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## Management Plan for Wood Bison in the Yukon

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IN THE YUKON**

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## 1.0 INTRODUCTION

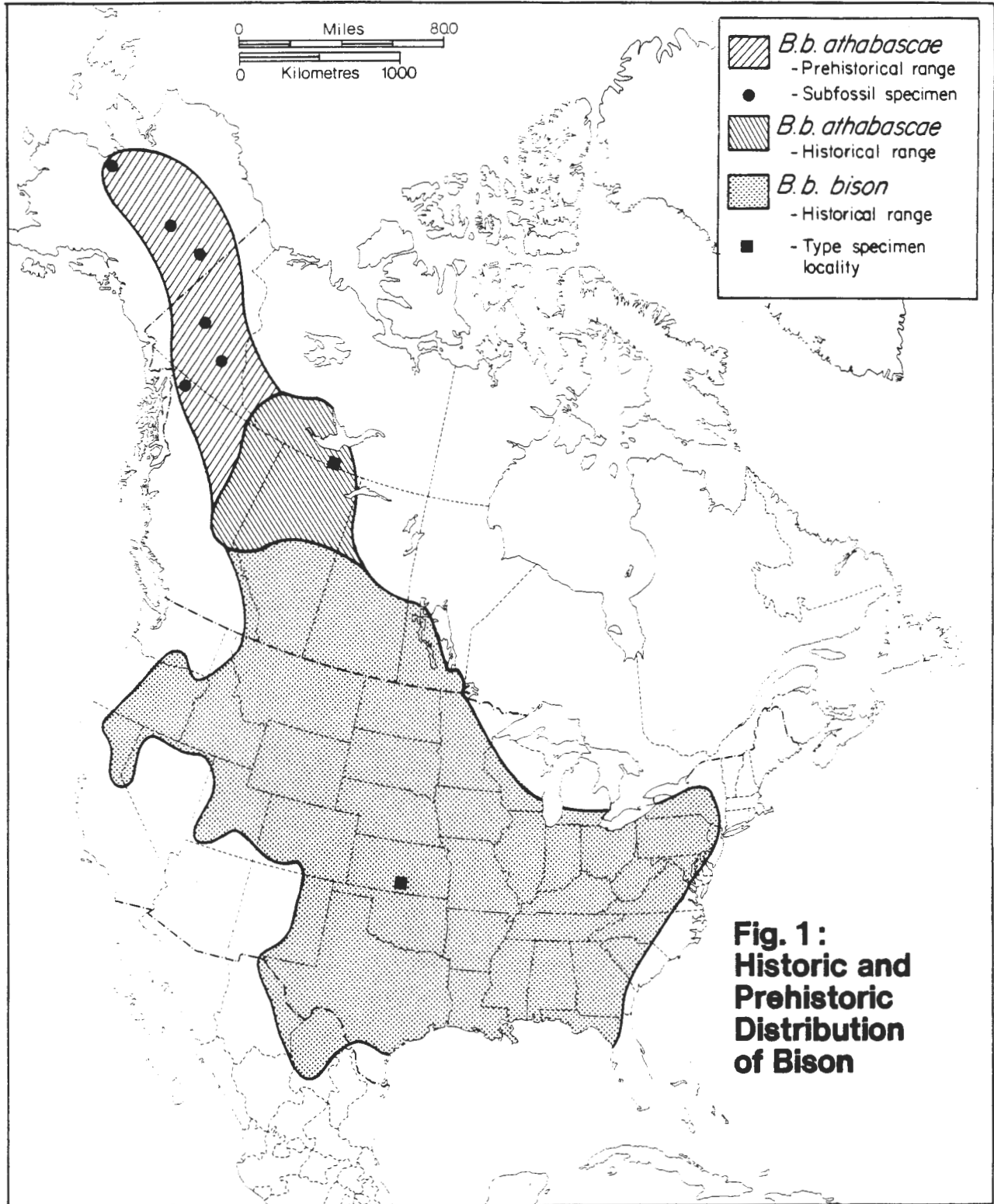
This management plan outlines how Yukon's commitment to the National Wood Bison Recovery efforts will be met. This document will remain flexible and will be subject to revisions as circumstances change.

Until recently, wood bison (Bison bison athabasca) have been classified by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as an endangered subspecies of the North American bison (Cook and Muir 1984), distinct from its close relative, the plains bison (B. bison bison). However, in April 1988, wood bison were downlisted from endangered to threatened by COSEWIC, based on the 1987 Status Report. Wood bison are also listed on Appendix I in the Convention on International Trade in Endangered Species (CITES), which restricts their international commercial trade. Current research on the systematics of North American bison has confirmed the validity of subspecific status for wood bison (van Zyll de Jong 1986). The Western Wildlife Directors support this scientific opinion and agree that wood bison and plains bison are to be treated as separate subspecies (Wood Bison Recovery Team 1987). The purpose of this report is to outline management objectives and the proposed methods for establishing a wild population of wood bison in the southwestern Yukon.

### 1.1 History

Historically, wood bison range was centered to the northwest of plains bison range and included the boreal forest regions of northern Alberta, southwestern Northwest Territories (NWT), northeastern British Columbia, and northwestern Saskatchewan (Fig. 1). Prehistorically, wood bison range extended further north and west to include north-central British Columbia, most of the Yukon Territory, and central Alaska from the southwest to the Bering Sea (Skinner and Kaisen 1947; van Zyll de Jong 1986). Wood bison declined throughout their range from an estimated 168,000 in 1800 to a low of about 250 by 1900. Severe winters and hunting may have contributed to the decline. Early conservation efforts included protection through legislation in 1877 and 1893 and the establishment of Wood Buffalo National Park (WBNP) in 1922. However, from 1925 to 1928, 6673 plains bison were introduced to WBNP from Wainwright, Alberta, resulting in hybridization with the 1500 to 2000 resident wood bison. Unfortunately the bovine diseases of tuberculosis and brucellosis were also introduced with the plains bison. By 1940, it was thought that wood bison had





**Fig. 1:**  
**Historic and**  
**Prehistoric**  
**Distribution**  
**of Bison**

become extinct through hybridization, but a small remnant herd was discovered in northwestern WBNP in 1957. From this stock, confirmed to be wood bison (Banfield and Novakowski 1960), 18 animals were transplanted to the Mackenzie Bison Sanctuary in 1963 to establish a wild herd. Another 24, apparently disease-free animals, were taken to Elk Island National Park in 1965 to establish a breeding herd for subsequent transplants. The numbers of wood bison in these herds now exceed 2000 and 300, respectively.

In 1975, a cooperative recovery program was formally initiated by federal, provincial, and territorial governments with the objective of reestablishing free-roaming herds of wood bison. The Canadian Wildlife Service (CWS) is coordinating this cooperative national program (Reynolds 1987;1988). Since 1978, transplants to establish wild herds were attempted in Jasper National Park and the Nahanni-Liard district of the NWT, and are underway in the Waterhen area of Manitoba, the Hay-Zama region of northwestern Alberta, and the Nisling River valley of the southwestern Yukon. In addition, captive breeding herds have been established in seven zoos and wildlife parks in Canada and the United States.

