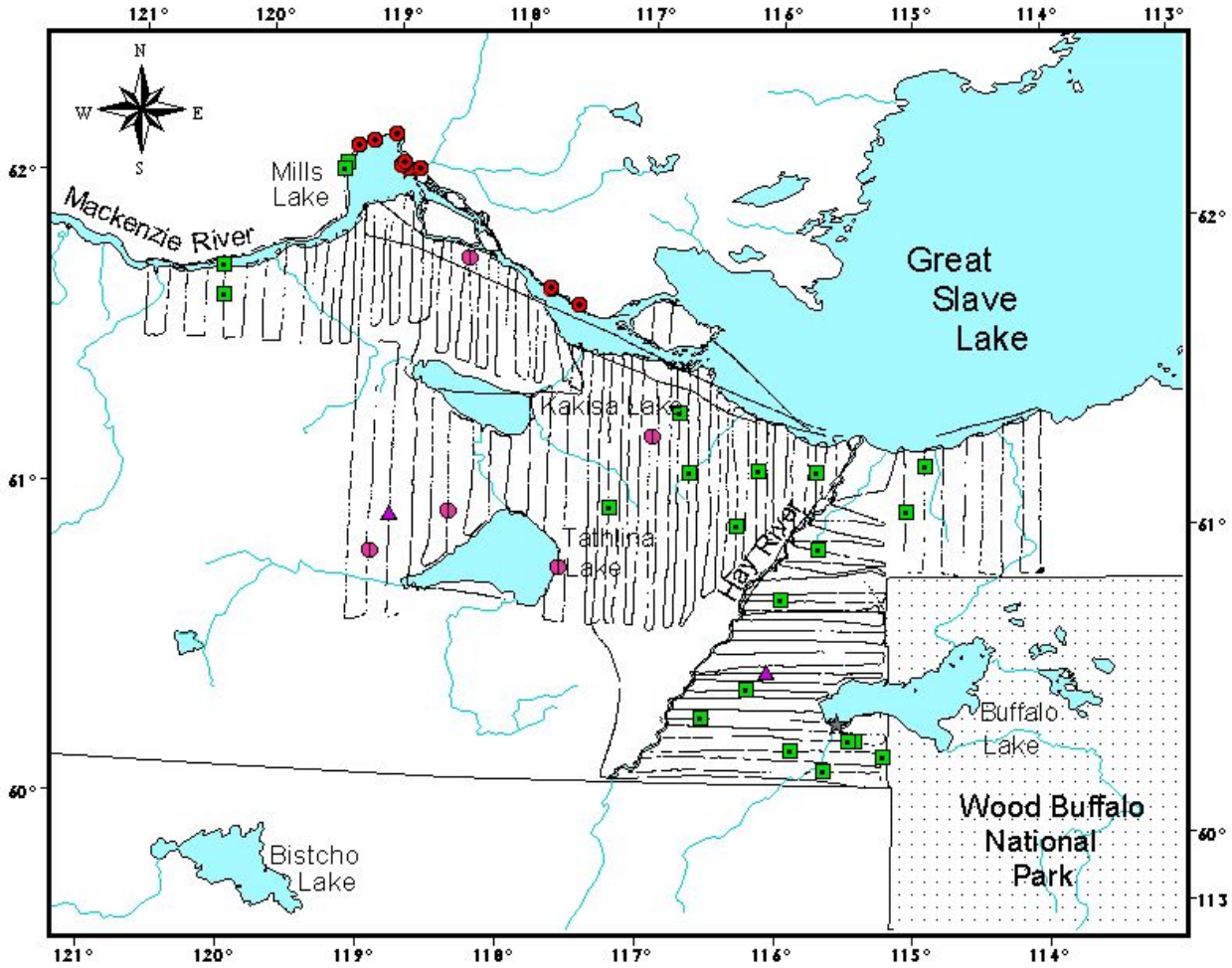

Figure 6.1

Flightline of survey aircraft and large animals observed during the Comprehensive survey of the Bison Control Area, Zones 1 & 2. 22, 25-29 March, 2004

