

THE UNIVERSITY OF MANITOBA

**THE WATERHEN PROJECT:
THE INTRODUCTION OF THE ENDANGERED WOOD BISON TO THE
INTERLAKE REGION OF MANITOBA AND ITS ROLE IN THE ECONOMIC
DEVELOPMENT OF THE WATERHEN BAND OF SAULTEAUX INDIANS**

by

CHARLES HARVEY PAYNE

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
OF DOCTOR OF PHILOSOPHY**

DEPARTMENT OF GEOGRAPHY

WINNIPEG, CANADA



July 1987

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A thesis submitted to the Faculty of Graduate Studies of
the University of Manitoba in partial fulfillment of the requirements
of the degree of

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ABSTRACT

THE WATERHEN PROJECT:

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The purpose of this dissertation is to give account from a geographer's perspective, of the introduction of wood bison, *Bison bison athabasca* to the Waterhen area of the Interlake Region of Manitoba. The project involves the interaction of cultural, social, economic and ecological processes. The management strategy advocated is a modest refinement of accepted wildlife management practice. This dissertation will explore the developing interdependency between the Waterhen Band and the wood bison, with the objective of resolving some of the social and economic problems of the former while ensuring the survival of the latter, which has been identified by the Convention on International Trade in Endangered Species (C.I.T.E.S.) as an endangered species. Critical to the potential future economic success of the Waterhen Project is the down-listing of the wood bison from endangered to

threatened status. The Waterhen Project has required and continues to require the involvement of several government and other agencies as it continues to move toward attaining its objectives.

ACKNOWLEDGEMENTS

To my advisor, Dr. Leonard Sawatzky, especial thanks are extended. He gave freely of his time and not only afforded a valued contribution to this study but also to the Waterhen Project. His wide-ranging knowledge and thought-provoking discussion expanded the philosophical basis of this dissertation beyond the range of conventional thought. His extremely prompt and thorough reviews of draft material helped enormously in preparation of this dissertation.

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INTRODUCTION

The Waterhen Project, as the name implies, is located near Waterhen, Manitoba, approximately 320 km north-west of Winnipeg (Figure 1). It is a flat, low-lying, generally wet environment, an ecotone between the Aspen Parkland and the Boreal Forest. Manitoba's northern agricultural frontier reaches its limit in the Waterhen area. The area exhibits a ridge and swale topography, following a north-west to south-east parallel orientation. Conifers and/or poplar dominate the upland areas, which are interspersed with low-lying wet sedge-willow meadows, known as fens, where the dominant species is *Carex* (slough-grass). The fens are gradually filling and are periodically rejuvenated by fire which removes accumulated litter. Forest habitat type on the upland is also determined by wild-fire.

A northern continental climate prevails in the area. It is typically characterized by generally hot, dry summers and cold winters, during which a meter or more of snow may accumulate over a five- to six-month period.

Wood bison, *Bison bison athabasca* are adapted to this type of environment and secure sufficient nourishment from the low protein sedges and utilize the forest as

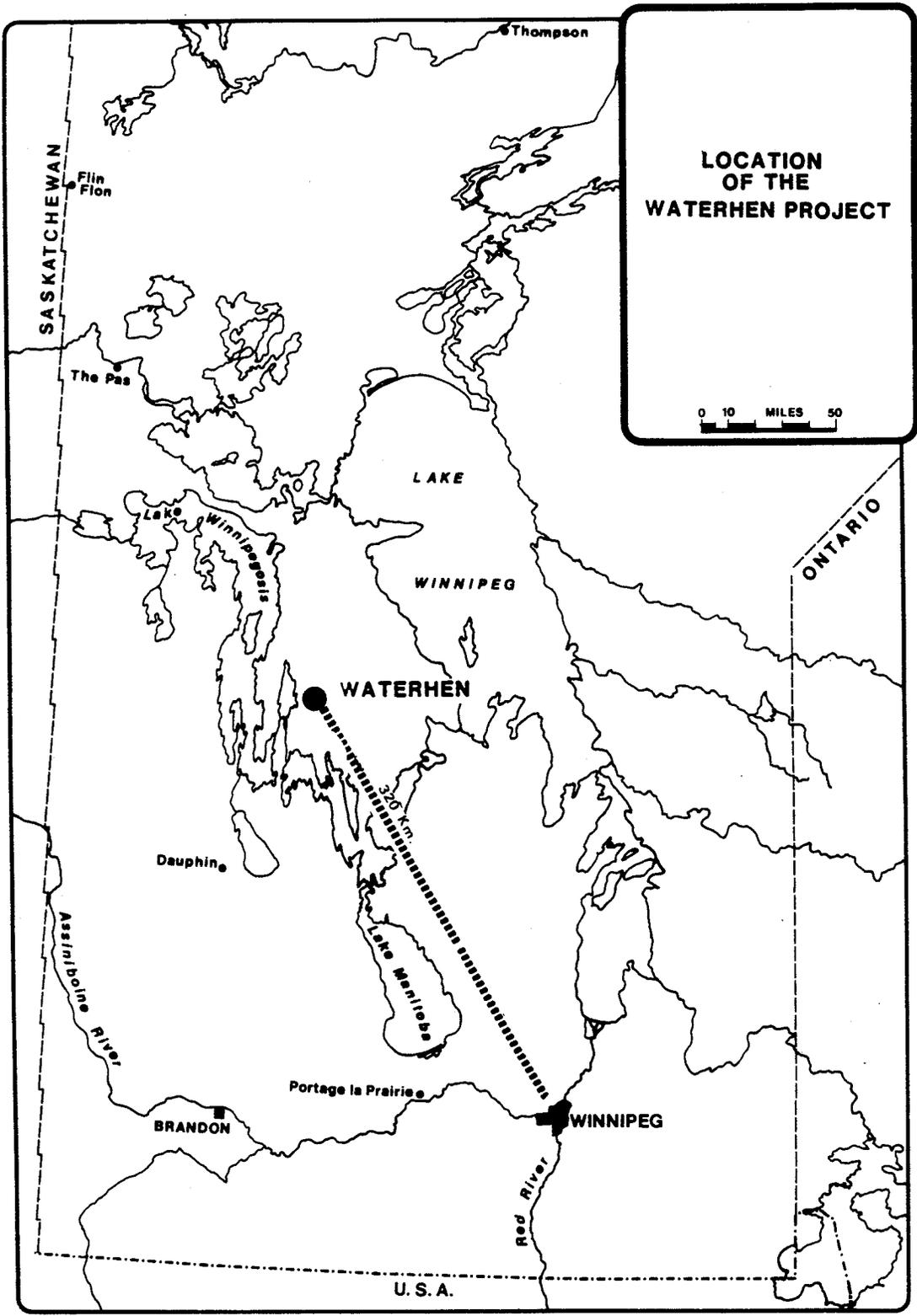


Figure 1 Location of the Waterhen Project

shelter throughout the year. Wood bison are a subspecies variant of the familiar plains bison, *Bison bison bison*. Generally speaking, the wood bison is larger and darker and is less migratory by nature than is the plains bison. There are only about 2000 extant wood bison and they are classified as endangered.

The Waterhen economy is depressed and is generally based on cattle ranching, commercial fishing, government and Indian Band administration and tourism. Sport fishing, primarily for pickerel (walleye) is the main attraction for tourists. The Waterhen Indian Band, located at Skownan, has a small population (approximately 300) relative to other Indian Bands in Manitoba and consequently the Reserve land-base is proportionately small. Cattle ranching, commercial fishing, trapping, operation of a fishing lodge and social assistance are the primary sources of income on the Reserve. The Band administration is the major employer and the unemployment rate exceeds 80%. There are two other small communities in the area: Mallard, a Métis community and Waterhen, a community of largely French, Ukrainian and native Indian ethnicity.

The Waterhen area, and in particular the Waterhen Band of Saulteaux Indians, is economically depressed, a condition which this game ranching venture, based on the wood bison, *Bison bison athabasca*, presumes to potentially alleviate.

The wood bison is an endangered subspecies of the genus *Bison*.

"Wood bison are listed on Appendix 1 of the Convention on Trade in Endangered Species of Wild Fauna and Flora and as such, trade in these animals is restricted. This subspecies is also listed in the Red Data Book by the International Union for the Conservation of Nature (IUCN) and thus is recognized as an endangered species." (Novakowski, 1978:11).

Once virtually extinct and presumed extinct for over twenty-five years, prior to their rediscovery in 1959, the wood bison is now (late 1980's) well on the road to recovery.

In order to relieve the endangered status of the wood bison, the Canadian Wildlife Service, in 1973, met with Provincial and Territorial Government Wildlife Agencies in an effort to jointly develop criteria for the management of wood bison. It was proposed to establish three free-ranging herds of wood bison, within the animals' former range (Reynolds et al., 1982:999).

We have no clear evidence that the wood bison ever inhabited the Interlake region of Manitoba. In passing, the Waterhen Project proposes to demonstrate that, whether they did or not, they are well adapted to that environment. The area exhibits a ridge and swale topography, typical of wood bison habitat in other

regions.

The Waterhen Project involves raising wood bison in captivity with the objective of releasing some of the progeny to the wild, of establishing a wild herd and developing a commercial captive herd of wood bison. The project also presumes to alleviate some of the social and economic problems of the Waterhen Indian Band, while at the same time achieving progress toward down-listing the wood bison status from "endangered" to "threatened".

The bison has played a significant role in the European settlement and development of North America. The early trails west and later inter-state highways followed the trails of the buffalo. Roe (1951:3) considered the bison, "one of those important creatures like the horse, the dog and the deer, which have exercised a great and far-reaching influence upon portions of the human race". It may also be true that the bison exercised more influence on the North American landscape than did the native human inhabitants. Estimates indicate that there were more bison than people. Due to their great size (close to 1000 kg) and large numbers, they carved trails throughout the the central and western portions of the continent, which lasted long after the bison were gone.

The role of the author was to identify a suitable location and methodology for establishing a herd of wood bison in Manitoba in collaboration with the Indian people of the Province. The author played an active role in the

subsequent development and management of the project.

The Geographical Context of the Waterhen Project

Geography follows many traditions, of which the multiple discipline generalist tradition is one. Alexander von Humboldt (1769-1859) and Carl Ritter (1779-1859) were the last scholars to embrace universal knowledge (James and Martin, 1972:113). They brought the classical period of geography to an end in the process of founding modern geography. Nonetheless the generalist tradition has continued and it was within this context that the Waterhen Project was fashioned.

Part of the Waterhen Project is biogeographical in nature although it is more wholly embodied in contemporary applied development geography. Harder (1981:257) concluded that northern Manitoba fits the Third World paradigm. He further concluded that "underdevelopment and modernization processes generate spatial, economic, social and political structures which mitigate against good nutrition and good health" (1981:257) and result in social and political pathologies. It is these pathologies which the Waterhen Project seeks to reform through applied development geography.

The Indian Dilemma

Indian people are often criticized for their modern hunting practices and perceived lack of conservation principles. This is often because the perpetrators of the criticism fail to recognize or are unaware of Indian hunting and fishing rights, especially as they exist in the prairie provinces of western Canada.

The Indians follow a hunting tradition. Such a culture is based on sharing and the success of a man is rated on the amount of game he retrieves and subsequently shares.

"When you kill a deer, it is not just food for your own family. There are other people to whom you will give each section of the animal. You know who these people are before you go on the hunt. Some may be immediately related to you, some only very distantly related. All are close to you by the bonds of human necessity." (Manuel and Posluns, 1974:42).

The bison played a dominant role in the lives of the Indian people of North America both before and in the early years of European settlement. The value of the bison, (commonly known only as the buffalo, at that time) to the Indians was well recognized during the Indian wars. According to Dary (1974:129), General Philip Sheridan

apparently requested the Texas Senate and House, in 1875, to appropriate funds to strike a medal for each buffalo hunter: "a medal with a dead buffalo on one side and a discouraged Indian on the other." Such a medal was never struck, but some years later the Government of the United States of America minted a five-cent coin depicting a buffalo on one side and an Indian head on the other. Relative to the Indian, the head of the buffalo is upside-down. Sheridan is also reported to have said in testimony before a joint meeting of the Texas Senate and House:

The buffalo hunters "have done in the last two years and will do more in the next year (1876) to settle the vexed Indian question, than the entire regular army has done in the last thirty years. They are destroying the Indians' commissary, and it is a well known fact that an army losing its base of supplies is placed at great disadvantage. Send them powder and lead if you will;..for the sake of a lasting peace, let them kill, skin and sell until the buffaloes are exterminated." (Cook, 1907, in Dary 1974:129).