## 1.2 Background of the Yukon Project.

In 1980 the Yukon Government decided to participate in the Canadian wood bison recovery program. At the request of the Yukon Government, the CWS evaluated potential habitat areas for bison. Of 26 sites inspected in the Yukon, the Nisling River flood plain, located 80 km west of Carmacks, appeared to have the best potential (Reynolds et al. 1982a). Preliminary range assessment work estimated that 400 bison could be supported in that watershed (Reynolds et al. 1982b).

After site selection, a formal cooperative agreement between the Yukon Department of Renewable Resources, Yukon Fish and Wildlife Branch (YFWB) and Environment Canada, CWS was prepared and signed by the respective Ministers. The agreement outlined agency contributions as discussed in Section 3.1.

The YFWB and CWS agreed that a transplant could occur only if an enclosure were constructed to hold the breeding stock. Experience in other areas (Nahanni, Jasper) has indicated that bison, when released directly to the wild, often wander long distances from the release site. It was hoped

therefore that a holding corral will cause locally-born offspring to consider the site as home and remain in adjacent areas after release.

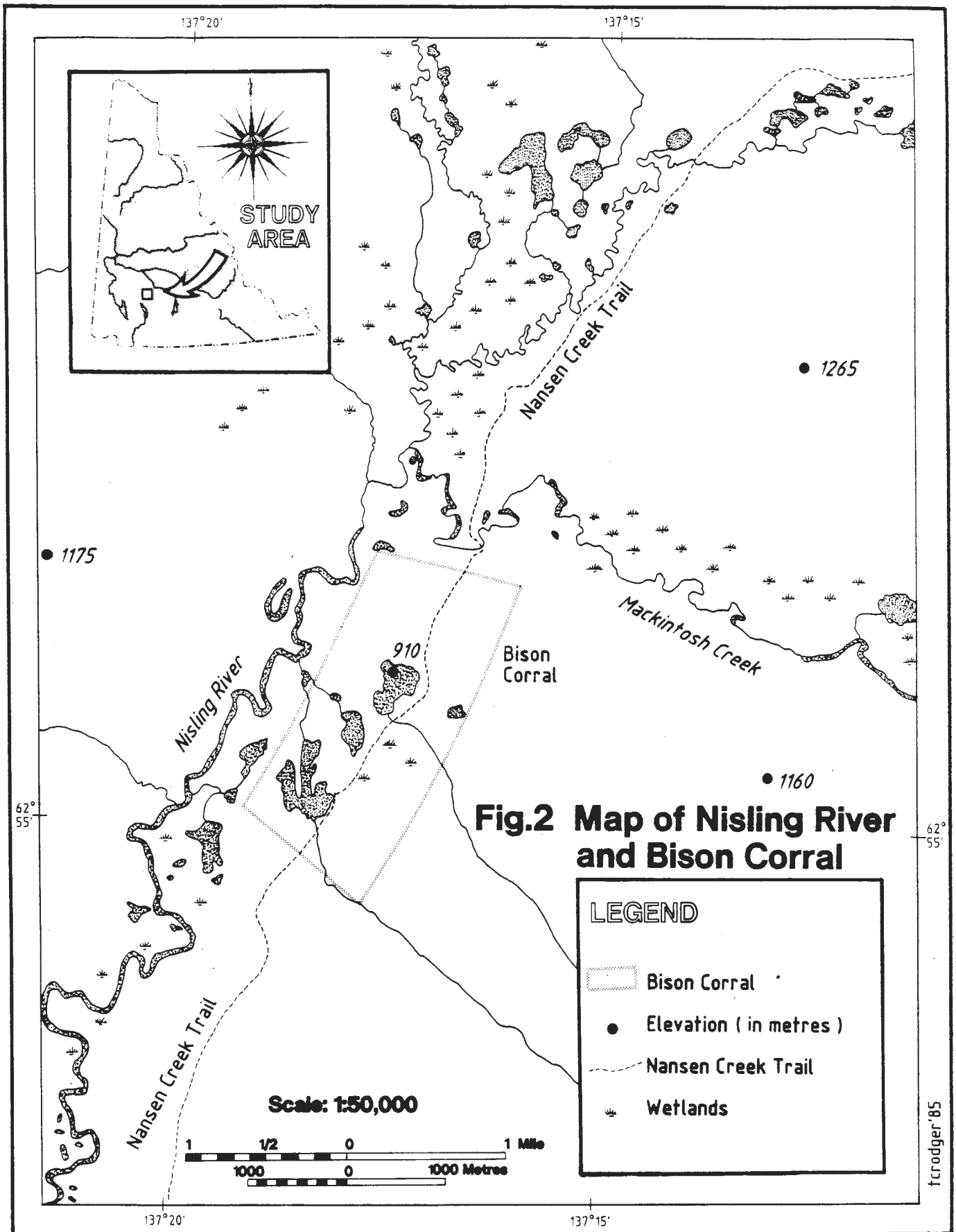
In 1984 and 1985, further vegetation analyses were carried out to assess the potential of the Nisling River Valley to support bison. Once building of the corral began, considerable construction problems were encountered because of discontinuous permafrost. With the help of many interest groups and funding agencies (Yukon Fish and Game Association, Katimavik, Environment 2000, New Employment Expansion Development Program) the fence for the 5 km<sup>2</sup> enclosure, 9.6 km in length, was completed in September 1985.

On 5 March 1986, the first phase of the project was completed with the arrival of 34 wood bison from Elk Island National Park. The transfer herd consisted of 19 females and 15 males, but no calves of the year. In May and June 1986, 11 calves were born, but in 1987 only one calf was born. During the spring of 1987, a female that was born in 1986 died from injuries reducing the population to 45. The wood bison were under continuous surveillance while in the enclosure and were provided with feed and minerals. The enclosure (Fig. 2) has the necessary habitat components essential for bison, however it cannot support 45 bison year round. Under terms of the cooperative agreement, the first release of bison, scheduled for spring 1988, occurred on 27 March when 21 bison were set free.

## 2.0 MANAGEMENT OBJECTIVES

### 2.1 To establish a viable, free-roaming population of wood bison (in excess of 200) in the Nisling River Watershed and adjacent areas.

A population goal of at least 200 has been chosen to compliment the criterion established by the Wood Bison Recovery Team in reference to the definition of a viable population (Wood Bison Recovery Team 1987). Presently, it is estimated that the Nisling River area can support about 400 wood bison, but the maximum carrying capacity may have to be adjusted as more information becomes available. Specifically, it may have to be refined when the distribution, dispersal, and range use patterns for locally released bison are known.