Legend

- Bison
- Moose
- Wolf
- Caribou
- Other

Map Scale 1:1,355,535
Projection: Lambert Conformal Conic
Spheroid: GRS 80

20 0 20 40 60 Kilometers

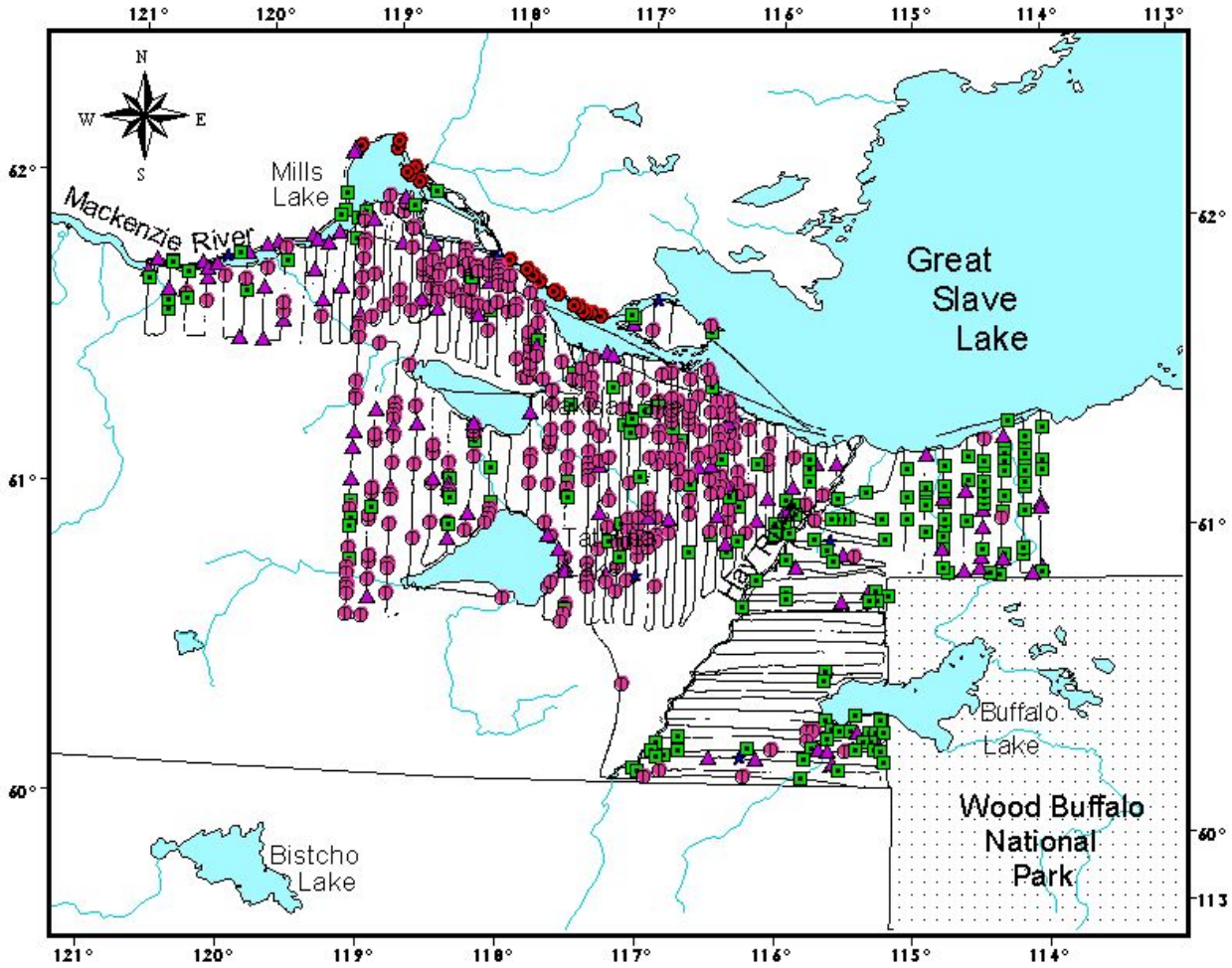

Figure 6.2

Flightline of survey aircraft and large animals tracks observed during the Comprehensive survey of the Bison Control Area, Zones 1 & 2. 22, 25-29 March, 2004

Legend

Tracks

- Bison
- Caribou
- Moose
- Unknown
- Wolf

Map Scale 1:1,355,535
Projection: Lambert Conformal Conic
Spheroid: GRS 80

20 0 20 40 60 Kilometers

Wildlife Observations

Although bison have been observed in the BCA in the past, we did not observe any bison, nor did we receive any reports of bison sightings in the BCA during the 2003-2004 surveillance season. However, on 5 February 2004, the Fort Providence Resources, Wildlife and Economic Development (RWED) Area Office received a phone call indicating that bison tracks were seen across the river towards Meridian Island. That same day, a Renewable Resource Officer followed the tracks to the south shore of Meridian Island and found that the tracks headed back to the north shore (E. Landry pers comm.). On 19 February, 2004, at approximately 1630 h, a pilot (D. King, Landa Aviation. Hay River, NT) spotted a bison on a small island (61.13732°N; 116.90799°W) west of Big Island situated at the mouth of the North Channel by Beaver Lake. A few hours earlier, this location was surveyed from the air (BCA semi-comprehensive survey) and it was noted that there were multiple bison tracks observed on the island. Attempts were made to secure a flight to immediately follow up on this reported sighting. The BCA Technician informed the pilot and observers who perform the weekly shoreline patrol survey to investigate the area on 25 February 2004 and report any sign of bison south of the island immediately.

On 25 February 2004, the shoreline patrol crew investigated the tracks thought to be bison that were observed on the south shore during the semi-comprehensive survey. The shoreline patrol crew did not observe any tracks south of Big Island and the suspected bison tracks observed during the semi–

comprehensive survey were confirmed as caribou tracks by Renewable Resource Officer (RRO) Landry (E. Landry pers comm.)[4]

During surveillance flights we did not observe any attempts by bison (*i.e.* fresh tracks) to cross the Mackenzie River. All bison observed during shoreline patrols or surveillance flights were located on the north side of the Mackenzie River in the Mackenzie Bison Sanctuary (MBS).

The cumulative totals of large mammals observed during shoreline patrols and surveillance flights were 2560 bison, 15 caribou, 124 moose, and 12 wolves (Table 3).

Bison were most often observed along the north shore of Mills Lake. (figures 4.1-4.13, Figure 5.1 and Figure 6.1). During shoreline patrols moose were generally observed along the south shore of the Mackenzie River southwest of Mills Lake, and around Big Island, also south of this along the shore to Kakisa River. On surveillance surveys moose were again observed most often along the south shore of the Mackenzie and down into Zone II near the southwest corner of Buffalo Lake (Figures 4.1-4.9, 4.12, 5.1, 6.1). Only one caribou was observed during shoreline patrols; this animal was seen on Big Island. During surveillance surveys most caribou were observed in Zone II around Tathlina Lake and east of this to Hay River (figures 4.3, 5.1, 6.1). The majority of wolves were observed during shoreline patrols. Most were seen along the south shore of the Mackenzie River and on the eastern shore of Big Island. Wolves were seen near the western shore of Buffalo lake and west of Tathlina Lake during the surveillance surveys (Figures 4.1, 4.3, 4.6, 5.1, 6.1).

[4] Personal communication with Edward Landry, RRO Fort Providence. 25 February 2004

Reported Sightings

On 05 July 2004 a forestry crew reported details of bison sightings within the BCA to the Bison Technician (T. Ellsworth) of the RWED Bison Program in Fort Smith, NT. The bison were observed while the crew were flying forestry plots on 27 June 2004. A reconnaissance flight was carried out on 06 July 2004; there were no sign of bison in the areas reported (see Appendix F).