Culleton (1985), also discussed the demise of the buffalo and its significance in determining the outcome of the Indian wars. In the introduction to "The Spirit of the Bison" (1985:3) she wrote:

"It was not a quiet, accidental extermination. The horror was that the killings were deliberate, planned, military actions. Destroy the livelihood of the Indians and win a war. 'Buffalo hunters' were heroes of that era, and lived on as legendary heroes of the American West. Was the war really won?"

The efficiency of the buffalo hunters is undisputed but their reputation as "professionals" is questionable. Martin (1973:99) described the "still hunt", developed by the hide hunters.

"A buffalo hunter went out before dawn. When he decided that there was enough light to do his job, he would spot his first victim - always a cow. He would lung-shoot her; she would not drop. As he expected, she just staggered around while the other buffalo frantically smelled her and milled about. Firing as quickly as he could, [with a Sharps repeating rifle] the hunter would down the whole bunch."

The demise of the buffalo meant the end of the traditional way of life for the Indians of the plains of North America, who were forced to live on reservations too small to provide adequate range for the buffalo. A similar scenario was enacted in southern Canada, only in a non-warring fashion. However, the situation with the wood bison in the northern forests was quite different. Wood

bison, although numerous, were not a primary resource for the Dene Indian people of northern Canada and were not to any significant degree hunted by the colonists. The cause of their sudden collapse in the late nineteenth century remains a mystery.

The Waterhen project has many facets. Like his counterpart in the United States the Canadian Indian became largely restricted to life on a reserve, with little room to support wildlife and little opportunity to pursue his traditional lifestyle. Although the Indian had in treaty retained the right to hunt, unfettered by law, on unoccupied Crown land, the land soon became settled and largely destitute of game. Moreover, legislation steadily infringed on the Indians' right to hunt. The lack of wildlife, the limited resource base on reserves and the provision of welfare transfer payments resulted in an impoverished lifestyle relative to that of other Canadians.

The fate of the Métis, who received no land settlement, was no better. Their dependence on the buffalo was equal to that of the Indian. Sealey (1975: 61) described the relationship in "Stories of the Métis". He tells the story of a buffalo hunt by the Métis of the settlement of Red River in 1842. He describes the excitement and happiness in the hearts of the hunters as they prepared for "their annual, fabulous breath-taking experience, the buffalo hunt." It is a picture of a long

train of six hundred carts, bulging with women, children, food and the supplies. There were winter hunts as well as fall hunts because, although the harvest of the fall hunt was bountiful enough, it was rarely sufficient to supply the settlement for the entire winter. The winter hunt was quite different from the fall hunt. Banks of drifted snow made the use of horses and carts impossible and the hunters resorted to using dogs and sledges for travel.

The market system of the mainstream of Canadian economic development was never well understood or adapted to by either the Indians or the Métis. In essence, they lacked marketable skills and demonstrated little will or desire to change the situation. The Waterhen Project embodies not only the restoration of an endangered species of wildlife but also an opportunity for the Waterhen Band to become more active in the market economy. The program has implicitly strong links to past cultural tradition, it embodies wildlife management teachings and practice and is compatible with the lifestyle of Indian people.

Samuel Walking Coyote

How the North American buffalo, *Bison bison bison* was saved from extinction is not only interesting but has implications for game ranching and the later near extinction of the Canadian wood bison, *Bison bison*

athabascaae.

One of the stories of how the buffalo was rescued from the brink of extinction is a romantic one and myth has probably replaced fact in many aspects and details of it. The actors in this story were all unusual people. They were very much individualistic thinkers and by no means conformed to the society in which they lived. They were prophets, but unversed in philosophy. How they saved the buffalo was a remarkable conservation achievement. However, there was little or no conservation thinking behind their actions: their interests were in personal gain through opportunism. The following account (from Dary, 1974:222) is one version of the story of those who saved the buffalo.

Samuel Walking Coyote was a Pend d'Oreille Indian who lived with the Flathead Indians on their reservation in what is today western Montana. In 1872, Walking Coyote left his wife and adopted home with the Flathead and moved east across the Rockies to a Blackfoot reservation, where he joined the winter buffalo hunt of 1872-1873. Walking Coyote did more than hunt buffalo that winter, however. He fell in love with a beautiful Blackfoot woman and married. If the story is true, and many dispute it, it was that marriage that saved the buffalo and later contributed to the near extinction of the Canadian wood bison through genetic dilution.

When spring came, Walking Coyote became homesick and

decided to return to the Flathead reservation, and take his new wife with him. However, there were problems with the plan. Flathead law prohibited taking a wife from off the reservation and the Jesuit Fathers of the Flathead Mission would not approve of any man taking more than one wife.

Several days later he was still pondering the problem, when eight buffalo calves wandered into his camp; some had been orphaned during the hunt whereas others had become separated in the chase. Apparently the little buffalo soon attached themselves to the Indians' horses and Walking Coyote got the idea that a gift of eight buffalo calves to the Jesuit Fathers would appease their anger toward him for having taken two wives. Comfortable with this idea, he set out across the Rockies with the eight buffalo and his Blackfoot bride.

It was a rough journey across the Rockies. Two of the calves died. In the spring of 1873, the couple, with the six surviving buffalo calves, arrived at the Jesuit Mission. The Jesuit Fathers were not impressed with Walking Coyote's proffered gift and the couple were beaten by the Flathead police and thrown off the reservation. This so angered Walking Coyote that he decided to keep the buffalo rather than hand them over to the Jesuit Fathers who had brought this misfortune upon him. He did not go far from the Mission but settled in the lush Flathead Valley and raised his buffalo calves, which, according to

the story, did extremely well and became exceptionally tame. The heifers produced calves when they were four years old. By 1884, Walking Coyote's buffalo herd numbered thirteen and they were becoming a problem. They were taxing Walking Coyote's meager resources and annoying his neighbors.

Reluctantly, because he loved the buffalo, Walking Coyote put them up for sale. The herd was sold to Charles Allard and Michel Pablo. Walking Coyote insisted on cash and was paid \$2000 in gold. The buffalo was now well on the road away from potential extinction, largely due to the economic rather than conservation interests of Allard and Pablo.

The buffalo prospered under the care of Allard and Pablo. However, complications following a knee injury resulted in the death of Charles Allard in 1895. The buffalo, now numbering 300, were divided between Pablo and Allard's estate. The interests of the latter were either immediately or ultimately sold. Some of the animals later went to repopulate Yellowstone National Park, while others were sold to private interests in Oklahoma.

Michel Pablo retained his animals until 1906. At that time, the Flathead reservation on which the animals grazed was being opened up for settlement. He offered to sell his buffalo to President Theodore Roosevelt, following refusal of a request for grazing privilege on Federal lands. His suggestion was rejected by the Congress

of the United States. Perhaps feeling distraught, he sold the buffalo to the Government of Canada because it too, like that of the United States, refused to grant grazing rights to him. The Government of Canada purchased the buffalo for \$200 each.

The buffalo prospered at Wainwright, Alberta, a buffalo reserve that the Government of Canada had established to preserve the plains bison (*Bison bison bison*). However, the plains bison were to later develop into a threat to the wood bison in Wood Buffalo National Park, located in Alberta and the Northwest Territories, which was established in 1922 to preserve the wood bison.

There are conservationists in Canada today who share the interests of Allard and Pablo. These people would like to see more commercialization of wildlife through development of its economic potential.

History of the Wood Bison

When Canadians talk of conservation we tend to focus attention on the problems of southern Canada and often console ourselves in the mistaken belief that to the north there is an enormous unspoiled virgin land that abounds in wildlife. Such belief inhibits the expansion of conservation efforts. Virtually all northern wildlife populations have suffered decline in the last 100 years.

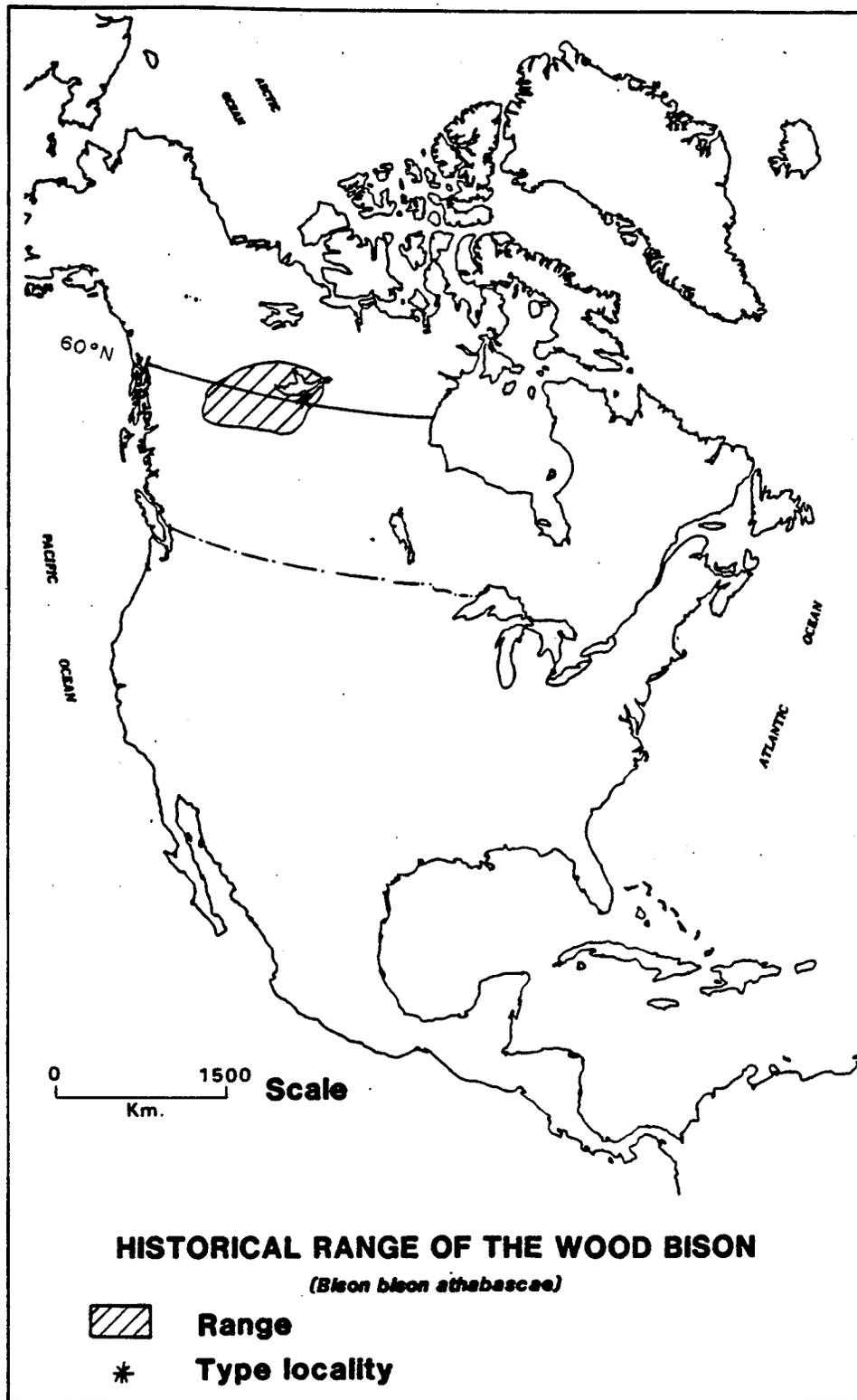
Hewitt (1921:56) wrote:

"Now that the buffalo has disappeared from our prairies the [barrenground] caribou constitutes, I believe, the most abundant of the larger land mammals in the world."

Barrenground caribou subsequently suffered drastic decline but have apparently made up some of their losses in recent years. The decline of the wood bison population is no better understood; neither is any resurgence of numbers indicated.

Samuel Hearne, one of the earliest explorers of Canada's northlands, was likely the first European to see a wood bison. On his journey from Fort Prince of Wales (Churchill, Manitoba) to the mouth of the Coppermine River and back, Hearne passed through what may have been the center of the wood bison population at that time. On his return trip from the north, he crossed Great Slave Lake. (Figure 2, after van Zyll de Jong, 1986:52). He recorded seeing wood bison on January 9, 1772. He wrote:

"The buffalo in these parts, I think are in general much larger than the English black cattle...the horns are short, black and almost straight, but very thick at the roots or base.... The head of an old bull is of a great size and weight indeed; some of which I have seen were so large, that I could not without difficulty lift them from the



Cartography by: W.Lucas

Figure 2 Map showing historic ranges of the wood bison *Bison bison athabasca*. Source: after van Zyll de Jong, 1986:52.

ground...." (Hearne, 1911).