**Fig.2 Map of Nisling River and Bison Corral**

**LEGEND**

- ▭ Bison Corral
- Elevation ( in metres )
- - - Nansen Creek Trail
- ★ Wetlands

2.2 To contribute to Canada's wood bison rehabilitation effort, with the aim of downlisting and eventually removing wood bison from the endangered species list.

The Wood Bison Recovery Team (1987) specified the following downlisting criteria:

- (a) There must be at least three geographically separated, stable or increasing populations of wood bison;
- (b) the conservation of each population must be assured through formal legislation or by cooperative agreement;
- (c) there must not be any foreseeable threat to wood bison habitat at any of the five introduction sites; (Mackenzie Bison Sanctuary and Nahanni in the Northwest Territories, Hay-Zama Lakes region in Alberta, the Nisling River Valley in the Yukon, and the Waterhen Lake area in Manitoba); and,
- (d) populations of wood bison must be available to provide stock for reintroductions.

The Yukon project has contributed to the down-listing criteria through items (a) to (c).

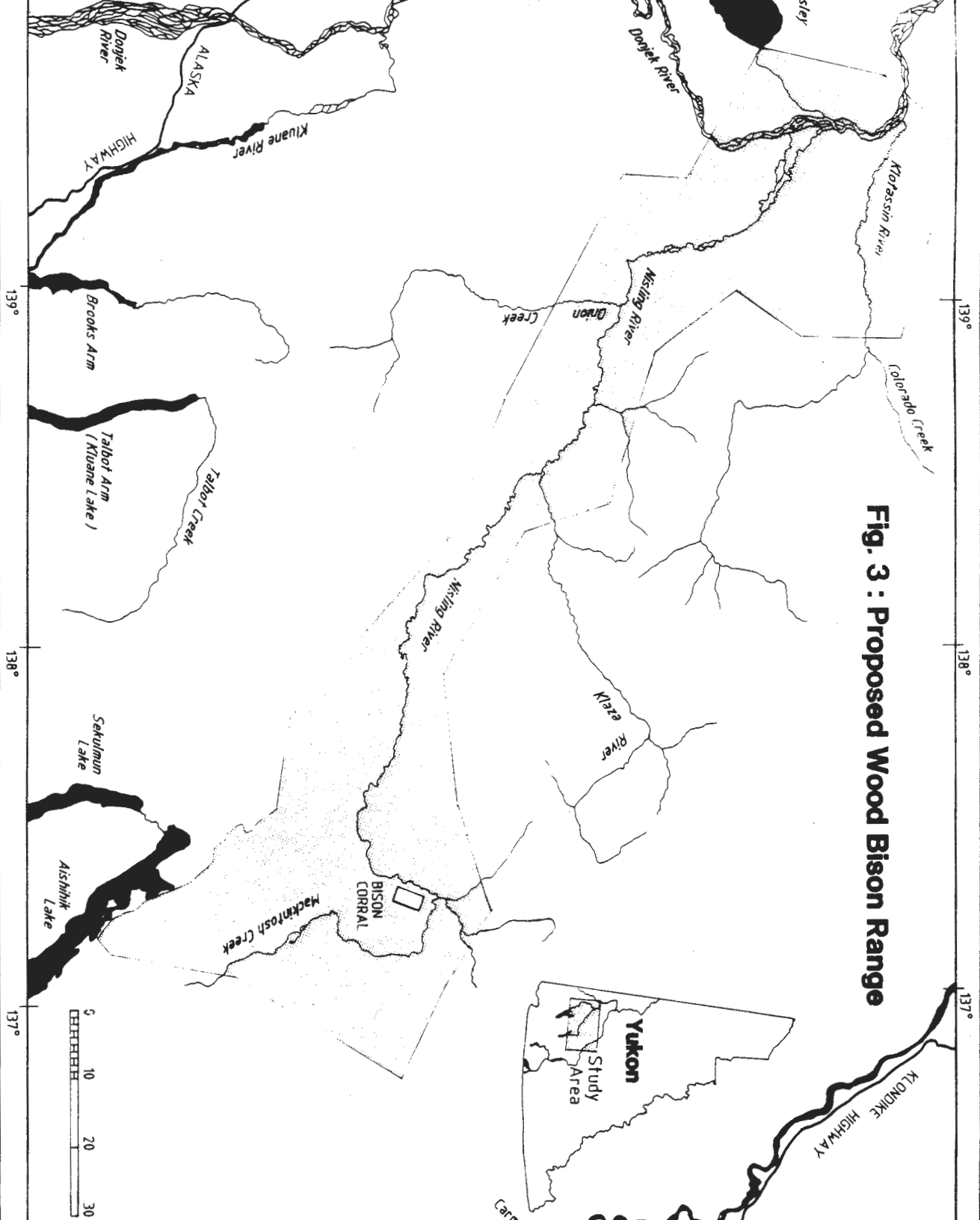
The following "delisting" criterion was developed by the Recovery Team:

"There must be at least four geographically separate populations in existence with a minimum of 200 bison in each, or four populations of at least equal biological viability. The sex ratio should be adequate to ensure genetic integrity and reproductive performance".

The population goal of at least 200 wood bison in the Nisling River watershed in the Yukon will contribute to the national delisting effort.

2.3 To manage the Nisling River Watershed and adjacent areas as Wood Bison Range.

Presently, the YFWB is planning to designate the Nisling River watershed as Wood Bison Range and is planning to declare it a special wildlife management area for inclusion in the Yukon catalogue of "key" wildlife habitats (Fig. 3). Land use activities that could negatively impact on the bison and their habitat will be regulated.



**Fig. 3 : Proposed Wood Bison Range**

2.4 To enrich the Yukon big game fauna through the introduction of an ungulate species filling a niche that is essentially unoccupied.

The preferred feeding sites for wood bison are sedge meadows and wet grass meadows - vegetation types rarely used by other grazing mammals in the Yukon. To a lesser extent, bison also feed on dry grassland sites. In other areas of the Yukon such sites may be used by elk (Cervus elaphus) or mule deer (Odocoileus hemionus); however, these species do not occur in the Nisling River watershed. In the future the range expansion of all three of these species will have to be monitored and managed to avoid conflicts.

2.5 To enhance the regional economic base through the introduction of a species with considerable economic potential.

The Yukon wood bison herd will be managed for consumptive and non-consumptive uses. This topic will be dealt with in more detail in Section 4.8.3, (Herd Management). Potential uses include: recreational and guided non-resident hunting, guided wildlife tours, research and educational opportunities, and source stock for other introductions in the Yukon, including game farming.

### 3.0 MANAGEMENT AUTHORITY AND COOPERATORS

#### 3.1 Principal Cooperators and Responsibilities

The wood bison reintroduction project is a cooperative effort, with the federal Department of Environment (CWS and the Canadian Parks Service (CPS)) and the Yukon Government (YFWB) being the principal contributors.