Table 3. Recorded sightings of large mammals observed during all surveillance flights in the Bison Control Area from January to April 2004.

	Surveillance Flights			
Species	Shoreline Patrols (n=13)	Semi-Comprehensive (n=1)	Comprehensive (n=1)	Totals
Bison	2119	298	143	2560
Caribou	1	2	12	15
Moose	69	29	26	124
Wolf	9	1	2	12

Communications

We tried to organize meetings with the communities within and surrounding the BCA but due to scheduling difficulties, we were unable to meet with community representatives. The BCA Technician contacted several band offices to inform them that we were interested in any reported bison sightings, and that this information should be relayed to a local RWED office as soon as possible. Posters and pamphlets were distributed to various band offices within and adjacent to the BCA to better inform the general public about the Bison Control Area Program and to emphasise their importance as participants in making this project more comprehensive.

A radio announcement was aired periodically on the Canadian Broadcasting Corporation (CBC) to inform residents, as well as tourists visiting the Territories, about the Bison Control Program and alert anyone travelling through the BCA to report bison sightings to the nearest Department of Resources, Wildlife, and Economic Development office (Appendix C). This radio message was also aired as an “Anik-info” spot on CBC-North Television.

A half page colour advertisement was included in the 2004 Explorer’s Guide as well as in UP HERE magazine (Appendix D). This advertisement was designed with the intent of reaching a wider audience; its aim was to inform the public about the Bison Control Program and to solicit public participation.

DISCUSSION

In the 2003-2004 surveillance season we did not observe bison or bison sign (i.e., tracks and/or feeding craters) in the BCA during weekly shoreline patrols, or the semi-comprehensive and comprehensive surveillance surveys. However, the occurrence of bison crossing the river is important. An occurrence that happened this season may have resulted in a bison entering the BCA if the report had not been followed up. Thus, absence of bison in the BCA should not be presumed. It is important that these surveys remain ongoing to ensure that the BCA is maintained free of bison.

In the upcoming 2004-2005 BCA surveillance season, flight times for shoreline patrols should be closely monitored to ensure that the estimated flight minimums are being flown. If there are excess hours then this time should be used to survey periphery areas. Because of the complications encountered this season, we drafted a suggested shoreline survey protocol (Appendix E) that outlines standard practices and protocols for shoreline patrol surveys. Prior to the beginning of the annual winter shoreline surveys, all pilots and observers who participate in the patrols must be informed as to the practices involved in properly executing these surveys. An information session may be arranged at the beginning of the season to relay proposed plans or a memo that contains all pertinent info may be distributed to the participants. Informing all those involved of survey protocol will aid in ensuring that proper procedure is followed at all times.

Public consultation and communication should be expanded further next season, as a well-informed public is more likely to report bison sightings. In addition to the current media spots in place, next season we encourage the following:

- Meetings should be held with community members in and around the BCA. Constant amendment of a provisional meeting schedule developed prior to next season, in concurrence with consistent band office communication, may give this important aspect of the BCA program the direction and attention it needs.
- Information regarding the Bison Control Program should be published in major newspapers of the Northwest Territories during summer months. This will maximise exposure to both residents and tourists.
- The Bison Control Area website's activation and maintenance should be a priority next season as it will be an effective medium that can be used to inform the public on a year round basis. Once the website is set up and functioning it must be updated regularly when changes in the data or the program occur.

Development of a database that stores location coordinates of probable areas of interest to bison (i.e. meadows, high density corridors, etc…) around standard surveillance routes should be considered. These locations may be selected in a number of ways:

- by conducting habitat analysis using satellite imagery based on vegetation types and proximity to diseased herds;

- locating areas based on results from studies such as Gates and Wierzchowski's landscape evaluation of bison movements and distribution (2003); and
- using compiled survey data to extrapolate potential areas of interest.

We suggest that survey effort in subsequent years for the semi-comprehensive and comprehensive surveys should be more reflective of the recommendations by Gates & Wierzchowski (2003). Based on the results of their bison movements model and the main objectives of the BCA program, Gates & Wierzchowski (2003) recommended aerial surveillance between Buffalo Lake and Highway #5, and due to the propensity of bison to use meadows near lakes and rivers, they also suggest aerial reconnaissance of the northwestern shore of Buffalo Lake. Although these areas are generally included in the current surveillance flights, we think that extending survey coverage during the semi-comprehensive and comprehensive surveys into the northwest corner of WBNP - in the area north of Buffalo Lake and west of *ca.* longitude 114 45' W - would improve our knowledge of the most likely areas along the northwestern park border where bison would disperse from.

ACKNOWLEDGEMENTS

The BCA program for 2003 – 2004 surveillance year was funded jointly by RWED South Slave Region, Fort Smith, NT. and WBNP, Parks Canada Agency, Fort Smith, NT.

Several individuals played an important role in conducting the Bison Control Area Program during the 2003-2004 surveillance season. Department of Resources, Wildlife and Economic Development personnel Gladys Schaeffer and Melissa Johns in Fort Smith handled administrative aspects such as staffing and pay records. Renewable Resource Officer Evelyn Krutko and trainee Edward Landry from Fort Providence assisted with logistics and shared their concerns and advice for on-going success of the Bison Control Program. We thank the community participants who assisted with the surveillance flights; they are Mike Krutko and James Bonnetrouge of Fort Providence; and from Hay River, Leon Thomas, Joe Cayen, Robert Buckley and Glen Tambour. Thanks also go to aircraft pilots Brian Hancock and Doug Williamson from Big River Air, and Darcy King from Landa Aviation for their input and expertise during surveillance flights. Lynda Yonge reviewed and provided helpful suggestions on the final manuscript.

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APPENDIX A: Summary of weather conditions during shoreline patrols and surveillance flights throughout the Bison Control Area Program surveillance season 2003-2004

Summary of weather data during shoreline patrols - BCA 2003/04 surveillance season.