Apparently, total populations of wood bison were never very large when compared to those of the plains bison, and they were distributed unevenly throughout their vast range. From the accounts of explorers and traders passing through the area we receive a variety of estimates of their numbers. In 1772, Hearne described them as "very plentiful" in the area of the Slave River. Alexander MacKenzie reported in 1789, that the wood bison was "reasonably numerous in the country from the MacKenzie River and Horn River". Other reports from that era (Harmon, 1808 and MacKenzie 1801, in Hewitt 1921:124 and Soper 1921:360) suggest no doubt as to the abundance of wood bison in the region.

There appears to have been no serious decline in wood bison numbers before 1860-65. Before that time the population may have dwindled slowly, but it was still likely a fair representation of historical numbers. However, by 1875 the wood bison was considered extirpated throughout much of its former range and in 1888 the total population of wood bison was estimated at between 500 and 600 animals (in Hewitt 1921:125).

Allen (1900:67) recorded the following wood bison population estimates for the decade 1889-1899:

"Hornaday, 1889.....	550
Russel, 1894.....	a few hundred
Jarvis, 1897.....	about 300
Moberly, 1897.....	250-300

Stone, 1899.....50"

By 1900, the plains bison was extirpated from the wild and only existed in Yellowstone National Park and in domestic herds. Total numbers were believed to be between 300 and 500 (Allen, 1900:67).

It is difficult to determine the exact cause of decline in the wood bison population. Hunting certainly played an important role, but it is difficult to imagine how the handful of hunters and explorers in that remote area of northern Canada at the time could have wiped out almost the entire population, especially when it was scattered over such a vast territory. However, there was little question in the mind of Seton in 1886 when he wrote:

"What destroyed them in that short interval ? The answer is not difficult to seek - - deep snow !During one winter of exceptionally deep snow, eighty buffaloes were killed in the vicinity of Dunvegan. The Indians ran them into the snow drifts and then dispatched them with knives."

Adverse winter weather conditions not uncommonly inhibit grazing by northern mammals, a fact well known to Lapp reindeer herders. Freezing rain or deep snow can effectively barricade the animals from the food resource beneath. Wild populations can be affected if such conditions are sufficiently widespread. Nonetheless, if

the Government of Canada considered such a potential event, the consideration was soon dismissed and controls to curb hunting were instigated.

In 1893, legislation was passed by the Dominion Government to protect the surviving wood bison population and in 1897 enforcement of the law was placed under the jurisdiction of the Northwest Mounted Police. Apparently, the wood bison responded well to the protective measures and numbers slowly began to increase.

Six Buffalo Rangers were appointed to patrol the range in 1911. By 1922, when the area was designated as Wood Buffalo National Park, there were approximately 1500 wood bison in the area (Graham, 1923). Their survival appeared secure.

Meanwhile, in 1906, the Government of Canada, as previously mentioned, had purchased more than 600 plains bison from a rancher in Montana, and moved them to an area near Wainwright, Alberta (Corner and Connell, 1958). These were the descendants of the animals that Samuel Walking Coyote originally walked across the Rocky Mountains. The intent was to preserve a herd of plains bison. By 1921 that herd of plains bison had grown to more than 4600 animals and was increasing at the rate of 25% per annum. Overgrazing of their range was an imminent danger. Despite the selective slaughter of over 2400 bison between 1921 and 1924, by 1925 the population topped 10,000. In desperation, the Department of the Interior

decided to embark on a long range plan to re-locate the surplus bison to Wood Buffalo National Park, despite the warnings of informed naturalists and zoologists (Corner and Connell, 1958).

Graham, described by Seton (1909:712) as the "alert representative, of the Northwest Territory and Yukon Branch, Dept. of Interior" was responsible for the relocation. However, Graham was of the opinion that there were not two subspecies of bison but rather morphological differences, resulting from environment. In 1923, Graham reported on his visit to Wood Buffalo National Park, in 1922. He wrote:

"There are many reasons why the wood bison in northern Alberta and the North West Territories should be preserved. They are the last of their species living today under absolutely free and wild conditions. They are the finest specimens of their species, superior in pelage, size, and vigor to those of the plains."

Earlier in the article he wrote that "whatever differences there are between it [the wood bison] and the buffalo of the plains are largely owing to environment."

Between 1925 and 1928, nearly 7000 plains bison were relocated to Wood Buffalo National Park. The seeds of destruction were sown: within two decades the wood bison was considered extinct through genetic dilution. As predicted, the two subspecies readily interbred and the

bovine diseases anthrax, brucellosis and tuberculosis, previously unknown among the wood bison, ravaged the Park: The problem of disease was documented, by Novakowski and Stevens (1965), as persisting and continues to this time. We have the technology to eradicate tuberculosis and brucellosis from Wood Buffalo National Park (pers comm Bulmer 1983), but not the political will. The cost has never been estimated, but would be enormous. The technology to eradicate anthrax has yet to be developed; consequently, periodic outbreaks of anthrax will persist into the foreseeable future.

Some zoologists perpetuated the theory that small groups of wood bison could still exist in remote areas of the park (Fuller, 1962, in Novakowski and Stevens 1965). It was speculated that these groups were so geographically isolated by natural topographic barriers such as muskeg, swamp and rough terrain that they would not have come in contact with the introduced plains bison. Foremost among the believers in the continued existence of wood bison in the Park were Fuller and Novakowski, both biologists with the Canadian Wildlife Service, who were studying wolf-bison relationships in the Park in the 1950s.

In 1957, Novakowski, while flying a survey in the Nyarling River and Buffalo Lake region of Wood Buffalo National Park, spotted a herd of bison. Due to the remoteness of the area and his preconceived notion of the continued presence of wood bison in some remote regions,

he speculated that they could be pure wood bison. From specimens collected in 1959, the National Museum of Canada confirmed his theory (Novakowski and Stevens 1965).

But in the early 1960s, the wood bison was threatened again, this time by an outbreak of anthrax in the Park. Consequently, in 1963, 18 wood bison were relocated to what is now the MacKenzie Bison Sanctuary in the Northwest Territories. Through protection as an endangered species, the herd prospered and now numbers in excess of 1500 animals.

To further ensure the preservation of the species, 23 wood bison were relocated to Elk Island National Park in Alberta, in 1965. They were found to be diseased. Veterinary treatment and careful management resulted in a disease free herd by 1971.

A renewed wood bison conservation effort began in the mid 1970s. The wood bison was classed as an endangered species and recognized as such by the Convention on International Trade in Endangered Species (C.I.T.E.S.), the Committee on the Status of Endangered Wildlife in Canada (C.O.S.E.W.I.C.) and the Northwest Territories Act (Reynolds 1980). The wood bison is also listed in the Red Data Book by the International Union for the Conservation of Nature (I.U.C.N.) which provides world-wide recognition of the subspecies as an endangered species. As a result, trade in these animals or products derived from them cannot be developed. Commercial trade in endangered

species is illegal, with any country that is signatory to C.I.T.E.S.. Exports and imports for scientific, conservation or educational purposes require permits from the respective countries.

The efforts of a Federal-Provincial committee for the preservation of wood bison met with remarkable success throughout the decade 1975-1985. A rehabilitation program for the wood bison was devised and quickly implemented. Essentially, the objectives of the program were to establish at least three and preferably five free-ranging herds of wood bison. In addition the program provided for the distribution of small breeding herds to zoological parks and gardens in order to preserve the wood bison gene pool (Reynolds, *et al*, 1982)

The dramatic success of the relocation of wood bison from Wood Buffalo National Park in 1963 created the illusion that further relocations would be easy. Such was not to be the case, as was documented by Reynolds, a biologist with the Canadian Wildlife Service. He wrote, in 1982, in reference to the recent relocation of wood bison to Jasper National Park, Alberta:

"Despite the apparent suitability of habitat and its historical record of use, newly transplanted animals may not remain near the release site. Random movements of released animals can often result in travels encompassing hundreds of kilometres through unfamiliar and unsuitable habitat. There are

no guarantees in this business as I can well attest!" (Reynolds, 1982).

The planned relocation to Jasper National Park had to be abandoned for the above reasons. Despite the fact that suitable habitat was present, the main herd travelled in excess of 150 kilometres during the first 30 days following release from its temporary holding corral. The animals traversed rugged mountainous terrain and eventually ended up in an area of agricultural development outside the boundaries of Jasper National Park. They had to be rounded up and returned to Elk Island National Park.

In sharp contrast to the Jasper fiasco, a relocation of wood bison to the Nahanni District of the Northwest Territories in 1980 was highly successful despite the fact that the original 28 animals splintered into different groups, with one group moving south into British Columbia. Successful negotiations with the Government of British Columbia enabled the wood bison to remain in that province (Reynolds, 1982).

Less dramatic but nonetheless highly significant were the successful relocations of wood bison to zoological parks and gardens. Wood bison were successfully relocated to the following institutions: Balboa Park Zoo, in San Diego, Calgary Zoo, Moose Jaw Wild Animal Park, Metro Toronto Zoo, Alberta Wildlife Park, Valley Zoo, in Edmonton, Banff National Park and Munich Zoo, West Germany.

NATURAL HISTORY OF THE BISON OF NORTH AMERICA

Family: Bovidae

Genus: *Bison*

Species: *bison*

Subspecies: *bison* and *athabascae*

Common names: bison, buffalo, plains bison, wood bison, woodland bison, mountain bison.

The bison, along with domestic cattle, sheep and goats belongs to the family Bovidae. Both sexes grow true horns which are never shed. The horn consists of a hard core and an outer sheath. Bison, like other bovids, are primarily grazers but will browse when grazing resources are limited. Young are produced annually, usually in late spring following a nine and one-half month gestation period. Sexual dimorphism is prevalent in bison; cows are significantly smaller than bulls. The bison is the largest land mammal native to North America. It is characterized by its low-slung massive head and disproportionately slim hind quarters. The heavy skull is triangular and flattened. The bison has a short tail, rounded hooves and short legs (Banfield, 1974:405).

Bison are gregarious animals, travelling and grazing in groups which may periodically join together to form

large herds. Cows and calves may be playful but adult bulls are stolid. In periods of excitement the tail is elevated and resembles a shepherd's crook in appearance. Leadership among bison appears ill-defined. Their defense strategy is to charge. Generally speaking they are of a docile disposition but unpredictable and consequently dangerous. As bovids, bison are relatively long-lived and have been known to attain a life-span of forty years.

The subspecies of bison native to North America are the wood bison, *B. b. athabascae*, and the plains bison, *B. b. bison*. The wood bison is generally larger and darker than the plains bison and has a more pronounced squarish hump.

The European bison or wisent, *Bison bonasus* is the only other species of the genus *Bison*. The wisent is taller than the American species and has less pronounced development of the hump and shoulders. Wisent were once present throughout most of Europe and possibly as far east as Siberia. They were gradually eradicated from much of their range through destruction of habitat (Crandall, 1964:652). There were two subspecies of wisent: *Bison bonasus bonasus* and *Bison bonasus caucasicus*. The last of the Caucasian race was killed in 1927. The Lithuanian race, *B. b. bonasus*, was narrowly saved from extinction about the same time (Zabinski, 1960 in Crandall, 1964:652), largely as a result of the efforts of the International Society for the Protection of the European

Bison, which was modelled after the American Bison Society.

Buffalo were once the dominant inhabitant of North America. Their numbers could not be counted. It is believed that at their peak the buffalo may have numbered between fifty and sixty million (Seton, 1909:260). Their range extended from the Canadian Athapascan region in the north to Mexico in the south, east to Pennsylvania and west to Oregon. It has been speculated that the Indian practice of woods' burning may have been partially responsible for extending the range. Burning was not wantonly destructive but was rather, a management effort to to increase the food supply for game and benefit to their economy (Rostlund, 1957:408).

The terms *buffalo* and *bison* have been the cause of contention and confusion since the animal first became known to Europeans. The different use of terminology was well described by Butler, an Irish explorer, commissioned in the British Army and stationed in Canada in the late nineteenth century. In reference to the difference in terminology used by the new Americans and the British scientists and naturalists of the Old World Butler (1872:315) wrote:

"Naturalists in Europe, hearing of the new animal, named it the bison; but the colonists united in calling it the buffalo, and, as is usual in such cases, although science clearly demonstrated that it was a

bison, scientific knowledge had not a chance against practical ignorance, and 'buffalo' carried the day."

The naturalists and biologists insisted that the word buffalo be used only in reference to the genus *Bubalus*, the originally named *buffaloes* of India and Africa. In 1951, F.G.Roe contended that the term buffalo was so widely used that he would use it throughout his lengthy treatise on bison titled, "The North American Buffalo". Many popular writers (e.g. Dary, 1974, McHugh, 1972, and Martin, 1973) have since followed his example. The word buffalo continues to have widespread use in North America and is better understood than the word bison.