The project commenced in 1980 when a Yukon-wide reconnaissance of potential wood bison release sites and a detailed range assessment of the Nisling River area were conducted (Reynolds et al. 1982a, 1982b). A proposal recommending the introduction of wood bison to the Nisling River area in a cost-shared arrangement between CWS and YFWB was drafted (Reynolds 1982). The Nisling River area was considered to have the greatest potential. The proposal was accepted by the Yukon Government and was formalized in an agreement signed by the Federal Minister of the Environment and the Yukon Minister of Renewable Resources on 5 July 1984. Under terms of the cooperative agreement, the Yukon Government agreed to construct a 5-km<sup>2</sup> enclosure, a capture facility, and a temporary camp in a mutually selected site in the Nisling River drainage, to

provide winter access to the site and supplementary feed for the bison until release, and to take over monitoring of the herd once a wild herd became established. The Federal Government agreed to provide 34 disease-free wood bison and to arrange for transportation to the Nisling River enclosure. In addition, they agreed to equip 20 wood bison with radio transmitters prior to release and to monitor movements for one year post-release. The first release, originally scheduled for winter 1986/87, was delayed one year because of construction problems with the enclosure but was accomplished successfully in March 1988.

### 3.2 Other Cooperators

A number of other agencies also contributed to the project. Employment and Immigration Canada approved two applications for funding (New Employment Expansion Development Program and Environment 2000) which were used to pay salaries during the construction phase of the project. Native people in the Carmacks area were the main group of people hired under these programs. The Yukon Fish and Game Association contributed significantly to the project by arranging for the transportation of fencing material from Elk Island National Park to the enclosure site. In addition, they co-sponsored an Economic Development Agreement application to support a graduate student from the University of Calgary for a two-year project. Elk Island National Park (CPS) donated a portion of the fence wire which greatly reduced the cost of the enclosure construction. Financial assistance was also provided by the Yukon Outfitters Association and Safari Club International. Voluntary labour for fence construction was provided by the Katimavik organization. The magnitude of specific contributions are listed in Section 5.0, Project Costs.

### 3.3 Management Committee

Under the terms of the cooperative agreement between Canada and the Yukon, the Management Authority, comprised of the Wildlife Director, YFWB, and the Director, CWS Western and Northern Region, will jointly decide on a course of action. The Management Authority will meet at least once per year to review progress and approve plans for future years.

The Management Authority established a Technical Advisory Committee comprised of one representative from CWS and one from YFWB. The Technical Advisory Committee is to meet at least once a year, or as often as deemed necessary, to



discuss progress of the reintroduction project, to report results to the Management Authority, and to jointly prepare a management plan.

#### 4.0 MANAGEMENT CONSIDERATIONS

##### 4.1 Management Strategy

The Technical Advisory Committee recommends a progressive approach, where a specific population goal and a time frame in which to achieve it is identified as the management strategy. An extension of the cooperative agreement between YFWB and CWS is required. Because of the resources invested in this project to date (Section 5.0), particularly the high cost of establishing the bison enclosure, there is an obligation to see the project through to completion. The rather difficult problems being experienced in Alberta and Manitoba, and the possibility that neither of these attempts will result in establishment of a viable wild population, create additional pressure to continue the Yukon project. Before wood bison can be removed from the endangered species list, it will be necessary to establish at least one more population of 200 or more in the wild in Canada. The Yukon project offers the best opportunity to meet that objective, not only in a territorial context but also from a national perspective. Therefore, the Yukon Wood Bison Technical Advisory Committee endorses renewal of the cooperative agreement.

We have projected the growth of the Yukon Wood Bison herd over the next 5 years (Table 1), based on the assumption that the proposed progressive management approach is adopted. The population goal of 200 bison can be reached within a 5-year time frame if a number of assumptions are met.

The assumptions are that in March of 1990 and March of 1992, additional shipments of 25 bison each will be provided from Elk Island National Park. The sex ratios of these transferred animals will be approximately 50:50 and there will be at least 6 females of breeding age in each shipment. The bison born in Yukon will also have an even sex ratio. Productivity estimates are based on observations made in the Yukon to date, as well as in the MacKenzie Bison Sanctuary and in the Nahanni/Liard region of the N.W.T. where the other two wild, free-roaming herds of wood bison are found. We assume that females are four years old when they have their first calf, and that females only have

calves in alternate years during the first few years in Yukon. Subsequently, productivity, expressed here as number of calves born, divided by the total herd size, will gradually improve and will reach 20% in years 4 and 5 of the time period considered here. Lastly, an annual mortality rate of 5 to 6% is predicted. This is also a reasonable assumption since the average age of Yukon bison are relatively young, and a certain portion of the herd is maintained in the enclosure where they are kept under constant surveillance and a food supplement is provided. These factors are reflected in the population dynamics compilation of Table 1.

In summary, we believe that these assumptions are fairly conservative, and that the population goal of 200 can be reached by the 1993/94 fiscal year.

We have predicted the respective sizes of the captive and wild herds and have recommended the number and composition of bison to be annually released from the captive herd into the wild (Table 1). An attempt is being made to retain all wood bison transferred to the Yukon from Elk Island National Park, or from the Moose Jaw Wild Animal Park, for at least one year in the Nisling River enclosure. Further, it is recommended that, if a choice is possible, females with calves should be released, while females without calves should be retained, based on an assumed affinity to the calving area. Secondly, younger individuals should be released while older ones should be retained in the enclosure. Experience to date has shown that younger bison do not move as far as older ones after release from the enclosure. The projected costs of this management approach are listed in Section 5.2.

#### 4.2 Legal Status of Bison

Section 17(3) of the Yukon Act (federal legislation) permits the passage of laws in respect to Indians and Inuit and their hunting of wildlife that has been declared by Governor-In-Council to be in danger of becoming extinct. In the Yukon, Regulation number SOR/60-429 identifies bison (Bison bison), elk, deer (Odocoileus sp.), and muskox (Ovibos moschatus) as species in danger of becoming extinct. In addition, these species are declared "specially protected wildlife" in the Yukon Wildlife Act (Yukon legislation) and Section 12 of this Act prohibits any person from hunting these species except under specially issued provisions. To date (1989), provisions have not been enacted to allow hunting of bison in the Yukon.