Date	Patrol #	Zone	Temp	Winds	Sky	Light	Intensity	Snow Cover
9-Jan-04	1	I	-25 C	10 kts - W	Scattered	Bright	Medium	Low veg Showing
15-Jan-04	2	I	-29 C	Calm	Clear	Flat	Low	Low veg Showing
23-Jan-04	3	I	-41 C	Calm	Clear	Bright	Medium	Low veg Showing
5-Feb-04	4	I	-14 C	10 Kts - W	Scattered	Bright	High	Low veg Showing
12-Feb-04	5	I	-25 C	Calm	Scattered	Flat	Medium	Low veg Showing
18-Feb-04	6	I	-20 C	15 Kts - NW	Clear	Bright	High	Low veg Showing
12-Mar-04	7	I	-27 C	5 Kts - W	Clear	Bright	High	Complete
19-Mar-04	8	I	2 C	5 Kts - SW	Clear	Bright	High	Complete
26-Mar-04	9	I	-4 C	10 Kts - SE	Scattered	Bright	Medium	Complete
15-Apr-04	10	I	-2 C	15 Kts - SE	Broken	Bright	Medium	Complete
25-Apr-04	11	I	3 C	Calm	Scattered	Flat	Medium	Ground Showing

Summary of weather data during surveillance surveys - BCA 2003/04 surveillance season.

Date	Survey	Zone	Temp	Winds	Sky	Light	Intensity	Snow Cover
30-Jan-04	Jan-Semi	I	-24 C	5 Kts - NW	Clear	Bright	Medium	Low veg showing
31-Jan-04	Jan-Semi	I	-30 C	10 Kts - NE	Scattered	Bright	Medium	Low veg showing
4-Mar-04	Mar-Semi	I	-27 C	10 Kts - SE	Scattered	Bright	Medium	Low veg showing
5-Mar-04	Mar-Semi	I	-24 C	15 Kts - W	Overcast	Flat	Medium	Complete
6-Mar-04	Mar-Semi	I	-28 C	15 Kts - N	Overcast	Flat	Medium	Complete
1-Apr-04	Apr-Comp	I&II	-20 C	5 Kts - N	Broken	Bright	Medium	Complete
2-Apr-04	Apr-Comp	I&II	-18 C	10 Kts - N	Scattered	Bright	Medium	Complete
3-Apr-04	Apr-Comp	I&II	-9 C	10 Kts - N	Overcast	Flat	Medium	Low veg showing
4-Apr-04	Apr-Comp	I&II	-7 C	10 Kts - E	Broken	Bright	Medium	Complete
5-Apr-04	Apr-Comp	I&II	-5 C	5 Kts - E	Scattered	Bright	Medium	Complete
6-Apr-04	Apr-Comp	I&II	-5 C	Calm	Clear	Bright	High	Complete

APPENDIX B: Summary of surveillance activities and removals of bison from the Northwest Territories Bison Control Area Program (1988/89-2003/04).

	Aerial surveillance					
Year	Shoreline Patrols	Semi-Comprehensive Surveys	Comprehensive Surveys	Total Hours	Snow-mobile Ground Patrols	Bison Removals
1988 / 89	1					
1989 / 90	2					
1990 / 91	2					
1991 / 92		7				
1992 / 93			3			9[a]
1993 / 94	14[b]		1		23	
1994 / 95	10 (26)[c]	6 (94)	1 (34)	153	33	2[d]
1995 / 96	11 (35)	3 (48)	1 (41)	123		3[e]
1996 / 97	21 (62)	3 (45)	1 (46)	153		
1997 / 98	14 (43)	3 (46)	1 (48)	137		
1998 / 99	14 (43)	2 (30)	1 (45)	117		
1999 / 00	14 (42)	2 (28)	1 (46)	115		
2000 / 01	13 (40)	2 (30)	1 (50)	120		
2001 / 02	14 (42)	2 (29)	1 (42)	113		
2002 / 03	11 (25)	2 (22)	1 (40)	87		
2003 / 04	13 (31)	1 (11)	1 (37)	78		

[a] 17 May 1992: 7 bulls shot near Point de Roche
31 May 1992: 1 bull shot near Point de Roche (no lymph nodes collected)
Serological testing for Brucella was negative for all 9 bulls, no lesions consistent with tuberculosis observed on gross pathology or histopathology.

[b] Four patrols covered the Hay River area and extended inland to the northwest park boundary.

[c] Numbers in brackets represent survey hours(rounded off to the nearest hour).

[d] 8 March 1995, 1 cow shot by hunter along south shore of Mackenzie River. Cow had likely been wounded by wolves. Blood serum and retropharyngeal lymph nodes collected.
13 October 1994, prior to the surveillance season beginning, 1 bison shot by hunter near the eastern boundary of the BCA. Blood and tissue samples collected but no evidence of brucellosis or tuberculosis.

[e] 19 March 1996: 3 cows killed by hunter on the south shore of Mackenzie River. Blood serum (n=2) and retropharyngeal lymph nodes (n=3) collected. No serological reactors to brucella, and lymphatic tissue normal on gross examination.

APPENDIX C: Anik-info announcement aired from January 15, 2004 to June 01, 2004

Visual:

Script:

Bison populations in Wood Buffalo National Park and the adjacent Slave River Lowlands are infected with tuberculosis and brucellosis.

A buffer zone has been created to prevent contact between these diseased bison and the healthy bison in the Mackenzie and Nahanni ranges to the North.

The buffer zone lies south of the Mackenzie River to the Alberta border and between Trout River in the west and Buffalo River in the east.

All bison in the buffer zone are presumed to be disease carriers and must be removed for testing.

Motorist and hunters are requested to report any sightings of bison in the buffer zone to the nearest Resources, Wildlife and Economic Development Office.

Resident hunters may shoot bison in this area at any time.

Hunters are required to report kills as soon as possible.