However, in recent time the term bison has gained more acceptance and will be used except when it is more appropriate to use the term buffalo. Some of the discussion in this paper will refer to either the buffalo or the bison. The terms are to be understood as being synonymous. However, they will not be indiscriminately or interchangeably used. Generally speaking, when reference is made to the United States the term buffalo will be used to identify the plains bison, *Bison bison bison*. The terms plains bison and wood bison, *Bison bison athabascae*, will usually be used when reference is made to Canadian bison. There is convention and rationale for the use of both terms. Generally speaking, popular American writers and ranchers use the word buffalo, whereas scientists prefer to use the term bison.

The sub-specific designation of the wood bison and the plains bison continues to be a source of controversy for naturalists and scientists. The wood bison inhabited the boreal forest, whereas the plains bison was a prairie animal. The controversy lies not in the morphological differentiation of the animals but rather in the genetic origin of difference. The morphological differences are obvious, but some can be varied by environment. For example, the chaps or skirts on the forelegs which are normally not prevalent in the wood bison become quite pronounced when the wood bison is raised in close captivity. Consequently, there is speculation that there are not two distinct subspecies of the species *Bison bison* but rather morphological varieties determined by environment. This debate is recognized but is not the subject of this treatise. Conventional scientific opinion and the results of a long-term study by van Zyll de Jong, (1986) indicating that two subspecies exist, is accepted.

The Wood Bison

The wood bison, *Bison bison athabascae*, differs in many ways from its familiar congener of the plains, *Bison bison bison*. Reynolds, et al. (1982) outlined the basic characteristic differences as follows:

1. The hair on the head, especially around

the horns and in the beard is much shorter in *B. b. athabascae* than in *B. b. bison*. The head and neck of *B. b. athabascae* is generally darker than that of *B. b. bison*.

2. The long hair in the area of 'chaps' or 'skirts' in *B. b. bison* is virtually absent in *B. b. athabascae*.

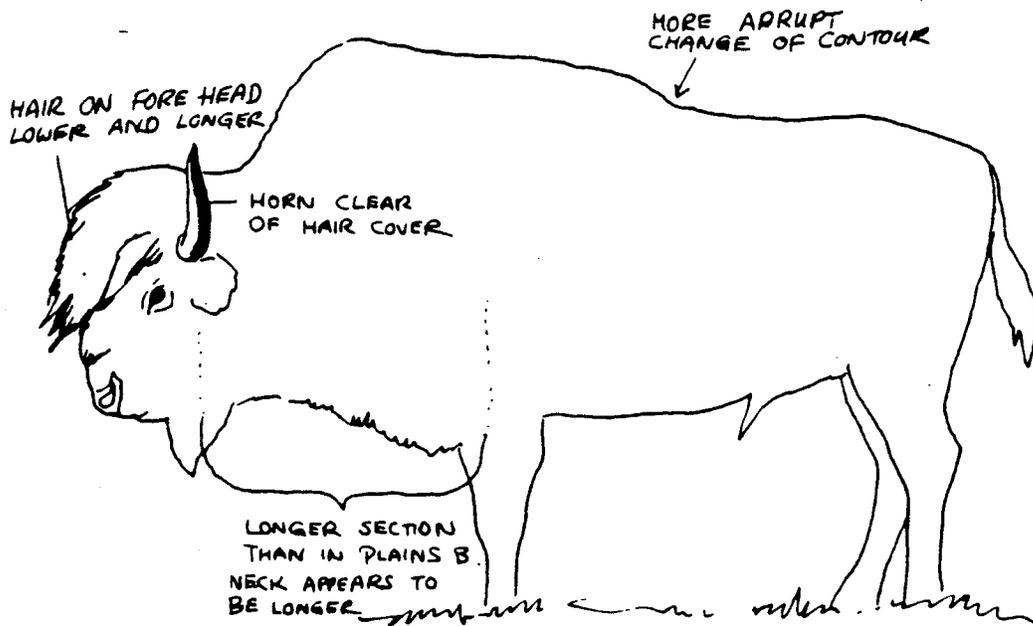
3. The cape of the shoulders, neck and hump of *B. b. bison* is more distinct and lighter than that of *B. b. athabascae*.

4. *B. b. athabascae* are taller at the hump, which in turn tends to be more square than the hump on *B. b. bison*.

The basic morphological differences between *B. b. bison* and *B. b. athabascae* are illustrated in Figure 3 (Payne, 1983, after Reynolds, *et al.* 1982:976) and Figure 4 (after Karsten, 1975).

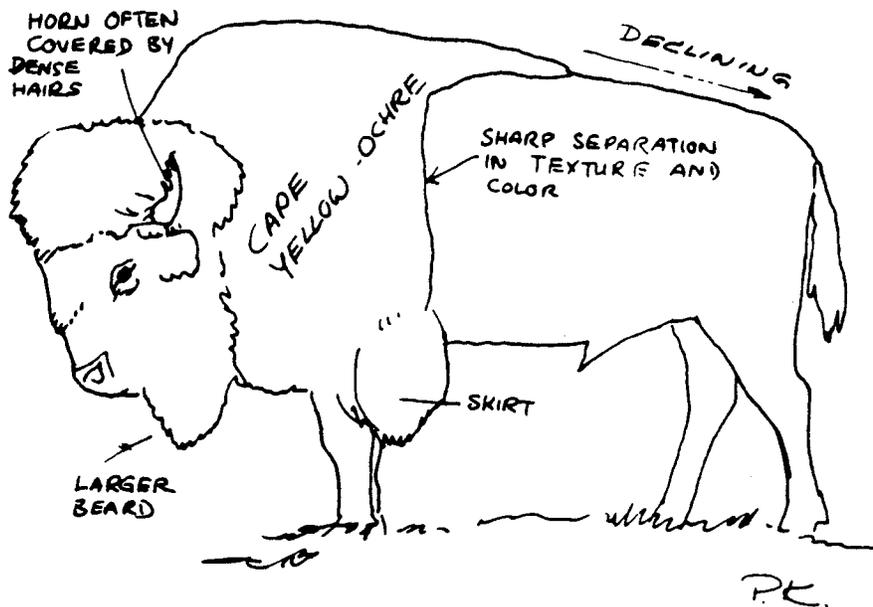
Wood bison bulls may attain weights in excess of one tonne. Cows are significantly smaller. The historical range of the wood bison is shown in Figure 1 (page 12) (after van Zyll de Jong, 1986:52). However, it is speculated that wood bison may once have been present in Manitoba. In 1873, J.W. Taylor, was the U.S. Consul in Winnipeg. He wrote:

"Formerly a variety called the wood buffalo was very numerous in the forests surrounding Lakes Winnipeg and Manitoba, the last survivor having been killed only two years



Wood Bison

(*Bison bison athabasca*)



Plains Bison

(*Bison bison bison*)

Figure 3

Morphological differences between the plains bison *Bison bison bison* and the wood bison *Bison bison athabasca* (lateral view). Source: Reynolds, et al. 1982, after Karsten, 1975.



Wood Bison

(*Bison bison athabascae*)



Plains Bison

(*Bison bison bison*)

Figure 4

Morphological differences between the plains bison *Bison bison bison* and the wood bison *Bison bison athabascae* (frontal view). Source: Karsten, 1975.

ago (that is 1870) on Sturgeon Creek, ten miles west of Fort Garry' (in Roe 1951:47).

The fact that bison were present in Manitoba in earlier times is undisputed. However, the actual range occupied is still a matter of debate. Roe (1951:292) presents circumstantial evidence for the presence of bison on the east side of Lake Winnipeg and in Northwestern Ontario. He also strongly questions the demarcation of the range by a line drawn mid-way between Lakes Manitoba-Winnipegosis and Lake Winnipeg. We know that the bison were present on the west side of the Interlake and it is therefore reasonable to assume that bison were present at least as far east as the western shore of Lake Winnipeg. Sir Alexander Mackenzie, in his description of the country near Lake 'Winipic', made mention of herds of "... buffalo and elk, especially on the Western side", he was at least of the opinion that bison were present on the eastern side also.

The point of contention is that if bison were more widely distributed in the northern woodlands than has been scientifically established, perhaps they were wood bison and not plains bison. Whichever subspecies was present in the northern Interlake or on the east side of Lake Winnipeg, it was occupying range which is today recognized as appropriate wood bison range.

In conclusion, and in light of the circumstantial evidence, it is contended that the bison which occupied

the northern wooded regions of Manitoba may well have been wood bison, although such view requires archaeological substantiation.

The introduction of the wood bison to the Waterhen district of Manitoba poses no identified threat to wildlife presently in the area. It is known that bison were previously present and consequently the introduction of wood bison essentially fills a vacant niche. The time that has elapsed since extirpation of the bison from the region has been insufficient to enable existing wildlife to change feeding habits or for opportunistic emigrants of other species to invade the area. Bison are grazing animals and they are selective in grazing, showing adaptability for utilizing the sedges of the low lying areas. None of the other ungulate species present in the area use sedges as a source of food. Moose browse on shrubs. Whereas elk and deer are both browsers and grazers, their preference when grazing is toward grasses and perennial plants of the lowland and forest floor. The habitat niche that the wood bison will occupy is one that has been essentially vacant for more than a hundred years.

No description of the wood bison would be complete without reference to the Radford bull. In the Report of the American Bison Society for 1922-23, Garretson (1923:31) wrote:

"The only mounted specimen of the Wood Bison in existence where weight and measurements

were taken at the time it was killed, is the bull killed by Henry V. Radford west of Slave River, between Fort Smith and Slave River, December 1, 1909. Mr Radford had taken with him a 200-lb steelyard of extreme accuracy and carefully ascertained the weight by piecemeal method. The weight and measurements are as follows:

Total weight (weighed piecemeal)..2402 pounds
Height at shoulder..... 5 ft. 10 ins.
Height at rump.....5 ft. 4 ins.
Circumference at neck.....6 ft. 0 ins.
Circumference of muzzle behind nostrils.....
.....2 ft 3 5/8 ins.
Girth behind foreleg.....9 ft. 9 ins.
Length of head and body.....9 ft. 9 ins.
Length of tail vertebrae.....1 ft. 7 1/2 ins.
Circumference of forearm.....1 ft. 9 1/2 ins.

The skin was fully 3/4 inch thick all over the body, where not thicker. On the shoulders it was one inch, on the neck and throat 1/2 to 3/4 inches, on the forehead 2 3/8 or over, elsewhere on head 3/4 to 1 1/2 inches."

MANAGEMENT PERSPECTIVES ON THE WATERHEN PROJECT

The Waterhen project is essentially a game ranching venture involving Indian people as managers. As such it necessarily involves consideration with respect to game management and the hunting rights of Treaty Indians. An understanding of the potential (especially game ranching) and constraints (especially Indian rights) of wildlife management is prerequisite to understanding the nature of the Waterhen project. We shall deal with hunting rights first.

Hunting Rights of Indian People

Wildlife, including fish and wild plants, was once the mainstay of Indian society. There is also suggestion that the Indian people managed the wildlife resources on which they depended. Feit (1971, in Cox, 1978:115) contends that the Waswanipi Cree managed moose through regulation of their hunting practices and Payne and Goulden (1982) suggest that the barrenground caribou of Keewatin were, historically, jointly managed by the Inuit in summer and the Chipewyan during winter.

Jenness (1932:53) wrote:

"The Indians were keen naturalists within the limitations of their interests. They knew the life-histories of the animals they hunted, the different stages of growth, their seasonal movements and hibernation haunts, and the various foods they sought for sustenance."

It is reasonable to assume that a hunter would have to work hard to secure sufficient game to provide food and clothing. In reference to conservation measures in effect at that time, Hewitt (1921:13) wrote:

"In his primitive state he was merely a unit in that balance of nature that is so marvelously adjusted that while the abundance of species rises and falls extermination does not follow the preying of one species upon another."

A major goal of the Waterhen Project, albeit unstated in official documents containing statements of purpose and objectives, was to demonstrate that Indian people could and would, if they were trusted and assisted, initiate, develop and manage a major conservation project. The author's role was to facilitate such happening from its conception to present day management.

The arrival of the European inaugurated great changes in the lifestyle of the Indian people. To this day a

conflict over the right of the Indian to utilize wildlife without let or hindrance continues.

As McNeil (1983:1) wrote:

"The special rights of the Indians to hunt, trap and fish have been a continuing source of misunderstanding and conflict in the region now comprising the prairie provinces at least since the time the treaties were signed."

However, despite the contentions of Indians and covenants entered into by proclamation and treaty, the Supreme Court of Canada has ruled that Indians are subject to the laws of the Parliament of Canada and certain laws of general application of the Provincial Legislatures.

The special rights of Indians to hunt and fish were first affirmed in the Royal Proclamation of 1763. At that time aboriginal title and the special right to hunt and fish were recognized by the Crown. This Proclamation has often been held to constitute a Charter of Rights for Canada's aboriginal people.