Table 1: Projected population development of the Yukon Wood Bison Herd

Fiscal year: (April 1 to March 31 following)	Current		89/90	90/91	91/92	92/93	93/94	
	87/88	88/89						
Transplants of Bison to enclosure	0	<sup>a</sup> 56 59 } 10c	<sup>b</sup> 120 139 }	0	<sup>b</sup> 120 139 }	0	0	
Estimated calf production in captive herd	0	8	8	8	8	6	2	
Estimated size of captive herd before mortality and releases	86 169 }	24 120 209 8c }	40 200 269 8c }	54 200 269 8c }	41 140 199 8c }	42 130 219 8c }	20 30 119 6c }	7 10 49 2c }
Proposed annual releases from captive herd	120 99 }	21 40 79 8c }	19 60 89 5c }	19 60 89 5c }	30 120 109 8c }	26 100 89 9c }	14 20 69 6c }	7 10 49 2c }
Estimated calf production in wild herd	1c	2	2	10	18	30	43	
Estimated size of wild herd before mortality and before annual releases	110 99 1c }	21 120 99 2c }	23 190 229 2c }	41 190 229 2c }	67 240 339 10c }	110 430 499 18c }	158 620 669 30c }	21 760 869 43c }
Estimated total annual mortality	2	3c	5	7	10	11	12	

(continued)

Table 1 (continued)

Fiscal year: (April 1 to March 31 following)	Current						
	<u>87/88</u>	<u>88/89</u>	<u>89/90</u>	<u>90/91</u>	<u>91/92</u>	<u>92/93</u>	<u>93/94</u>
Estimated mortality rate (expressed as percent of animals lost in total herd size)	2/45 = 4.4%	3/60 = 5.0%	5/95 = 5.3%	7/108 = 6.5%	10/152 = 6.6%	11/178 = 6.2%	12/212 = 5.7%
Estimated production rate (number of calves born, expressed as percentage of total herd size)	1/45 = 2.2%	10/60 = 16.7%	10/95 = 10.5%	18/108 = 16.7%	26/152 = 17.1%	36/178 = 20.2%	45/212 = 21.2%
Estimated total Wood Bison population in both herds (after calving and including reduction through mortality)	43 (= 45-2)	60 (= 63-3)	90 (= 95-5)	101 (= 108-7)	142 (= 152-10)	167 (= 178-11)	200 (= 212-

<sup>a</sup> From Moose Jaw Wild Animal Park

<sup>b</sup> From Elk Island National Park

<sup>c</sup> c = calves

#### 4.3 Habitat Protection and Management Zone

The YFWB has filed a land reservation with the Lands Branch of Indian and Northern Affairs Canada for the wood bison enclosure, a 5 km<sup>2</sup> area in the Nisling River valley (Fig. 2). The entire Nisling River valley is Federal Crown land. Presently, no agriculture is practiced there nor are there any other land-use activities in the valley. Limited mining exploration occurs at the headwaters of some creeks in the Nisling watershed, but this activity is not expected to affect habitat for wood bison.

Subject to the establishment of a viable, free-roaming population of wood bison in the vicinity of the enclosure, the valleys of the Nisling River watershed and adjacent areas, including tributaries such as Mackintosh Creek, will be designated as "Yukon Wood Bison Range", and will be included in the Yukon catalogue of key wildlife habitats. A map of the proposed bison range, which has been filed with the Federal Lands Office for notation, is shown in Figure 3. Measures to protect this range from land-use activities that could adversely affect the wood bison will be implemented, in particular, no alienation of lands for agriculture or grazing will be permitted. The proposed boundaries are tentative and will be refined once the range requirements of the free-roaming herd are established.

#### 4.4 Policy Implementation

Threats of disease transmission and genetic contamination have been identified as potential limiting factors for other wood bison populations (Wood Bison Recovery Team 1987). To address these problems in the Yukon, the transferred herd of wood bison was tested for brucellosis and tuberculosis prior to import and was certified disease-free by Health of Animals Branch, Agriculture Canada. All other ungulates brought into the Yukon for release to the wild or for game farming will be required to undergo veterinary inspections. On 7 November 1985, the Minister of Renewable Resources issued a statement that permitted only wood bison to be imported to Yukon, thereby preventing the problem of hybridization with plains bison. The YFWB is developing a policy to prohibit importation of plains bison to the Yukon in line with the statement by the Minister which is to be part of the game farming strategy.

#### 4.5 Range Investigations

A number of studies have been undertaken to determine the suitability of the Nisling River area as habitat for wood bison, to predict carrying capacity,

and to assess habitat and forage needs of the bison. In 1980, a total of 26 potential wood bison release sites were evaluated as a result of an aerial reconnaissance survey (Reynolds et al. 1982a). The sites were assessed on the basis of size, vegetation, composition, access, and potential land-use conflicts. The Nisling river valley area was rated as having the best potential. Also in 1980, the Nisling River area range was assessed in considerable detail (Reynolds et al. 1982b). The project resulted in a description of the botanical composition of vegetation types, an estimate of annual herbage production, and an estimate of the carrying capacity of the Nisling River watershed for wood bison. The recommendations of this study were instrumental in obtaining approval for the transplant project and in selection of the site for an enclosure. Based on forage production only, it was estimated that the Nisling River area could support at least 400 wood bison (Reynolds et al. 1982b). During summer 1984, the Habitat and Research Section of the YFWB established a number of permanent transects, within and outside the bison enclosure; these are monitored annually. Transects have been established in sedge meadows, the vegetation type of greatest importance to bison for food. The objectives of this research are to assess the impact of bison on the vegetation and to evaluate preferential use of forage species.

Two university studies have been conducted on the Yukon wood bison project. Nicolas F. Mai completed a Master of Science thesis project under the supervision of Dr. A. Harestad, Simon Fraser University. This study determined the extent of potential range in the Nisling River valley for the wood bison and complemented previous work by Reynolds et al. (1982b). Mai (1987a,b) investigated three areas of the Nisling River watershed that contained large areas of sedge meadows, two of which had not been previously assessed. Based on a number of variables, Mai (1987b) estimated the carrying capacity of these three sites to range from 171 to 689 bison. The mean value (420) is similar to the estimate given by Reynolds et al. (1982b). The field work for another Master of Science project, carried out by Bruce Greenfield under the guidance of Dr. Valerius Geist, University of Calgary, was completed in October 1987. This research project included studies on the adaptation of wood bison to a new environment, daily activity rhythms, range use and forage selection patterns, and social behaviour. Forage plants were collected for chemical analyses to determine if the quality of native vegetation meets basic nutritional requirements of wood bison.

#### 4.6 Monitoring the Captive Herd

From March 1986 to March 1988, the introduced wood bison were maintained in the Nisling River enclosure and continuously monitored. A caretaker was on site and performed the following tasks: fence maintenance, supplementary feeding in winter, provision of mineral blocks, periodically counting bison to determine calf production and mortality, and monitoring predator activities in the area. Wherever possible, the caretaker role was performed by graduate students in addition to their research investigations. During the winters of 1987/88 and 1988/89, a field camp manager was hired by the YFWB. This practice will continue each year if financially possible.

#### 4.7 Method of Introduction

Based on experience gained from other bison transplants, the Yukon project was planned with the intent to provide the greatest probability of success. A 5 km<sup>2</sup> enclosure was established so that the introduced bison could become familiar with their new environment prior to release to the wild. The immediate release of bison to the wild without temporary holding has caused problems in other reintroduction projects because released bison dispersed widely and often ended up in areas of land-use conflicts.