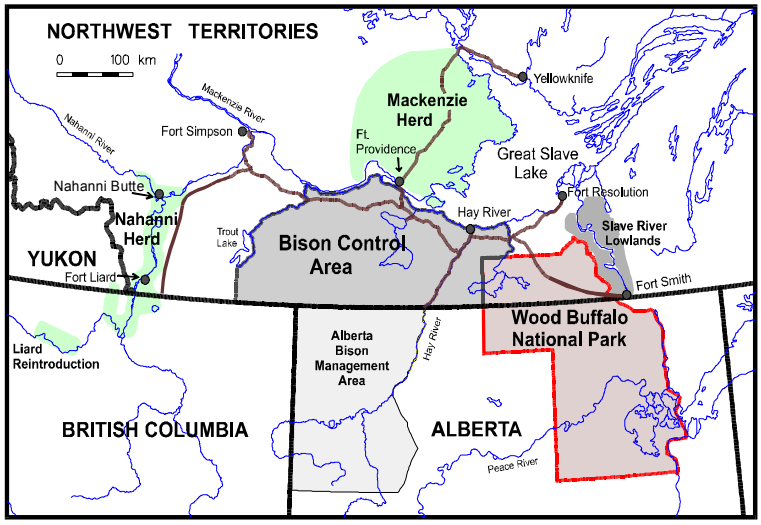
Public participation is an important part of the bison control program.

Please report all sightings.

APPENDIX D: Half page colour article published in the 2004 Explorer's Guide & UP HERE magazine.

IF YOU SEE A BISON In the Control Area...

Bison populations in the Slave River Lowlands and the Wood Buffalo National Park area are infected with bovine tuberculosis and brucellosis. In 1987, the Bison Control Area (BCA) was created to prevent the spread of these diseases to the healthy Mackenzie and Nahanni herds. The BCA program is jointly funded by the Department of Canadian Heritage and the Government of the Northwest Territories.



All bison in the BCA are presumed to be diseased and must be removed and tested.

In the Northwest Territories, two herds have been re-established and are disease-free. The Mackenzie herd numbers approximately 2000 animals, and represent the largest herd of healthy wood bison in Canada and a cornerstone in the nation's wood bison recovery program. The Nahanni herd now numbers about 150 animals.

Please report any bison sightings in the BCA as soon as possible to the nearest Resources, Wildlife and Economic Development (RWED) office.

Under the Northwest Territories Wildlife regulations, a resident may at anytime, hunt bison within the BCA. A hunter who kills a bison in the BCA is required to report the incident as soon as practical.

If you would like more information regarding the Bison Control Program, please contact any RWED office.

PHONE : Hay River (867) 874-6702 Fort Providence (867) 699-4271 Fort Liard (867) 770-4311
Fort Smith (867) 872-6400 Fort Simpson (867) 695-2231

APPENDIX E: Practices and protocols for shoreline patrol surveys to be reviewed prior to commencement of next surveillance season

Review of Shoreline Patrol Surveys

Prior to the commencement of the annual winter shoreline patrols, all pilots and observers must be informed about proper execution of these surveys, including a review of survey routes and optimal ground speed and elevation. An information session may be arranged at the beginning of the season to relay proposed plans or a memo that contains all pertinent info may be distributed to the participants.

Suggested Protocol

- During each survey flight a GPS (i.e. Map 76 Garmin) will be used for the duration of the entire flight to log the flight track. The BCA Technician or observers must manually log animal observations during the flight. All observers should be familiar with operation of the GPS unit.
- Once each survey is flown, the GPS unit will be connected to a computer and the track and waypoint files downloaded into Ozi-Explorer. The track file includes flight track, speed, altitude and duration of the flight, whereas the waypoint file includes locations of observations. The information from each patrol flight should be filed and kept on record by the BCA Technician to ensure consistency and accuracy in all aspects of the shoreline surveys.
- A digital camera should be taken on each flight to visually document conditions and occurrences (kill site, snow and ice conditions, etc…).
- A regular review of the hours for each shoreline patrol flight should be carried out as well. Hours flown per patrol flight serves as an index of survey effort. Review of hours will also indicate any residual flight time that may be used to

explore surrounding areas that bison may use, but are presently not surveyed.

If all these practices are followed correctly, sources of error in all aspects of the project should be reduced considerably and creation of a functional database that can be used confidently in future applications is possible.

APPENDIX F: Reported sighting of bison in the Bison Control Area

27 June 2004

- A Forestry crew observed a group of 3 to 4 bison on the south shore of the Mackenzie River, in the area east of Axe Point along the shoreline. Another small herd of bison were observed in the same area; these animals were seen swimming across the Mackenzie River towards the south shore but turned back around to the north shore, presumably due to the noise and presence of the helicopter.
- The crew also observed a large group of bison (*ca*.150 animals) along the southeast shore of Mills lake near the mouth of the Horn River. (Figure. 1)

05 July 2004

- Details of the sighting (by P. Kitchen and B. Fichter) were reported to the Bison Technician (T. Ellsworth) of the RWED Bison Program Fort Smith, NT. The initial course of action was to secure a fixed wing aircraft to survey the general area of the sighting. Sighting details were relayed to Ed Coulthard, (Manager, Warden & Technical Services, WBNP), along with a request to use a Big River Cessna 210 under WBNP's Standing Offer Agreement for reconnaissance survey. Coulthard granted the request for aircraft that day.

06 July 2004

- A reconnaissance flight with a Cessna 210 was scheduled for 0900h from Big River Air. Flight crew included: B. Buehler (Pilot), T. Ellsworth

(Navigator), W. Bidwell (Observer), and WBNP Warden, C. Zimmer (Observer).

- Flight Plan, survey crew and area to be surveyed were provided to Regional Fire Operations in Fort Smith prior to departure. Flight following was provided by RWED fire operations in Fort Smith, Hay River, and Fort Providence.