In 1870, an Imperial Order-in-Council transferred Rupert's Land and the North-Western Territory to Canada and at the same time imposed on Canada the obligation to deal and settle with claims to compensation for lands ceded by the Indians for settlement purposes. The Canadian Government respected the provisions of the Imperial Order-in-Council and proceeded to enter into

treaties with the Indian people, by implication recognizing that the Indians had a valid claim to compensation.

Generally speaking the treaties extinguished or at least infringed upon aboriginal rights. Many treaties made no mention of hunting rights, but all imply, one way or another, that the right to hunt and fish would remain unaltered. Clauses such as:

"It is further agreed by Her Majesty and the said Indians that the sum of fifteen hundred dollars per annum shall be yearly and every year expended by Her Majesty in the purchase of ammunition and twine for nets for the use of the said Indians,"

(Treaty No.3, in Morris , 1862:324) imply that the right to hunt and fish would remain unaffected.

At the time of treaty negotiation hunting and fishing rights were of paramount importance to the Indians. Had legal counsel been available to the Indians at that time it is probable that the treaties would have spelled out hunting and fishing rights in specific terms.

The Migratory Birds Convention Act and the Manitoba Natural Resources Act (both Acts of the Parliament of Canada) serve to restrict the hunting rights of the native people. The Supreme Court of Canada has ruled (6 to 5) that Indians are subject to the provisions of the Migratory Birds Convention Act and that the hunting

clauses contained in other acts, treaties or proclamations are overruled by that act. This is the law at present. However, there is dissention in the courts and this ruling is considered by some to be a breach of the Royal Proclamation of 1763, a breach of treaty guarantees and contrary to the provisions of both the Indian Act and the Natural Resource Agreements which (although detracting from them to a large extent) serve to affirm the proclamation of aboriginal rights as does the Constitution Act, 1983. [In May, 1987, Henry Flett, a Treaty Indian was acquitted by Provincial Judge William Martin on the grounds that Sec. 35(1) of the Constitution Act recognizes treaty and aboriginal rights and protects the right to hunt waterfowl at any time. The Justice Department will appeal the case to the Manitoba Court of Appeal. (Winnipeg Free Press, May 15th., 1987)].

At the time of treaty, the Government hoped that the Indians would ultimately take up the white man's way of life and that the clauses respecting hunting and fishing rights were therefore largely transitional in nature, allowing the Indians to continue their mode of life (trapping, hunting and fishing) until such time as they became integrated with the Euro-Canadian society.

It has been construed (Cumming and Mickenburg, 1972) that the regulations or restrictions contemplated in Treaty No.3 are included solely to ensure game for Indian needs, in cases where Indian hunting alone (excluding

non-Indian hunting) poses a threat to game supply. In other words the right to hunt wildlife on unoccupied Crown lands is primarily reserved to Indians and only the surplus game supply (when Indian needs have been met) may be hunted by the non-Indian population.

The legal framework pertaining to the hunting rights of Indians is summarized as follows:

1. The Treaties extinguished aboriginal rights as proclaimed by George III, in 1763.
2. The Treaties retained for the Indians certain hunting and fishing rights, subject to some regulation.
3. The Indian Act extinguished Treaty Rights through interpretation and incorporation of rights granted by that Act.
4. The Migratory Birds Convention Act prohibited native hunting of most migratory birds except during the hunting seasons established annually through the provisions of that Act.
5. The Manitoba Natural Resources Act restricted native hunting to hunting for food only, during all seasons on unoccupied Crown

land and any other land to which the Indians have right of access.

It is evident that since the signing of the Treaties Euro-Canadians have encroached upon native hunting rights through the legislation of the Indian Act, the Migratory Birds Convention Act and the Manitoba Natural Resources Act.

The expectation, at the time the treaties were signed, that the Native Canadians would soon become part of the mainstream of Canadian society, has not, and appears unlikely to be realized in the foreseeable future.

There are four conclusions probable regarding the hunting rights of Treaty Indians:

1. The hunting rights of native people are 'rights', retained by them at time of Treaty and not 'privileges' granted by the Crown.
2. Indian hunting rights can be unilaterally abrogated by the Parliament of Canada.
3. Indian hunting rights have been infringed upon by legislation.
4. The Constitution Act appears to enshrine Indian and Inuit rights as they presently

exist and recognize that Metis people may also have special rights.

The Concept of Game Ranching

As previously stated, the Waterhen project is essentially a game ranching venture. Economic enhancement and development of the local area are major objectives. But, its goals are diverse, since it is also a conservation initiative designed to restore an endangered species to the wild.

Theoretically, game populations have the potential for geometric increase. However, there are constraints to population growth in nature. The lifestyle of modern man has added additional constraints. Management is the result of the will to understand and govern the constraints.

Game ranching is intensive wildlife husbandry in a defined area. In simple terminology, wildlife husbandry may be defined as an integrated activity that combines agricultural and wildlife management techniques. The objective of game ranching is to produce from the land more of what society demands than nature freely provides. The philosophy of game ranching is that native animals will not only be economically more productive than counterpart domestic animals exotic or alien to the locale, but will also impose less degradation on the

environment. Hudson (1984) wrote:

"The greatest potential for game production lies in the vast aspen boreal forest which extends from southern Manitoba to northeastern British Columbia. The clearest insight into the inherent productivity of this landscape comes from the seventy years of experience at Elk Island National Park, Alberta, where fenced populations have been harvested to maintain an appropriate balance between animals and vegetation. The carrying capacity of the area is approximately nine bison, four moose and four wapiti (elk) per sq km without supplemental feed and without clearing trees and establishing tame pastures."

Game ranching has the potential to enhance regional development through encouraging investment and creating employment. These benefits are created in areas where little other potential exists and unemployment is extremely high. Furthermore, it is unlikely that these lands are suited to any other form of economic development. In addition, game ranching can serve to preserve natural landscapes and hence the habitat for other creatures such as waterfowl, upland birds and many furbearers.

Manitoba's beef industry faces many economic problems largely stemming from high interest and energy costs, high development costs and low economic return for the final

product.

Extension of the agricultural frontier only serves to exacerbate the problem. Native communities in particular suffer from a lack of development, often because soil conditions result in negative economic cost:benefit analyses of their proposals to enter the conventional agricultural field.

It is these problems that have prompted thought to the development of a new agricultural horizon using native animal species and native forage. Bison, moose and elk all show potential in this regard.

Essentially there are three types of potential enterprise: mixed species game ranching on extensive acreages, bison farms, and elk farms. Bison farms have long been in existence in Canada, but elk farms have been slow to develop and mixed species game ranches are virtually non-existent.

Bison, elk and moose, carefully balanced in total number and in proportion to each other through careful management, will achieve optimum results in terms of production, economic return and landscape conservation. The 2300 ha wood bison enclosure near Waterhen, Manitoba, could potentially serve Western Canada and perhaps the world as an example of the benefits of mixed species game ranching: all that is required is the addition of elk and moose and some minor manipulation of habitat. The ranch could supply the red meat needs of the local population

and some steady employment and economic return to the community, largely through the sale of meat products and breeding stock.

The economics of game ranching was addressed by the Economics and Program Review Branch of the Manitoba Department of Natural Resources in 1981. It concluded that:

".....there are potential economic benefits associated with game farming. However, realizing these benefits will depend upon ensuring (1) a supply of very inexpensive lands; (2) low interest rates; (3) developing an effective marketing system. Direct returns to the provincial economy will be in the form of (1) jobs; (2) economic incomes; and (3) revenue for the provincial treasury." (Gravelines, 1981).

The economic potential of game ranching has been studied in detail by Hudson in 1984. He wrote:

" With routine winter feeding, costs of production are about \$1.25/kg for bison and \$1.15/kg for wapiti (elk) under circumstances where comparative costs are \$1.65 for beef cattle."

Bison meat is sold on a stable specialty market which sustains prices at 1.5 times the prevailing beef price.

"The [game ranching] industry has grown worldwide, especially in the last decade. The greatest success story has been the phenomenal development of the New Zealand red deer industry. In Canada, the development of a game industry offers to increase the viability of many agricultural operations, to provide a culturally-consistent livelihood for native people and to open new opportunities on export markets." (Hudson, 1984).

It is opportune to paraphrase a statement by Luten (1972) as a question: Is it "...time that we abandon our treasure-hunt philosophy of economics and reward productivity, not opportunism"?

Perhaps game ranching has the potential to 'reward productivity', in some select areas. I refer to those lands where environmental degradation has resulted in economically non-viable domestic livestock production. Game ranching may have the potential to revitalize the economy of these enterprises. Native animals are more biologically efficient converters of vegetation than are conventional domestic livestock and therefore more economically produce a kilogram of meat. Situations such as these would reward productivity without the imposition of increased environmental degradation: the environmental impact may in effect be one of partial restoration, through regeneration of a natural landscape.

A situation in which game ranching has sound environmental potential is on Indian Reserves and on lands

adjacent to the reserves. In these areas wildlife populations are depleted and often only remnant populations remain. Game ranching could serve a twofold objective in these areas: enhancement of the local economy through meat production and reduced domestic hunting pressure on extant wildlife populations.

Within the concept of game ranching it is implicit that certain proprietary rights in wildlife be transferred from the public domain to private individuals. It is not incongruous that there is objection to such transfer, especially from the hunting public and their fraternities.

Early in this century, game was a commercial commodity, but it was abused. Following lobbying by sportsmen and naturalists, the commercial harvest of game became illegal. In 1921, Hewitt wrote:

"It is universally recognized now by sportsmen and conservationists that the free marketing of wild game is one of the greatest factors tending rapidly to exterminate our native game resources, and that, with the existence of so many other factors that are beyond our control, adversely affecting the abundance of our game mammals and birds, the sale of protected game must be prohibited if the disappearance of such game is to be prevented and its continued existence secured for use and enjoyment by sportsmen and nature-lovers dwelling in our cities and countryside."

Hewitt decried market hunting, but he was an advocate of the production of game in "private and government game farms and preserves....for those who desire it and are unable to obtain it by other means than purchase....(The) sale of such surplus and propagated game is to be strongly commended..." (Hewitt, 1921:331). Hewitt's contention is that game propagated on a game farm is surplus to that which nature would provide and consequently its sale is morally justifiable.

Unfortunately, the bitter memories of market hunting prevail to this day. The activity continues, as poaching. It is these memories and fears, that game ranching and farming will result in an escalation of poaching, that cause conservationists to fear and oppose development of the industry. Hunters also fear that lands to which they presently enjoy access for hunting will become unavailable to them.

Bergman (1984), summarized a debate which has been raging in Alberta for the past few years. Two contestants in the debate are Geist of the University of Calgary, who opposes game farming, and Hudson of the University of Alberta, its major proponent.

Hudson contends that land development is inevitable, and that the development of game ranching will impose less degradation on the landscape than will deployment of traditional domestic livestock to northern Alberta. It is worthy of stressing that Hudson refers to 'landscape'

degradation as opposed to degradation of 'environment'.

Geist agrees with Hudson that game ranching is economically sound but argues that environmental costs are too high, requiring a similar depletion of wolves, grizzly bears, black bears, cougars and lynx (Bergman, 1974), as would be required for conventional livestock production.

According to Bergman (1984), in reference to the proliferation of poaching, Geist stated: "I'm not going to bet a plugged nickel for the safety of any big game animal if this industry is allowed to flourish".

In 1984, Geist wrote:

"The principle that wildlife not be allocated by market forces in American wildlife management is very important. It is first and foremost a conservation measure....I too am aware that the state has not always been the best warden of wildlife....However, if public wildlife management in America is awful...then every other system -- to borrow a Churchillian turn of phrase -- is worse!"

Hudson (1984) rebutted:

"Organized sport hunters have expressed increasing concern regarding pre-emption of hunting opportunities and the emergence of widespread illegal dealings in wildlife products. Sport hunters have been

the traditional client of provincial agencies responsible for wildlife and have developed an effective lobby. Who will speak for the farmers and native people?"

Landowners contend that they are already raising the game and the only beneficiary is the hunter. Landowners also deserve a return. According to MacLeod (1984) "We have elk feeding off ranchers' hay stacks and grain swaths, deer feeding in alfalfa fields, upland game birds surviving winter on the farmers' grain and ducks breeding in man-made ponds created for that purpose." He contends that many of these animals would not be able to anymore contend with the natural environment and poses the question: "Why go on pretending? Game ranching would just make it official."

Proponents of game ranching often contend that the opponents of game ranching are not objective, scientific or pragmatic in their thinking, but the proponents do not have the right to force thought to be channelled solely along those lines. Situations reflect individual perceptions, and in those cases the 'real world' may be no more than the perception of a dogmatist. From an overall perspective the game ranching debate reflects the differences in perception that arise when a situation is viewed from the perspective of 'conventional wisdom' or 'scientific thought'. Philosophy is a major component of the former, whereas apparent 'fact' deduced through

scientific observation and reason, forms the basis of the latter.