##### 4.7.1 **Release Strategies**

###### 4.7.1.1 First Release

The transferred herd of wood bison was maintained in a 5 km<sup>2</sup> enclosure from March 1986 to March 1988 to pre-condition them to the new environment. This strategy was decided on because other transplants, in which animals were released immediately, have not always been successful. Bison are gregarious animals that live in herds. This type of behaviour may be the influencing factor determining whether or not the bison will stay in the selected area or whether they will disperse to undesirable areas where land-use conflicts could develop.

In general, older animals are more likely to disperse than younger ones while animals born on site are the least likely to disperse. Mature females appear to be herd leaders and may influence other herd members. Mature bulls may also disperse, but this is a natural behavioural trait. Older males often remain alone most of their lives except during the rutting season when they

join the mixed herds. If they move out of the area, it is unlikely that they will take female groups with them.

A release strategy should take into account behavioural characteristics, as well as other biological and economic considerations. Roundups and handling can be traumatic and stressful experiences for bison, and compromises may have to be made to avoid injuries or fatalities to bison and people handling them. Many release strategies are possible; however, the following guidelines are recommended for the Yukon project, keeping in mind that detailed implementation is not always possible:

- 1) The selection of younger animals to enhance the likelihood of them staying in the area;
- 2) The release of at least 20 animals with as high a percentage of females as possible to increase the probability of establishing a viable wild herd for the first release;
- 3) The selection of unrelated animals for the release herd to enhance genetic diversity;
- 4) The selection of a maximum number of bison for release to protect the habitat within the enclosure and to reduce the cost of supplementary feeding in winter.

The first release to the wild occurred on 27 March 1988. Nine animals that were born in the enclosure in 1986 (5 males, 4 females), nine four-year old bison (4 males, 5 females), three 5-year old males, and one male calf that was born in 1987, for a total of 22 wood bison, were released. The twenty bison retained in the enclosure included 15 females of breeding age plus 5 males from three to six years of age. After one week, a two-year old male arrived at the compound from the release herd and was returned to the captive herd.

The inclusion of three mature bulls in the group that was released to the wild was based on the following considerations: 1) these bulls were surplus to the breeding requirement for the herd in the enclosure; however, they could be important to the breeding component of the release group; 2) release of extra animals will reduce the costs of supplementary feeding; and 3) mature bulls, if they remain with the release herd, could provide protection from predators and leadership to younger animals. Should these bulls move out of the area, their loss would not be critical to the viability of the release project.



#### 4.7.1.2 Subsequent Releases

Assuming that the released bison remain in the vicinity of the enclosure, or in the Nisling River watershed and adjacent area in general, supplementary releases should take place every year afterward for a 5-year period. Additional releases will depend on the final management objective for the captive herd, the fate of the bison released to the wild, and the possibility and timing of additional transfers from Elk Island National Park or from other herds of wood bison. The Yukon Technical Advisory Committee recommends that 15 to 25 bison be released annually from the enclosure over the next five years (March 1989 to March 1993) as outlined in Table 1.

To increase the genetic variability of the wild herd and to accelerate its growth, two additional transplants to the enclosure are recommended (March 1990 and March 1992) as well as an additional 10 calves from Moose Jaw Wild Animal Park in March 1989. The genetic makeup of the Yukon wood bison is rather homogeneous, originating from the offspring of 21 animals brought to Elk Island National Park in 1965. The greatest beneficial effects would be achieved by using stock from the Mackenzie Bison Sanctuary, which are animals derived from a different parental stock and which have adapted to northern environmental conditions. At this time, capture facilities have not been established there and transplants from the MacKenzie Sanctuary herd are not envisioned within the next five years.

### 4.8 Management of the Wild Herd

#### 4.8.1 **Monitoring**

Twenty of the wood bison released in March 1988 were equipped with radio transmitters, including "mortality sensors" to assist in determining whether mortalities occur, and if so, the probable causes. Movements will be monitored through regular aerial surveys. Reconnaissance flights will be frequent immediately after release or when the herd is on the move. Flights will be less frequent once the herd settles down and becomes sedentary. Continuation of regular aerial monitoring surveys is recommended following additional releases from the enclosure.

#### 4.8.2 **Limiting Factors**

The following limiting factors have been identified in the Wood Bison Status Report regarding the recovery of wood bison in Canada: diseases, genetic

contamination, predation, range quantity and quality, land-use conflicts, competition with other wildlife, and losses through poaching (Wood Bison Recovery Team 1987). These factors are briefly discussed in relation to the Yukon project.

#### 4.8.2.1 Disease

Disease is not to be considered a potential limiting factor in the Yukon. Wood bison imported to the Yukon are certified disease-free by Health of Animals Branch, Agriculture Canada. Any wildlife imported to Yukon in the future, either for release or for game ranching, will have to be tested for tuberculosis and brucellosis and inspected by Health of Animals Branch prior to transfer. Infectious diseases that could be transmitted to the wood bison have not been observed in indigenous wildlife or in domestic animals presently in the Yukon.

#### 4.8.2.2 Genetic Contamination

Genetic contamination through cross-breeding with plains or hybrid bison is not considered to be a potential limiting factor in the Yukon. Presently, there are no other bison in the Yukon and future imports are restricted to wood bison under a Ministerial Order. The closest plains bison populations are located near Delta Junction, Alaska and Pink Mountain, B.C., 500 and 850km from the Nisling River area, respectively. Genetic mixing of these herds with Nisling River wood bison in the Yukon is unlikely.

#### 4.8.2.3 Predation

The degree of predation on bison populations varies. In the Mackenzie Bison Sanctuary herd, which now has expanded to in excess of 2000 wood bison, predation has not been a problem. Contrarily, the hybrid bison populations in Wood Buffalo National Park and in the Slave River lowlands have been detrimentally affected by wolf predation (Van Camp 1987). Some experts assume that this difference is based on evolution of predator/prey systems. A regional wolf population has evolved in association with local prey species over thousands of years, and predation strategies that have developed are aimed at local ungulate species. The use of a newly introduced prey species into the system will take time, particularly when traditional prey species still exist in the area. Development of new predation strategies based on a slow learning process through trial and error may be required. For these

reasons, it is anticipated that wolf predation will not be a factor in the establishment of a viable wild herd of wood bison in the Nisling River valley, at least not initially. On the other hand, should wolf predation become a factor and threaten the establishment of a viable wild herd of wood bison, selected predator control must be considered immediately. Grizzly and black bears are known to prey on bison, particularly calves, but their potential impact is not considered to be a serious threat at present.

#### 4.8.2.4 Quantity and Quality of Range

Range quantity in the Nisling River valley has been assessed while quality analyses are still in progress. Two independent projects estimated carrying capacity of bison in the Nisling River area at approximately 400 bison, based on habitat quantity (Reynolds et al. 1982b; Mai 1987b). Nutritional quality is presently being assessed in cooperation with the University of Calgary. Deficiencies in range quality are not anticipated because other wildlife, including a small number of plains bison introduced in 1954, survived in the area for many years. In addition, free-roaming horses have survived in the Aishihik region since the turn of the century.