Route

We flew direct to Hay River (Airborne 09:20, Speed: 100 knots, Altitude: 336 m, winds 5-10kts @ 150 deg., Down YHY @10:15), refuelled and were airborne again at 11:00. The shoreline survey commenced at 11:04 near Hay River. We flew the shoreline to Mills Lake (arrived 11:45) and continued on to Axe Point and vicinity (Figure. 2). Mills Lake and vicinity was also flown. At 13:30 we were enroute to Fort Smith and arrived there at 14:55. We flew a reconnaissance flight of the area at an average speed of 110 knots and an average altitude of 380 m A.G.L.

Survey Results

We did not observe any bison or their sign (i.e. tracks and/or feeding craters) in the vicinity of Axe Point where the initial sightings were thought to be. Suitable bison habitats (sedge meadows) in this area were located on a map prior to departure and were surveyed during the flight. The area we surveyed east of Axe Point did not match any of the pictures that were provided in the original report. However, one of the pictures of bison near a camp did resemble that of the Horn River Camp, near the mouth of the Horn River (Figure. 3 & 4).

We concluded that there was some confusion in terms of the locations and areas where the initial sightings where made, and that the bison sightings were actually in the vicinity of the Horn River cabins (61.500338 N; 118.018117 W) (Table .1) and not Axe Point. Renewable Resource Officer E. Krutko of Fort Providence confirmed that the picture provided in the original report was in fact that of the Horn River Camp cabins.

We observed one large bison herd (est. 100-150 animals) near the southern shore of the lake during the flight, however this group was further south than the location where the crew observed a large herd. We concluded that the herd the forestry crew observed probably moved south along the shore of Mills Lake. Overall, no bison were observed in the BCA during the reconnaissance flight (Figure. 2, Table .1).

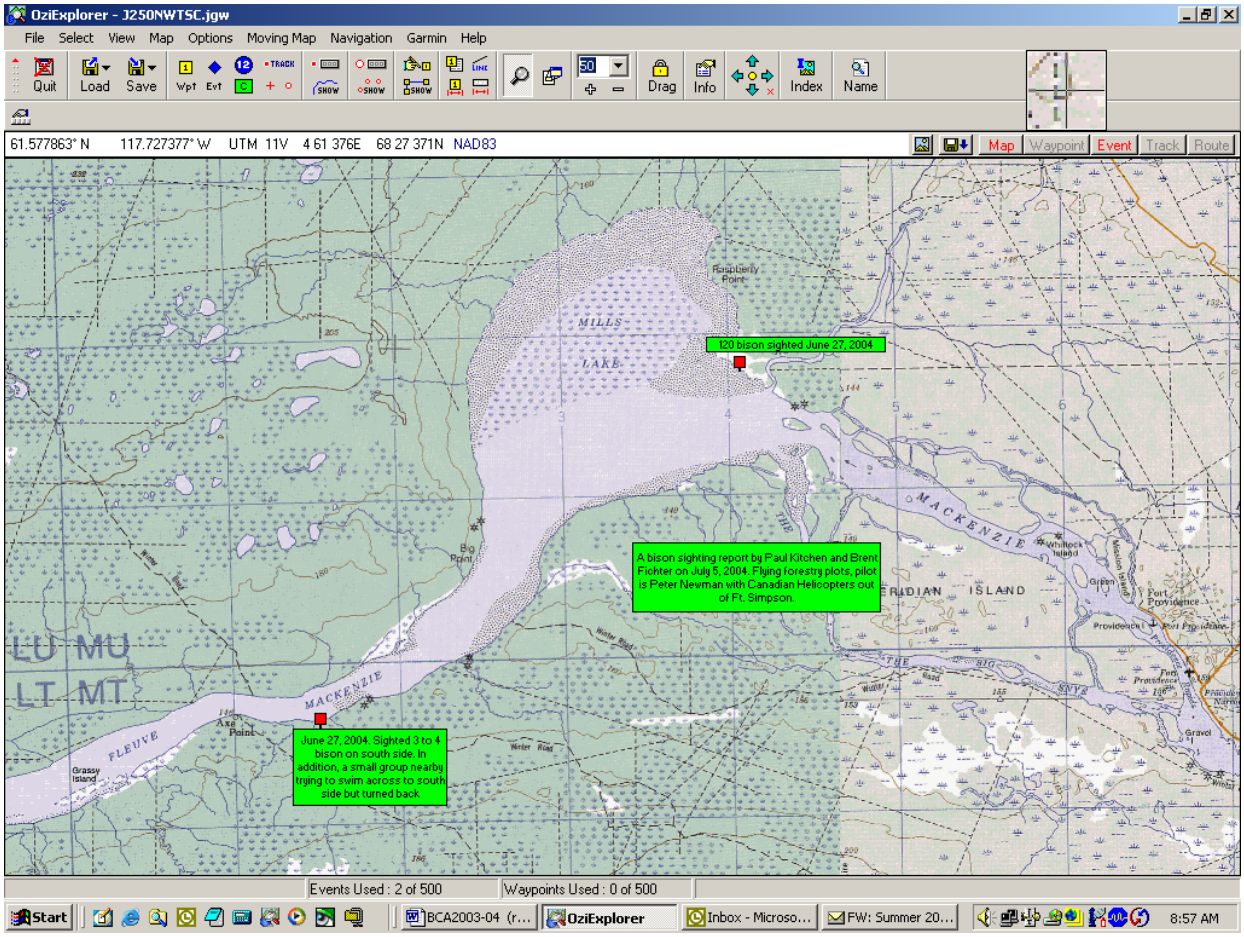


Figure 1. Map with locations of initial bison sightings observed by P. Kitchen and B. Fichter on 27 June, 2004.