In retrospect, it is evident that at least in conservation thinking, conventional wisdom and thought has preceded scientific understanding. By way of example, in 1930 the following statement was made in the annual report of the Department of Agriculture: "A genuine love of wild life by the people of our province is the only source of protection that is worth very much." (in Bossenmaier, 1978). In 1930, natural resources were transferred from the jurisdiction of the Federal Government to the Province of Manitoba and resulted in a new Game and Fisheries Act. It is important to note that since 1870, regulation of the use of wildlife was always under provincial control. Through an assumption that was never challenged, the provinces managed the wildlife under the provisions of the British North America Act. A section of that Act provided the provinces with jurisdiction over 'matters of local concern'. Wildlife was considered to be one of those matters (pers comm Bossenmaier, 1985). It was much later that wildlife evolved into a 'resource' as the term is understood today. Waterfowl was the only wildlife exception to this convention because of the Migratory Birds Convention Act, which, incidentally, had the agreement of the provinces. This historical observation exemplifies the significance of conventional understanding in wildlife conservation in Canada.

The opposition to game ranching is a reality: a philosophical statement of conventional wisdom. Unfortunately, in its attempt to express itself, it resorts to pragmatic reason, fails in its attempt and becomes termed illogical and irrational by the proponents of game ranching.

On the other side, the proponents of game ranching are of such pragmatic stripe that abstract reason is untenable to them. Expansion of the agricultural frontier, economic growth and development express their ingrained beliefs. However, they also have a certain awareness of the impact of further intrusion on the natural environment and seek to lessen it. It is a choice between traditional domestic livestock ranching or game ranching. To retain pure wild lands and wild rivers is an untenable option because of doctrine and symbolizes waste.

The concept of bringing Canada's remote lands into agricultural production is not new. In 1922, a Royal Commission (Rutherford *et al*) recommended development of muskox and reindeer industries in the arctic and sub-arctic regions. Experiments and studies continue, but the concept has been largely dismissed for economic and social reasons (Payne, 1977). Payne (1977) concluded that the herds of free-ranging barren-ground caribou restored to former numbers would constitute a more valuable asset to northern Canadians, not only in economic terms but for strong cultural reasons that the proposed alternatives

ignored. In more southern regions interest in elk ranching has resulted in more vociferous debate, especially during the 1970s and 1980s, due to enhanced communication and greater interest in and awareness of conservation issues among the Canadian public.

It is inevitable that the controversy surrounding game ranching will continue for some time. Canadian politicians will avoid the issue whenever possible due to its controversial nature, and the current *status quo* will tend to prevail.

However, the game ranchers (developers) will continue to build whatever herds they can, within the restrictions of game laws. Most of these men are economic opportunists (modern-day Allards and Pablos) attempting to capitalize on the growth philosophy of society. They offer increased production of the species being ranched but not increased overall productivity. Who can measure the cost? How much is a wolf worth relative to his commercially reared natural prey? Eventually the presence of commercial herds of game animals may be accepted by the public and legislative change to enable their commercial exploitation may be accomplished without public furor. The legislative change which is unacceptable at this time, may well at some future time be accepted by society and minority concerns may be easily overridden and dismissed.

THE WATERHEN PROJECT

Wildlife introductions or re-introductions are at best hazard-filled undertakings. The best laid plans can go awry. Failure to recognize the significance of a minor detail can result in at least a costly mistake or, more seriously, an ecological disaster. Both of these undesirable results can be readily portrayed.

There was an introduction of plains bison, *Bison bison bison* to the Carrot River area of Manitoba, near The Pas, in 1970, that did not work well. The bison failed to stay in the area of release, and wandered into the agricultural zone, causing havoc with farmers' fences and crops. The endeavour was a disaster; not to mention the cost of rounding up the animals with helicopters and drug-darting guns. The program had been in the formulation stages for approximately twenty years! Other disastrous introductions of record include: gorse to New Zealand; rabbits to Australia; and mongoose to Hawaii. Some areas have been subjected to more change through species introduction than others: the islands of Hawaii and Madagascar are notable examples.

Biological Investigation of Site

It may be technically incorrect to refer to the Waterhen Project as a re-introduction as it is uncertain that the wood bison was ever present in Manitoba. Although references to the historic presence of wood bison in Manitoba are scarce there are references suggesting their presence, as discussed earlier.

"The rangelands of northern Manitoba form a considerable resource. Currently they are understocked, and consequently the benefits which we can realize from these resources are greatly reduced. This under-utilization of rangelands is wasteful of resources...." (Payne, 1977:72).

Successful programs to restore abundance and diversity of wildlife can not fail to benefit the residents of the areas affected.

The methodology followed was to select the environment deemed most suitable for the wood bison in Manitoba. Of primary importance was appropriate habitat, but it was equally important that the environment be devoid of hazards such as poaching. Conflicts with agriculture and cattle ranching were also a major concern. Isolation was vital but accessibility was also identified as an important factor at this point.

Preliminary examination of the Province revealed two

suitable areas: the Swan-Pelican area to the north of Swan River and the Waterhen area east of Waterhen Lake between Waterhen and Easterville bounded on the east by PTH # 6 and to the south by PTH # 238 (Figures 1 and 5). The advantage of access resulted in the Waterhen area being examined first. Its deemed suitability resulted in it being the only area examined.

Initial ground-level surveys were followed with fixed-wing aircraft and helicopter surveys. These were preliminary to detailed habitat analysis from maps produced through interpretation of aerial photography. Satellite and computer techniques were not employed, due to their lack of sophistication in selection of a relatively small area for the enclosure (2300 ha) within what was roughly considered to be approximately 2500 sq km of suitable wood bison habitat.

Concurrent with habitat selection were negotiations with the Waterhen Indian Band to solicit and ensure their co-operation in the program. The results of these negotiations were highly positive and resulted in the Indian Band coming forward with their own initiatives for the program, far beyond the 'silent support' that is often accorded programs of this nature. This support welded the bonds of co-operation which were later to become the hallmarks of the entire program.

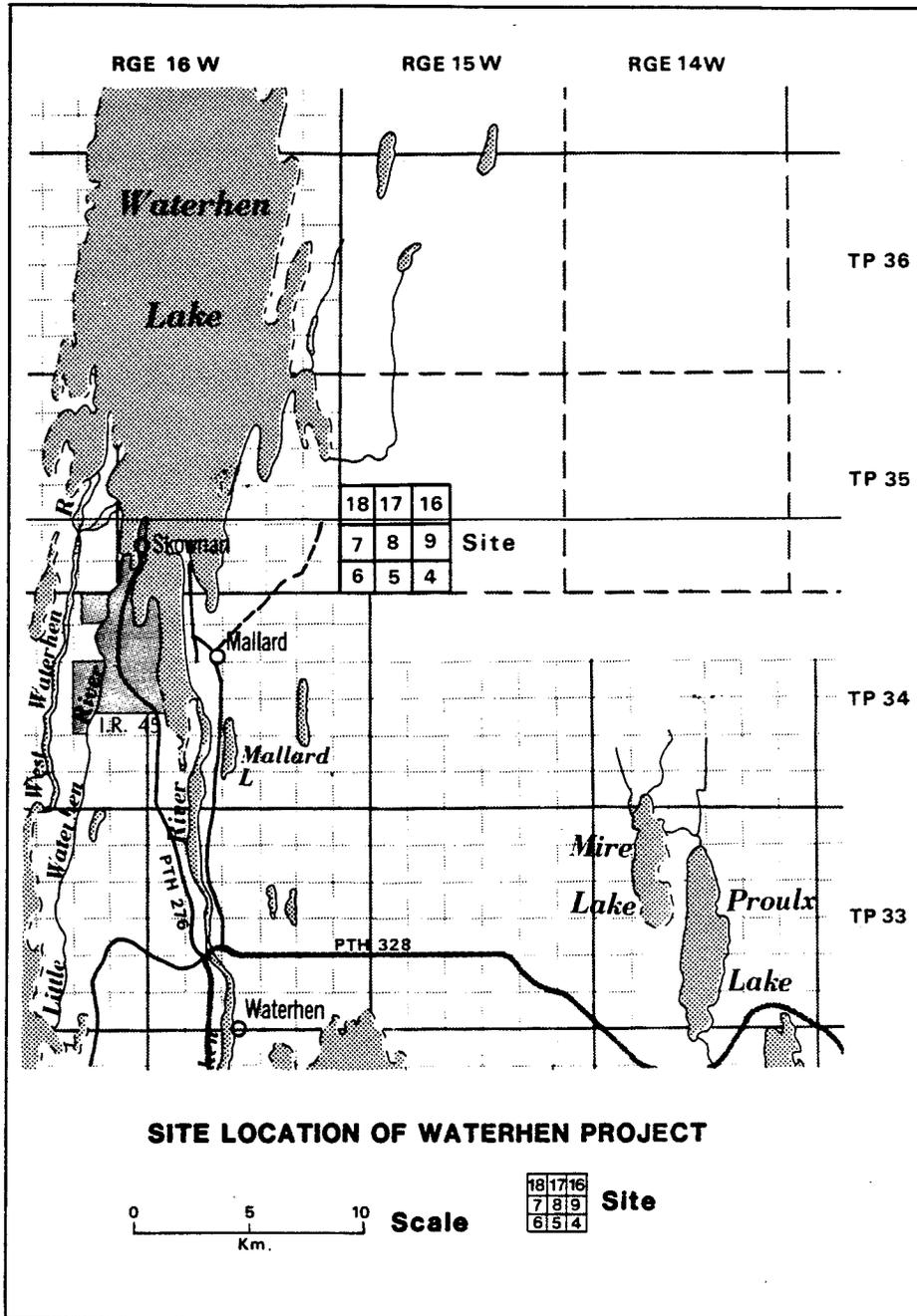


Figure 5 Site Location of the Waterhen Project

As stated, the site selected for the wood bison introduction was based on careful prior evaluation of physiographic, botanical and overall environmental factors.

Cursory examination of the Waterhen area reveals a ridge and swale topography. The higher ground supports a mixed boreal forest habitat at the interface of the aspen parkland and the boreal forest. Consequently, an ecotone environment is presented. This ecotone environment is reflected in the variety of wildlife species present in the area. It supports the greatest variety of ungulate species found in Manitoba: moose, *Alces alces*, elk, *Cervus elaphus manitobensis*, whitetailed deer, *Odocoileus virginianus*, mule deer, *Odocoileus hemionus* and woodland caribou, *Rangifer tarandus caribou* are all present in the area, although their abundance is low due to low primary productivity and heavy hunting pressure. Historically, bison (subspecies unknown) were also present in the area.

The upland areas are largely dominated by aspen, *Populus tremuloides* and *Populus balsamifera*. White spruce, *Picea glauca*, jack pine, *Pinus banksiana*, balsam fir, *Abies balsamea* and tamarack, *Larix laricina* are also present but in lower abundance.

The lowland fen area is dominated by sedges, *Carex* sp. The dryer parts (edges) of the fens support grasses of several species. The presence of reed grass, *Calamagrostis* sp was an indicator of suitable wood bison

habitat (Reynolds, pers. comm., 1981). Willows, *Salix sp*, Alders, *Ulnus sp* and horsetail, *Equisetum sp* are found on the fen edge and bullrushes, *Scirpus sp* and flag grass, *Phragmites sp* in the wetter areas.

Following mapping of the area through interpretation of aerial photography, a suitable location for the site of the enclosure was selected by moving a scaled 2300ha (3 mile square) transparent grid over the habitat map. The objective was to select a square area (a significant factor when fencing costs are considered), containing maximum fen habitat (the grazing ground of the bison) with reasonable access but also removed from agricultural and ranching activities. Habitat mapping revealed three classes of fen: a class most suited to wood bison, in very small quantity; a suitable class of habitat in large quantity, and floating bog which is unsuitable.

Another concern in site selection was that the fence be located primarily on the higher ground due to the difficulty of fencing across the fens.

"...fens present fencing problems as the depth to substratum of gravel or clay may be as much as two meters. Consequently, fencing 'on the fen' should be avoided ... (and) fens should wherever possible be crossed at the narrowest point." (Payne 1984).

Once a suitable area was located, more detailed habitat analyses were undertaken. A further helicopter

survey was conducted. The results were positive. In addition a more detailed classification of habitat within the fens was conducted.

The suitability of the area was confirmed by the predominant presence of sedges and grasses in the fens. The upland areas are important for resting and shelter. Their interspersal with the fens was considered desirable because of the influence of the woodlands on the local deposition, drifting and consolidation of snow cover. Consequently, areas of soft snow cover would always be available to the wood bison where through cratering they could graze beneath the snow. Wood bison experience difficulty feeding in areas where the snow surface has become consolidated through drifting.