#### 4.8.2.5 Land-Use Conflicts

The only other land-use in the Nisling River watershed, at present, is mining in the headwaters of some of the tributary creeks as well as on the surrounding mountains. However, these areas are not considered to be potential wood bison habitat. Within the designated Wood Bison Range in the Nisling River Watershed and adjacent areas, key habitats such as sedge meadows or sedge/shrub communities will be identified. Special protective measures will be implemented to protect these key wildlife areas, in particular, land alienation for grazing and agriculture will not be permitted. Other land-use activities will be regulated to prevent any detrimental effects on bison and their habitat.

#### 4.8.2.6 Competition with Other Wildlife

The primary wood bison feeding areas in the Nisling River valley, the wet-sedge meadows and sedge/shrub associations, are not being heavily used by other wildlife species. Grazing ungulates such as elk or mule deer are not found in the Nisling River watershed. Competition with other wildlife is not deemed to be a limiting factor to the establishment of a viable wood bison

population. Similarly, establishment of a wood bison herd is not assumed to negatively impact on other big game species in this area.

#### 4.8.2.7 Illegal Killing

Wood bison are declared as specially protected wildlife in the Yukon Wildlife Act (Yukon legislation) and are listed as endangered wildlife in the Yukon Act (federal legislation). Wood bison cannot be legally hunted by anyone in the Yukon. The high profile of this conservation project combined with appropriate public relations efforts make it unlikely that poaching will become a problem. The isolated and relatively inaccessible location imposes an additional restriction on potential poachers.

### 4.8.3 Herd Management

#### 4.8.3.1 Wild Herd

The management goal is to establish a viable, free-roaming herd of more than 200 wood bison, with an estimated maximum of 400 bison, in the Nisling River watershed and adjacent areas. As additional information becomes available, it may be necessary to refine the population goal according to carrying capacity of the range. Under optimum conditions of growth, as observed in the Mackenzie Bison Sanctuary with annual increments of 22%, the Yukon herd could reach the estimated carrying capacity of 400 animals in 10 years. However, it is likely more realistic to predict a slower growth based on reproductive problems observed in 1987. Growth of the Yukon herd could be enhanced by supplementing it with additional transplants. Proposed additional transfers of 40 to 50 bison would not only greatly reduce the time required to achieve the population goal, but would increase the genetic variability in the herd.

The Nisling bison herd will be managed for consumptive and non-consumptive uses. A limited amount of hunting may be permitted prior to the herd reaching carrying capacity, but this would be strictly regulated and limited to bulls. Bison are particularly suited for non-consumptive activities such as wildlife viewing and photography because they are the largest terrestrial mammal in North America, and tend to occupy open habitat types.

The Nisling River has the potential to become one of the better wildlife viewing corridors in the Yukon because the viewing opportunities for wood

bison are also enhanced by the presence of Dall sheep (Ovis dalli), moose (Alces alces) and sharp-tailed grouse (Tedioecetes phasianellus) in the area.

#### 4.8.3.2 Captive Herd

Maintenance of a captive herd is recommended for at least 5 more years, subject to additional transplants of wood bison from Elk Island National Park, Moose Jaw Wild Animal Park, or the Mackenzie Bison Sanctuary, and to release approximately 15 to 25 bison to the wild annually. The captive herd will serve several purposes.

Initially, the captive herd will provide a backup for establishment of the wild herd. Productivity in the wild herd may not be as high as expected, predation may become a problem, bison may disperse into areas where they are not wanted, or survival may be low. The chances of establishing a wild herd could be greatly enhanced with additional annual releases over a 5-year period.

The YFWB may decide in the future that the success of the Nisling wood bison project justifies establishment of other herds in Yukon. The existence of the captive herd and a handling facility in the Nisling River valley renders the establishment of other herds relatively inexpensive.

The YFWB may decide that game ranching of wood bison should be allowed in the Yukon and support such an initiative by providing breeding stock. Existence of the captive herd and the capture facility at the Nisling River would make such a plan easier to implement.

The captive herd could serve as a focal point for such non-consumptive uses as wildlife viewing, wildlife photography, scientific investigations, and guided tours for students and sightseers.

#### 4.9 Native Involvement

The Carmacks Indian Band is interested in the wood bison project. Band members have worked on the project, particularly during construction of the enclosure fence and capture facilities. Their involvement should continue whenever possible. The Carmacks Band could benefit from the wood bison project in several ways.

In terms of consumptive use, when a bull harvest can be permitted the quota could be split 50:50 between resident hunters and the Carmacks Band. The Band could be given permission to sell their hunts to non-resident hunters with Band members serving as guides. The hunter could take the trophy (skull and hide) and leave the meat with the Band. Currently, bison hunts south of the Canadian border sell for \$3,000 to \$4,000 U.S. In Manitoba, a similar management objective exists for the Waterhen wood bison project, in cooperation with the local Indian Band.

In terms of non-consumptive use, the Band could conduct wildlife viewing and interpretation tours along the Nisling River. The wood bison would be the main feature of the tours, which would also include viewing opportunities for a number of other wildlife species. The camp facility at the enclosure could be improved to include an interpretive centre.

#### 4.10 Future Studies

The most obvious task is to monitor the performance and movement of released bison. If problems arise such as continued low rate of reproduction, specific studies will have to be conducted to address the problems.

As a result of range assessments and feeding preference determination, a range improvement study is being proposed. Much of the lowlands along the Nisling River are covered by "buckbrush" communities (Betula glandulosa). The buckbrush vegetation is used little by the wood bison. In addition, small amounts of forage grow in association with the buckbrush. However, where the shrub cover is removed, for example, along fence lines or winter roads, the succeeding vegetation consists largely of sedges and grasses. These sites tend to be heavily used by the bison, particularly in early spring when greenup occurs first at these sites. It would appear that regeneration of the buckbrush is extremely slow or non-existent. Winter roads in the area have existed for more than 20 years and revegetation by buckbrush has not occurred. If an inexpensive method can be used to remove the buckbrush, the grazing area for bison could be greatly enlarged, thereby increasing the carrying capacity of the Nisling River watershed. Techniques such as mechanical removal and prescribed burning should be investigated to determine if buckbrush can be removed relatively inexpensively on a large scale.