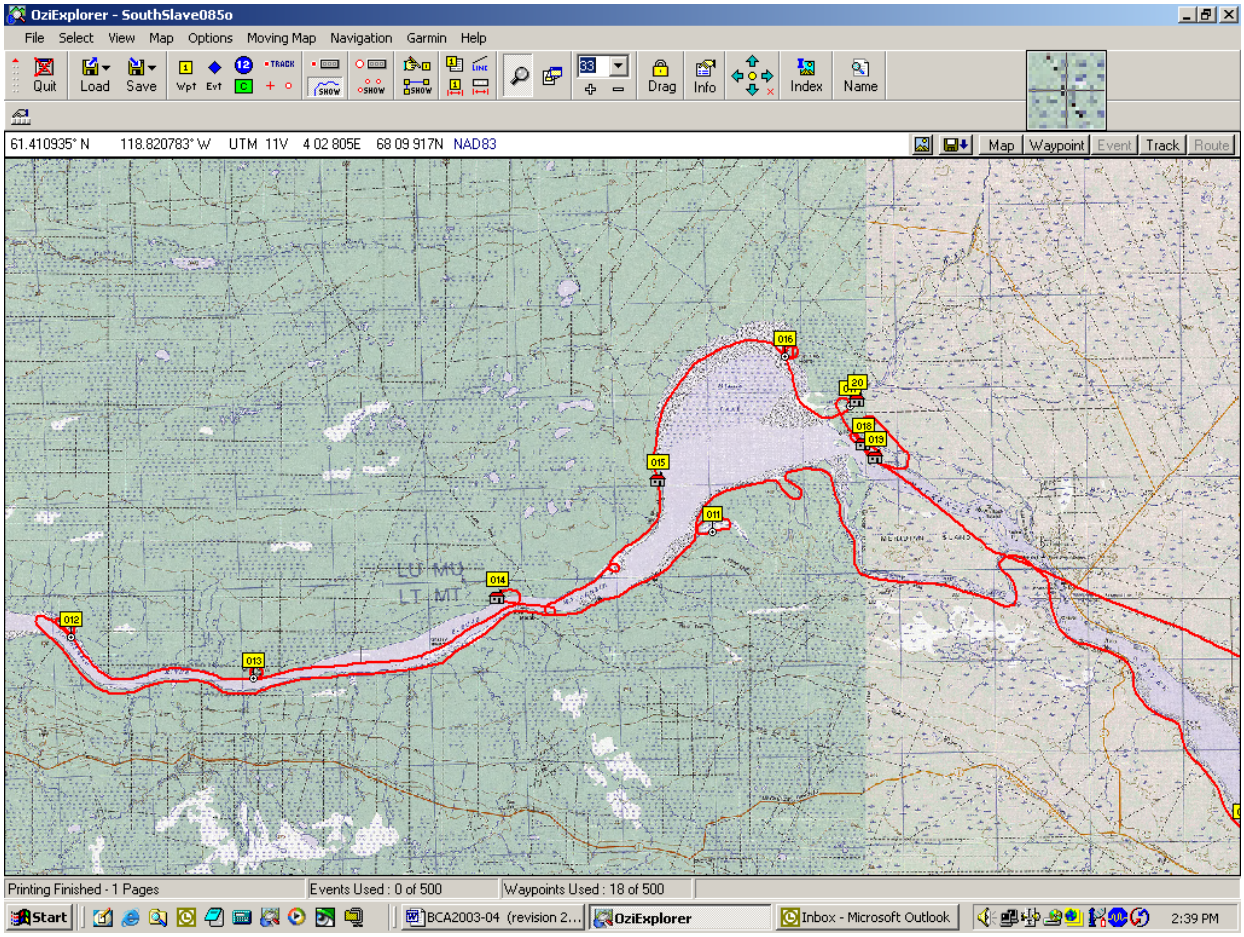


Figure 2. Map of areas searched during reconnaissance flight (flight track is shown in red).Yellow waypoints denote points of interest (tracks, cabins, etc…). See Table 1. for details of each waypoint.