In wildlife management programming, one of the major factors that the manager needs to consider is the role of people in the environment of the species under consideration. Only isolation, trust and the heavy involvement of the Indian people have safeguarded the wood bison at Waterhen to this date. The nature of the wood bison, in particular its roaming tendencies, are such that we can only hope that this new plan is successful in avoiding the problems experienced in previous relocations. Although habitat was a primary focus in the selection process, the entire environment was carefully evaluated.

In regard to protecting the wood bison from hunting by Treaty Indians, they are presently safeguarded by a

gentlemen's agreement reached between the Indian people of Manitoba and the Provincial Government.

The enclosure area has been designated as a wildlife refuge where no hunting or trapping is permitted.

Project Planning and Development

The Waterhen project began in 1981, on instruction of the Assistant Deputy Minister of the Manitoba Department of Natural Resources, when he directed the author of this dissertation to prepare a proposal and plan to establish a herd of wood bison in Manitoba. Subsequently, the author was responsible for development of the project in consort with the Waterhen Indian Band. "A Proposal to Re-Establish Wood Bison in Manitoba" was produced in 1981 (Payne, 1981). The proposal was largely based on economic potential, specifically on the potential revenue which would be generated through the hunting of a rare animal. Part of the proposal included de-listing the wood bison from 'endangered' to 'rare'. The capital cost of the project in 1981 dollars was estimated to be \$908,000.00, with operating costs estimated at \$112,500.00 annually. Its objectives were as follows:

1. To establish a free-ranging herd of wood bison;

2. To utilize the herd on a sustained yield basis;
3. To provide international recognition for the role of Manitoba in restoring an endangered species.

The Indian people of Manitoba endorsed the project provided that "legal options required to be examined to implement the project to regulate hunting of the herd do not infringe upon any existing Indian hunting rights". (First Nations Confederacy, 1982, unpublished letter).

A Manitoba provincial election in 1982 resulted in a change in policy regarding the proposed project, which prior to the election had been virtually approved. The hunting aspect of the proposal, designed to cater to the desires and aspirations of financially affluent trophy hunters. was no longer acceptable and consequently the proposal was revised (Payne, 1982). The proposal remained otherwise essentially unaltered, in respect to the strategy applied. However, its objectives departed significantly from those of the original. The revised objectives were as follows:

1. To provide economic development;
2. To provide short-term and long-term employment;
3. To re-establish a wild herd of wood bison in the Province of Manitoba;

4. To provide an agricultural base; and
5. To foster multi-agency co-operative wildlife management.

Although the revised proposal was politically acceptable the cost, essentially unchanged from the former proposal, was considered too high. However, by this time the Waterhen Band had become highly involved and with assistance from Indian and Inuit Affairs Canada was actively promoting the project and soliciting funds.

The Department of Regional Economic Expansion, through the Northern Development Agreement (a federal-provincial cost-shared agreement) expressed interest, but required an independent consultant's report, assessment and proposal on the project. Consequently, in May 1983, P.M. Associates' "Wood Bison Re-Establishment Proposal" (Coates, 1983) was submitted to the Waterhen Band and subsequently to the Northern Development Agreement. Its stated objectives were as follows:

1. To re-establish a wild herd of wood bison in the Province of Manitoba...and to exploit the same as an economic resource;
2. To provide short-term employment;
3. To provide long-term employment;
4. To foster multi-agency co-operative management of Canada's wildlife resources.

A reduced capital cost was projected largely on the basis that on-going government activities were not part of the cost of the project. The Board of Directors of the Northern Development Agreement approved of the proposal and agreed to fund it as proposed by P.M. Associates, with several sponsoring agencies, prominent among them the Province of Manitoba, Indian and Inuit Affairs Canada, Canada Employment and Immigration Commission, the Canadian Wildlife Federation and the Waterhen Indian Band.

The P.M. Associates' proposal advocated a novel innovation in the development of the Wood Bison Re-Establishment Foundation Inc., a non profit foundation that would fund the Waterhen project through private donations once the infrastructure was developed by government agencies. The foundation has since received good support and has as its patrons :

His Serene Highness, Prince Albert of Monaco;

The Honourable, Pearl McGonigal, Past Lieutenant Governor of Manitoba; and

Mr. Robert Bateman, wildlife artist.

Construction on the site of the Waterhen project began in August, 1983. The wood bison program at Waterhen has many objectives beyond the preservation of the wood bison sub-species. It involves job creation and aspires to long-term economic development. These aspects are major issues in a community which suffers from severe

economic depression. In fact they promise to become the major focus of the program.

It was extremely important that the multiple objectives of the Waterhen project be clearly understood by all of the parties involved. It is difficult for the unemployed to focus their expectations on future economic development when burdened by immediate financial hardships. The community of Waterhen desperately needs economic development which will provide jobs and income for individuals and the community. But, a more pressing and immediate need is for jobs to provide income to meet individual demands. The demand for jobs creates a conflict with economic development when future long-term employment opportunity is sacrificed in the interest of immediate job creation. Economic land development and establishment of infrastructure can no longer accommodate large amounts of physical labor; the use of machines will most often provide far greater economic return for the amount invested. Consequently, the immediate demands for employment conflict with lowest-cost development of infrastructure and threaten to strain limited financial resources. If the development of infrastructure was reduced the future long-term employment potential would be diminished. The compromise between these alternatives involved the careful planning of a socio-economic strategy.

The economic development potential of the wood bison

program is forecast in terms of revenue generated and jobs created. The economic developers see their objectives thwarted by short-term job creation priorities on the one hand and by conservation goals and ideals on the other. Conservation goals seldom fully accommodate economic development opportunity in conventional terms. The wood bison program may be an exception to this general rule, but its economic potential has yet to be demonstrated and realized. From a land management standpoint the wood bison has merit and can produce meat more economically than conventional cattle on marginal lands such as those in the Waterhen area. The economic potential of the wood bison is enhanced as an endangered species. It serves as a tourist attraction and may in future provide unique sport hunting opportunities. In combination these factors provide favourable economic prospects for the wood bison at Waterhen.

Wildlife management is expensive. Worthwhile programs cost millions of dollars, are not easily championed and are seldom sanctioned by governments because they fail to demonstrate realizable economic potential. The Waterhen wood bison program was approved largely because it embodied the objectives of conservation, economic development and job creation through the adoption of several distinct objectives, adjusting and adapting them to eliminate the mutually exclusive elements.

The diversity of the objectives resulted in a

protracted period of negotiation and planning. Conversely, it could be said that a protracted period of negotiation, compromise and planning resulted in diverse objectives.

To meet these objectives, the Waterhen Project became complicated and expensive. Many different agencies each with its own specific mandates, have been involved, each with its own specific criteria which must be met. Politics, lobbying and public relations also strongly influence the objectives and the interpretations of them.

The process followed in planning the program was basically similar to that outlined by Burch and MacKenzie (1976). The initial conceptualization of the program took place within the wildlife sphere of the Government of Manitoba. The primary objective was clearly a "wildlife" one with 'spin-off' benefits to enhance its saleability. The wildlife objective was a laudable one on behalf of an endangered species and contained many components. In summary, it was to restore the endangered species to the degree necessary to ensure survival and again become an asset to society. The original objective involved raising wood bison in captivity, releasing the progeny to the wild, and eventual removal of the enclosure once a wild herd was firmly established and the process of de-listing the wood bison as an endangered species was in effect. The wood bison would be a valuable addition to Manitoba's fauna and would eventually be managed along lines similar to other wildlife in the Province.

However, there were constraints to development of such unilateral programming. The support of the Indian people of Manitoba was indispensable if the wood bison was not to be hunted at will. Recognition of native hunting rights, enshrined in Treaty, the Canadian Constitution and other legislation must not be compromised. The financial magnitude of the program required the involvement of various funding agencies which included private conservation interest groups, job creation arms of government (local, provincial and federal) and economic development bureaucracies.

The initial constraint to program development was opposition to compromise of the philosophically derived objectives of wildlife conservation agencies. However, it was eventually agreed that programming based on compromise was more desirable than no programming. Agreements in principle were accordingly reached, to the effect that it was not improper to plan for the commercial use of an endangered species, in a manner which embodied its preservation and conservation as opposed to exploitative management. The objection to game ranching in principle and to development of the commercial potential of the wood bison were particularly contentious issues. The debate on specifics continues, but sufficient compromise has been achieved to enable development to proceed. At least partial resolution of the ideological dispute between the Manitoba Wildlife Branch, the Canadian

Wildlife Service and the Canadian Wildlife Federation had to be achieved prior to negotiation with the bureaucracies of the economic development sector of Government.

Nor was agreement with the Indian people regarding hunting of the wood bison easily secured. In 1981-1982, the First Nations Confederacy (F.N.C.) was in a state of political upheaval and many Indian Bands, especially in northern Manitoba, had withdrawn their membership. Consequently, the following resolution from the F.N.C. was only endorsed by about one half of the Indian Bands in the province. The support of the northern bands was absolutely essential. Fortunately, the Tribal Councils were gaining political recognition at that time and meetings with the Swampy Cree Tribal Council in The Pas and the Keewatin Tribal Council in Thompson secured the agreement in principle of the remaining Indian Bands in the province. The F.N.C. resolution reads as follows:

"Whereas, the Department of Natural Resources has proposed to re-introduce the wood bison into Manitoba in and around the area of the Waterhen Band. And whereas, this project promises to enhance the economic development opportunities for the Waterhen Band through joint band/provincial management of the project with the objectives of turning over control and management through mutual agreement of the project to the band.

Be it therefore resolved, that the Chiefs of F.N.C support the Waterhen Band in [its] efforts to implement these goals. Be it

further resolved, that the Chiefs direct the F.N.C. Grand Council to ensure that the various legal options required to be examined to implement the project to regulate hunting of the herd do not infringe upon any existing Indian hunting rights." (Unpublished letter from First Nations Confederacy, 1982.)

It needs to be noted that this resolution has no legal status. It is a statement of principle and no more. The required legislative process to protect the wood bison from hunting by Treaty Indians, within the provisions of the Natural Resources Transfer Agreement, is to amend the agreement. The amendment would exclude the wood bison from the provisions of Article 13 of the agreement, which reads:

"13. In order to secure to the Indians of the Province the continuance of the supply of game and fish for their support and subsistence, Canada agrees that the laws respecting game in force in the Province from time to time shall apply to the Indians within the boundaries thereof, provided, however, that the said Indians shall have the right, which the Province hereby assures to them, of hunting, trapping and fishing game and fish for food at all seasons of the year on all unoccupied Crown lands and on any other lands to which the said Indians may have a right of access." (in McNeil, 1983:20).

Such amendment requires the assent of the Legislature of Manitoba and the Parliament of Canada. It is speculated that the Indians of Manitoba would not consent to the amendment and that without their consent legal amendment is unlikely in the near future.

The Waterhen Indian Band was involved in all deliberations following selection of the area close to the community as the most suitable location for wood bison in the province. The general area had been selected, subject to specific site selection during initial development of the concept. Support of the Band, and especially Chief Harvey Nepinak, was invaluable in securing agreement with the FNC and the Tribal Councils.

Once the basic principles of the program were agreed upon by the wildlife agencies and the Waterhen Indian Band the formidable task of securing funds was undertaken. Wildlife Branch or Indian Band budgets are not such that a major new program (estimated at approximately \$1Million over three years) can be absorbed with existing funds. The financial projections of the program were, and would continue to be, tenuous and long-term. In addition the program was outside the realm of conventional economic development ventures. Predictably, the proposal met with general skepticism, but there were some supporters, especially in the Government of Canada, Department of Indian Affairs and the Canadian Wildlife Federation. The Waterhen Indian Band, the Department of Indian Affairs and

the Manitoba Wildlife Branch functioned as promoters and solicitors of funding. In July, 1983 a major financial commitment was made by the Department of Regional Economic Expansion (D.R.E.E.) through the Northern Development Agreement based on the recommendations of the consultants' (P.M. Associates) report (Coates, 1983). D.R.E.E.'s participation was, however, conditional upon proportional financial commitments by the Province of Manitoba, the Canadian Wildlife Federation, Canada Employment and Immigration Commission, the Department of Indian Affairs, the Waterhen Indian Band and others. The Canadian Wildlife Service (C.W.S.), Parks Canada (P.C.), West Region Tribal Council (W.R.T.C.) and the Manitoba Wildlife Branch (M.W.B.) were already committed to long-term participation. Through the Northern Development Agreement sufficient momentum was achieved to permit construction on the site to begin in August 1983, partially under the auspices of the Manitoba Jobs Fund. From there on, many aspects of the program would be financed through short-term employment-creating programs.