#### 4.11 Extension of Cooperative Agreement

The cooperative agreement between the Yukon Government (YFWB) and the Federal Department of Environment (CWS), which expired 31 March 1988, should be renewed. Under terms of the extended agreement, CWS will provide two more shipments of bison from Elk Island National Park, one in March 1990 and another in March 1992, will provide radio transmitters for released bison and will assist with the monitoring of released bison (Section 5.2). YFWB will be responsible for maintenance of the captive herd and assist with monitoring of the released bison. At the end of the extension period, terminating on 31 March 1994, YFWB will take over sole responsibility for the bison herd. By that time, the wild herd should have increased to about 200, thereby fulfilling the objective of the Yukon project and the Canadian Wood Bison Recovery Plan. Extension of the agreement will require annual financial contributions similar to those of the 1987/88 and 1988/89 fiscal years. To lower the financial commitments by the two cooperating governments, it is recommended to solicit external support for this project from such funding programs as RENEW.

### 5.0 PROJECT COSTS

#### 5.1 Expenditures during the period 1983/84 to 1988/89

The project has been more expensive than initially estimated. Major problems were encountered with fence construction, particularly the drilling of fence post holes, because much of the area is underlain by permafrost and coarse gravel. Expenditures up to and including all of the 1988/89 fiscal year have exceeded one-half million dollars (Table 2). The total project cost, of which the Yukon Government contributed about two-thirds, is likely an underestimation because of several indirect contributions. For example, several kilometres of surplus, used fence wire were donated by Elk Island National Park, two graduate students worked on the project with support from outside funding agencies and universities, and habitat work that is carried out annually is provided for in the budget of the vegetation specialist in the YFWB. Therefore, it is likely that more than 600 thousand dollars have been invested in the project, a financial commitment of considerable magnitude. It is with this investment in mind that a number of recommendations have been made, such as retention of the captive herd, additional transplants under a renewed cooperative agreement, and predator control, if required, to ensure the success of this cooperative project.

Table 2. Expenditures and contributing agencies for the Yukon wood bison project from 1983/84 to 1988/89.

Year	Contributors	Amount (thousand \$)
1983/84	Yukon Government	53.0
	N.E.E.D. (Environment and Immigration Commission)	<u>27.0</u>
	<b>Sub Total</b>	<u>80.0</u>
1984/85	Yukon Government	125.9
	Environment Canada (Environment 2000 Program)	45.9
	Yukon Outfitters Association	1.0
	Safari Club International	0.5
	Canadian Wildlife Service (fence wire)	49.0
	Yukon Fish and Game Association	<u>10.0</u>
	Elk Island National Park (used fence wire)	N.C.
<b>Sub Total</b>	<u>232.3</u>	
1985/86	Yukon Government	38.0
	Canadian Wildlife Service (Transfer wood bison)	8.0
	<b>Sub Total</b>	<u>46.0</u>
1986/87	Yukon Government (O & M)	19.0
	Yukon Government (Capital)	54.5
	Economic Development Agreement	<u>10.0</u>
	<b>Sub Total</b>	<u>83.5</u>
1987/88	Yukon Government	30.8
	Safari Club International	5.0
	Economic Development Program	10.0
	Canadian Wildlife Service (transmitters, helicopter transportation)	<u>7.0</u>
	<b>Sub Total</b>	<u>52.8</u>
1988/89	Canadian Wildlife Service (monitoring)	12.5
	Yukon Government (hay and manager)	<u>33.5</u>
	<b>Sub Total</b>	<u>46.0</u>
<b>6-YEAR TOTAL</b>		<b>540.6M</b>



## 5.2 Estimated future costs of the project for the period 1989/90 to 1993/94

The management provision outlined in this plan, including two additional shipments of bison and the monitoring of released animals, will require about \$50,000 per year. This is similar to the amounts the Yukon Government (35 to 40 K) and C.W.S. (12 K) have contributed to this cooperative project during the last two fiscal years (1987/88 & 1988/89). In Table 3 we have summarized the annual estimated costs over the next 5 years, a breakdown of the costs, and a recommended cost-sharing between the two parties. This proposal is only a guideline, since it is realized that neither party can commit itself to specific annual contributions 5 years ahead of time. Every annual budget will have to go through the regular approval process.

The Technical Committee further recommends that every effort should be made by both government agencies to solicit external financial support for this project. The high profile of Wood Bison being one of the threatened wildlife species in Canada, the relative success of the Yukon project, and its importance to Canada's Wood Bison recovery efforts, makes it highly probable that external funding could be obtained from such agencies as WWF, or such government programs as RENEW.

## 6.0 ANNUAL REPORT

The Technical Advisory Committee will provide the Management Authority with an annual progress report which summarizes research data collected and evaluates the success of the project. Data on population statistics such as total numbers, calving success and mortalities, information on movements and dispersal, and a financial statement are to be included in the report. Recommendations will be made on how to improve management of the wood bison herd and how to enhance growth rate and viability.

Table 3. Estimated Cost of Project and Proposed Contribution by each Party

	1989/90	90/91	91/92	92/93	93/94
<b>PROPOSED CWS CONTRIBUTION</b>					
Transfer of Bison		5 K		5 K	
Radio Transmitters	4 K	7 K	4 K	4 K	4 K
Assistance with Aerial Monitoring of Released Bison	8 K		8 K	3 K	8 K
<b>Total CWS Contribution</b>	<b>12 K</b>	<b>12 K</b>	<b>12 K</b>	<b>12 K</b>	<b>12 K</b>
<b>PROPOSED YTG CONTRIBUTION</b>					
Salaries for Caretaker, Contractors & Casual Staff	11 K	11 K	11 K	11 K	11 K
Hay and Mineral Blocks and Delivery to Site	10 K	12 K	8 K	12 K	8 K
Fence Repairs and Maintenance of Camp and Capture Facility	5 K	2 K	5 K	2 K	2 K
Helicopter Contract	3 K	3 K	3 K	3 K	3 K
Aerial Monitoring	2 K	8 K	2 K	8 K	2 K
Materials (Groceries, Gas, Propane, Firewood)	2 K	2 K	2 K	2 K	2 K
Road Clearing for Hay Transport	2 K	2 K	2 K	2 K	2 K
<b>Total YTG Contribution</b>	<b>35 K</b>	<b>40 K</b>	<b>33 K</b>	<b>40 K</b>	<b>30 K</b>

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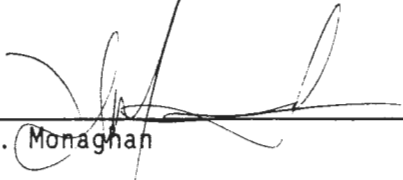
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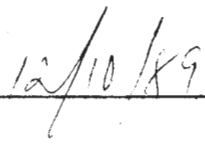
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**8.0 APPROVAL OF THE MANAGEMENT PLAN**


As members of the Management Authority, we the undersigned agree to the terms of the wood bison management plan described herein with the proviso that either signatory may request a review of the plan to be discussed at one of the meetings of the Technical Advisory Committee, if so deemed necessary.

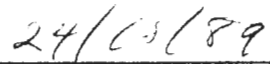
Director, Yukon Fish and Wildlife Branch

  
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Hugh J. Monaghan

  
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Date

Director, Canadian Wildlife Service  
Western and Northern Region

  
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Gordon Kerr

  
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