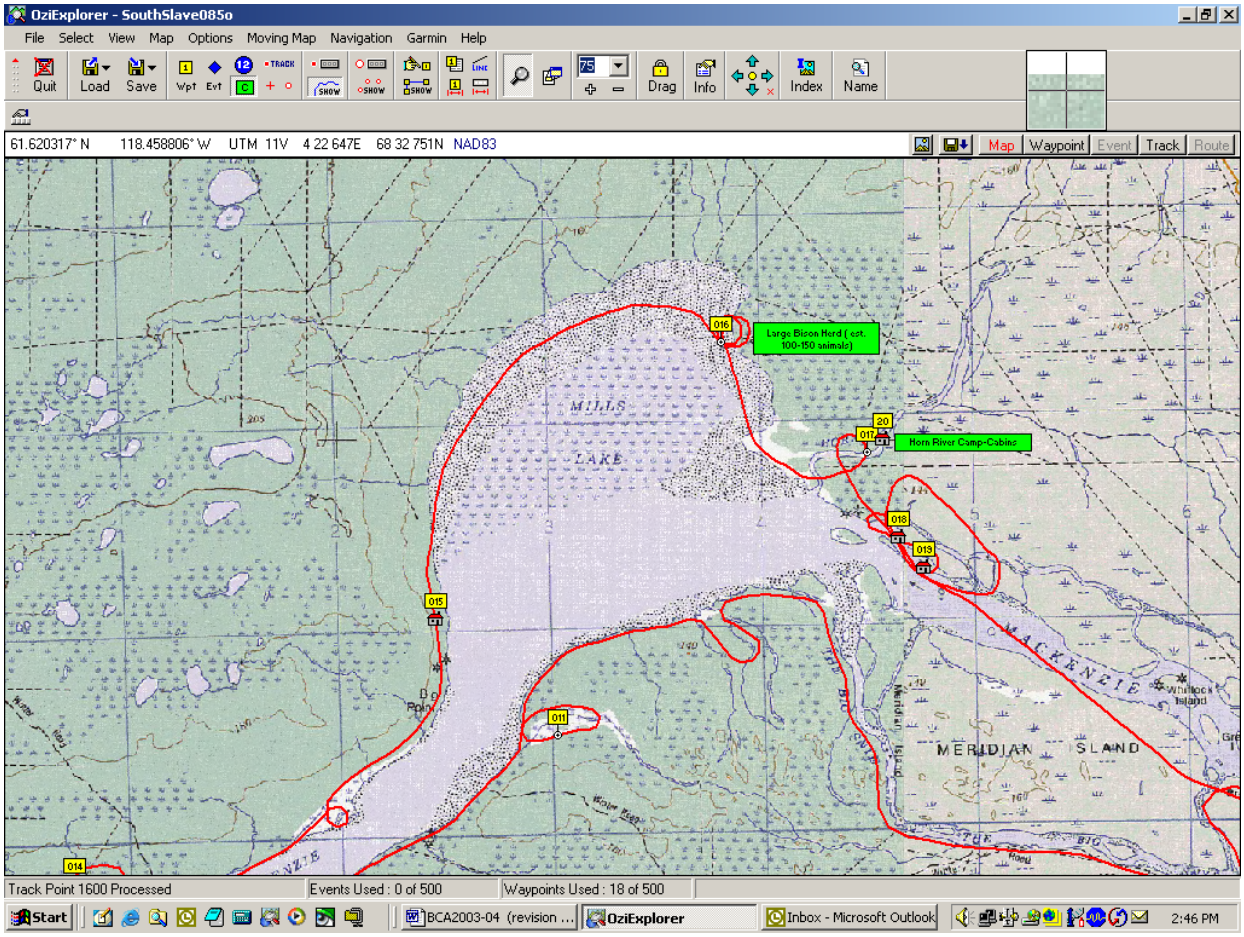


Figure 3. Map of Mills Lake area with track from reconnaissance flight and waypoints for Horn River Camp and the large herd spotted during the flight (See waypoints 20 and 16).

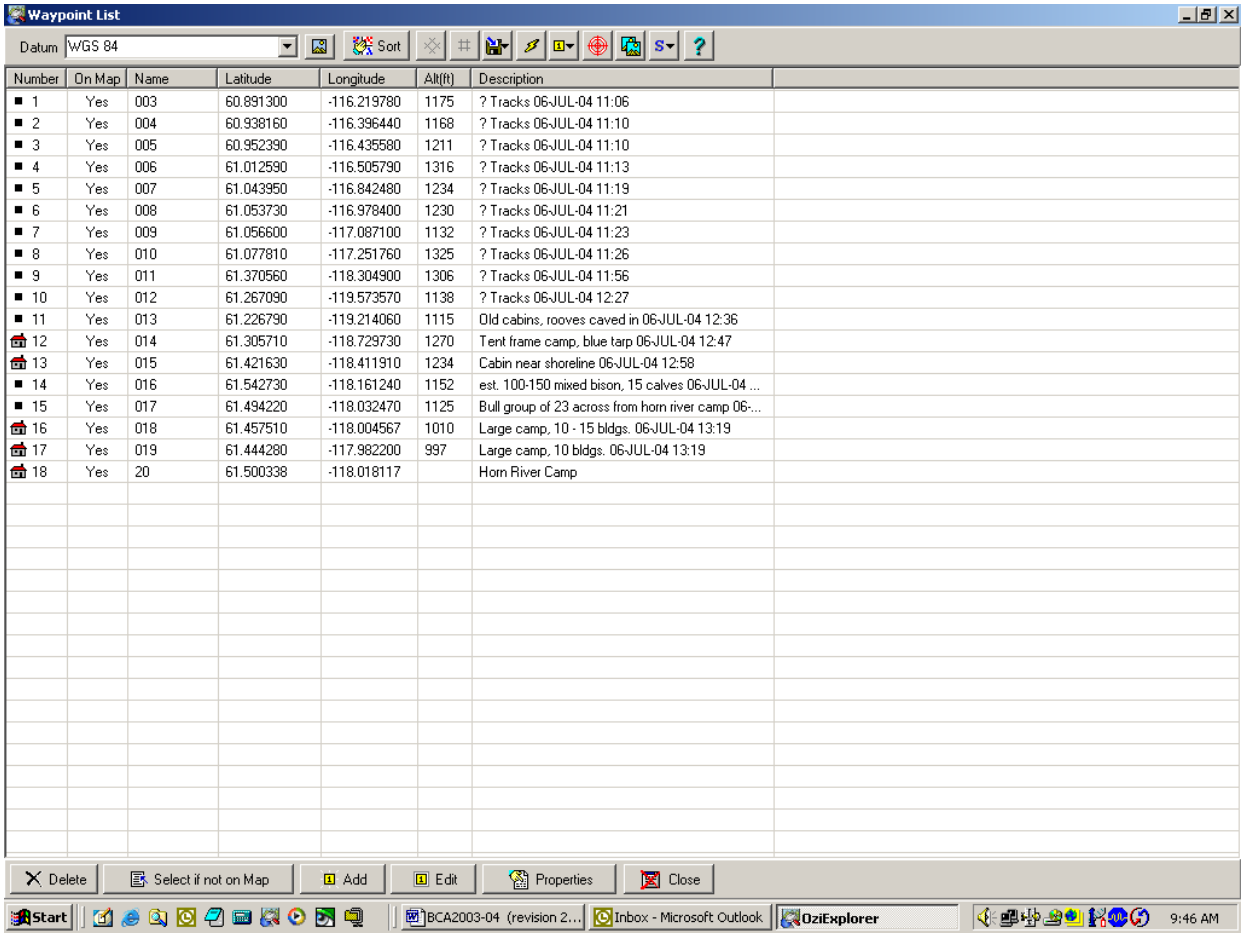


Table 1. Waypoint list for above maps (waypoint numbers on maps correspond to those numbers in the *Name* column).

Figure 4. The photograph of Horn River Camp provided by P. Kitchen and B. Fichter on 05 July , 2004.