Despite lengthy discussion, agreement and bureaucratic 'commitment to paper', the objectives have continued to be beset by controversy. Within the agreements in principle, there has been wide disagreement among the parties involved concerning action or decision-making regarding such aspects as the disposition of the surplus animals and the rate of release to the wild.

Consequently, the program objectives have been constantly under direct or indirect review and refinement. An unforeseen event may force clarification of principle, as for instance, when a bull had to be destroyed and it was agreed to distribute the meat among members of the Waterhen Indian Band.

Reproduction Characteristics of the Wood Bison at Waterhen

The first shipments of wood bison arrived in February 1984. There were 34 animals and the sex distribution was equal. They were surplus stock from various zoological parks and gardens in western Canada, a result of the successful breeding that had taken place since the mid-1970s. Upon arrival they were introduced to a 255 ha (one-mile-square) enclosure, where they were fed, since they had been raised in an essentially domestic manner. Notwithstanding the stress of relocation during pregnancy only a few months earlier, eleven calves were born on the site in June, 1984. Only one failed to survive, being lost to unknown causes.

During the winter of 1984-85, the entire expanded 2300 ha (three-mile-square) enclosure was made available to the wood bison. Disappointingly, only three calves were born in 1985. Several theories were advanced relative to this poor breeding performance:

1. Was the selected range unsatisfactory from a nutritional standpoint, for wood bison ?
2. Were essential trace minerals, such as selenium, lacking in the area ?
3. Had biting insects, primarily Tabanids (bulldogs, horseflies), inhibited breeding?
4. Were there too many bulls relative to the number of breeding cows in the herd, and had disruptive competition among the bulls resulted in few cows being successfully bred ?
5. The 1984 calf crop had been conceived prior to relocation. Was relocation, and the bringing-together of animals from several different sources, a possible cause of a low breeding performance level ?
6. Could wood bison, raised in captivity, perhaps not adjust to the relatively wild environment in a manner that would maintain breeding performance ?

The sixth question was satisfactorily set aside in 1986, when healthy calves were produced. It was subsequently learned (February, 1987) while this dissertation was in the final stages of preparation that only 11 calves were born or that only 11 had survived. It was not possible to derive an accurate count prior to that

time, when the animals were rounded-up. The sex ratio of the calves was six males, four females and one of undetermined sex. The latter escaped from the corral and was not examined. Its small size indicated that it was probably female. The other five questions remain at least partially unanswered as no scientific trials were conducted to test specific hypotheses. It is conceivable that the one-mile-square enclosure was too small to nourish the 34 bison that had been placed there or too small to provide escape refuge for non-breeding competing bulls. Tests were undertaken to ascertain an indication of selenium levels. They were found to be on the low side, but due to the toxicity dangers of high levels no supplements of selenium were provided. Tabanid numbers and activity, in 1985, were at a lower level than in 1984. The number of bulls relative to cows did not decrease in 1985, but more escape refuge was available during the 1985 breeding season, in the 2300 ha enclosure. The overall improvement in the physical condition of the animals, based solely on visual observation, indicates that a one year period is required for adjustment to the new environment. Subsequent arrivals of wood bison at the Waterhen site have shown similar physical improvement following one year, although such improvement has not been universal.

Since the project began, two major biological concerns have been identified:

1. Could fire enhance range conditions and consequently the biological productivity of wood bison ?

2. How significant was harassment by tabanids and could tabanid populations be controlled ?

Both of these concerns were investigated by the University of Manitoba, through graduate student research projects. The range condition and potential of controlled burning was investigated by Berezanski (M.Sc. Student, Zoology Department.), in 1984 and the tabanid situation was studied by Morgan (Natural Resource Institute), in 1985.

Berezanski (1986:96) recommended that rotated controlled burns be conducted at Waterhen. The rationale for the recommendation was as follows:

"The reason is to afford the Waterhen wood bison herd a source of nutritious sedge shoots early in the spring. Burning effects are two-fold and interdependent: burning would remove the litter and promote early growth (as a result of increased solar warming): burning would remove the litter and make the emerging shoots easier to find."

Reynolds (1976:42) was similarly of the view that the carrying capacity of the Slave River Lowlands could be increased with range management. He recommended research

to study the effect of fire on herbage production. Berezanski (1986) found no significant increase in herbage production, in the summer following burning. The advantage of fire-management hence appears to lie solely in the earlier availability of new growth in spring. Further study is required to ascertain whether or not productivity in subsequent years is enhanced. Sawatzky (pers. comm., 1987) contends that spring burning in fact may inhibit productivity as a result of the cooling (refrigeration) effect of increased evaporation as a result of the ground being more exposed to solar radiation.

Morgan, (1987) found six species of tabanids to be present in the Waterhen area. The study concluded that harassment of the wood bison increased in proportion to tabanid activity, which increased with temperature. The chemical permethrin was found to be effective in controlling tabanids but its application remains a problem: spray application was found not to be practical. Continued use of the Manitoba Fly Trap and further investigation of chemical protection were recommended, including the use of insecticides in cattle oilers.

Involvement of Wildlife Agencies

Although the guidelines for community resource development as presented by Burch and MacKenzie (1976) were not deliberately applied to development of the Waterhen Project, the parallels are striking and the success of the project to the end of 1986 certainly adds credibility to the guidelines. Burch and MacKenzie (1976) attest that : "Resource development carried out in close co-operation with local people is virtually assured of success." and "Where social and economic goals have not been properly defined....the chance of success is greatly impaired." In addition the program's organizational structure provides maximum control to the community. Burch and MacKenzie (1976) caution, moreover, that the on-going evaluation and modification of objectives in consort with the community is essential. Projects may require more than one type of funding. Involving the community in negotiations will enhance local managerial skills and increase commitment to the attainment of agreed objectives.

Since the program became operational, wildlife personnel have maintained a sustained involvement with the Waterhen Project, serving largely as advisors and consultants. It is important that they avoid directing the operation and that they fully recognize the authority vested in the local controlling organization.

Bureaucratic administrative procedures limit the effectiveness of government workers in this field. Standard procedures and established practices designed to enhance the efficiency of government organizations at large can have severe negative impact on work of this nature. Consequently, inputs from wildlife personnel must be timely and accurate and made in a manner that can be clearly understood.

A common cause of failure of projects of this nature to become self-sufficient in administrative function is the often over-zealous (and at times impatient) desire of the field worker to achieve material success. Rather than assisting the local administration to resolve a difficulty, he removes it, in the interest of expediency. Short-term material success is achieved but dependency is fostered and humanity is not served. Patience and wise judgement best determine the time and form of worker intervention. There are times when timing is critical and times when it is not. In regard to methodology, there may be numerous ways to achieve a specific goal. It is principles such as these that I sought to guide me in facilitating the development and management of the Waterhen Project.

Furthering local initiative and autonomy is the fulcrum on which the continuing success or failure of the program rides. Extension skills are essential for outsiders when dealing with communities on programs of

this nature. Burch and MacKenzie (1976) attempted to identify these skills, beyond technical resource expertise, as follows:

1. Competence in community communication;
2. Capacity to empathize;
3. Respect for others;
4. Ability to work in a team;
5. Ability to handle new or ambiguous situations;
6. Skill in applying problem-solving methods.

Development of a Wild Herd of Wood Bison at Waterhen

Development of a wild herd is an objective integral to the Waterhen Project. It is hypothesized that animals born on the site will demonstrate a tendency to remain in the general vicinity of their birthplace. This hypothesis is to some degree based on speculation; consequently the attempt to develop a wild herd is to a substantial degree experimental. There are three major identified problems which may be encountered. They are as follows:

1. Illegal hunting of free-roaming wood bison by poachers or hunting by Treaty Indians pursuant to their rights, or a combination of both;
2. Conflict with agricultural activity, in the form of damage to property (i.e. fences, barns, etc.), damage to crops or interference with domestic livestock management;
3. Danger to people. If the bison extend their range to the highway network, they would pose significant danger to traffic and to local residents who might be attacked.

Should any of these problems be encountered, it will probably be necessary to abandon the attempt to establish a free-ranging, wild herd. In that event, if circumstances permit, the bison will be rounded-up and returned to the enclosure. To facilitate the release of animals, a release pen has been constructed. It comprises 1533 ha and will later be used in captive herd management. The release program will be guided by the following principles:

1. Only animals born at the Waterhen site will be candidates for release.
2. Animals to be released will normally spend one year in the release pen, immediately prior to release.

3. While in the release pen, animals will not normally be provided with supplemental feed. However, supplemental trace elements will be provided and in the event that animals must be fed, the release schedule may be amended.

4. The number of animals initially released to the wild will be optimized to ensure biological sustainability while safeguarding against major financial and political difficulty in the event of failure, i.e. if a "forced" termination of the experiment necessitates re-capture or direct harvest. The impact upon the captive herd, of removing animals from it, would also receive due consideration.

5. Age and sex characteristics of the animals released will reflect a herd structure normally occurring under wild conditions.

6. Subsequent releases will depend on the success of the first and procedure may be modified in accordance with experience.

7. All animals released will be equipped with radio transmitters, to facilitate monitoring of their movements and activities.

The first release is planned to take place in 1988. Release candidates will be re-located to the release enclosure in 1987. It is anticipated that 15 to 20 animals will be released in the initial attempt to

establish a wild herd. Subsequent releases may include selected mature bulls to accomodate trophy hunting interests and thus enhance the potential economic returns to the Waterhen Project.

The age class selected for marketing either through meat sales, live sales or trophy harvest is of paramount significance to effective economic management of the herd. Generally speaking, animals should be marketed as soon as possible. Herd management should strive for maximized growth in the early years, toward marketing for the meat market in the two year old age class.

Heifers, bred-heifers and breeding cows for live sale may be marketed in various younger age classes. Prices increase accordingly as the animal matures from heifer to cow with best prices to be expected for young cows with calf at heel. Careful scrutiny of the prevailing market prices will ensure best returns.

Bulls may attain trophy status as early as age four and certainly by six years of age. Older bulls are at increased risk due to increasing potential for horn damage as the animal gets older. Forecasting potential trophy harvest is difficult, as many animals will never attain trophy status. Lack of availability of trophy wood bison will make lower class animals saleable, in the early years, but this market will decline as more trophy-class animals become available.

Further discussion regarding this aspect is contained

in "Economic Projections for the Waterhen Project", below. Potential population increase in the wild herd is discussed in the section titled: "Models of the Biological and Economic Potential of the Waterhen Project", subsection "Population Growth of the Wild Herd".

Economic Potential of the Waterhen Project

The economic potential of the Waterhen Project can not be accurately forecast at the present stage of development. There is potential for economic return through trophy harvesting of members of the wild herd, which could be supplemented with selected bulls from the captive herd. Licensed recreational meat hunting could also provide local benefit. The captive herd can be managed to produce trophy bulls, breeding stock for live sale and meat production for sale or local use. All of these options are inherently compatible. The economic potential clearly exists but, due to national and international interests which determine the status of the wood bison, the future cannot be predicted with confidence until the question of down-listing is resolved.

Failure to down-list the status of the wood bison from "endangered" to "threatened" by C.O.S.E.W.I.C. (proposed for 1988) and later by C.I.T.E.S. (proposed for 1989, if down-listed by C.O.S.E.W.I.C. in 1988), its

economic potential is virtually restricted to local domestic use and to a role as an attraction for tourism. However, there is sound reason for optimism that C.O.S.E.W.I.C. and C.I.T.E.S. will revise the wood bison status. The last status report to C.O.S.E.W.I.C. on wood bison was submitted in 1978 (Novakowski, 1978), at which time C.O.S.E.W.I.C. recognized its status as "ENDANGERED". Since that time, considerable success has been attained in attempts to up-grade the survival potential of *Bison bison athabascae* as a sub-species. Whereas in 1978 total numbers were estimated at 450, *B. b. athabascae*, in 1986, numbered in excess of 2000. In 1986, the Western Wildlife Directors' Sub-Committee of the Federal Provincial Wildlife Conference established a task force to prepare a revised status report to C.O.S.E.W.I.C. on wood bison. The task force is composed of representatives of the Canadian Territories, the Western Provinces and the Canadian Wildlife Service. The task force and the Western Wildlife Directors agree that the status of the wood bison could, and should, be down-listed from "endangered" to "threatened", while progress in restoration continues toward justification of ultimate de-listing to "not in any category", a category reserved for species which have been reviewed by C.O.S.E.W.I.C. but not assigned a status.

At this time, it appears probable that the wood bison will be down-listed and that its economic potentials can then be more fully realized. However, local, provincial,

national or international opinion, events or politics could intervene and cause the opportunity to be lost. C.I.T.E.S., for example, is a highly politicized, lobbyist forum. Should the Canadian delegation, for instance, offend the sensitivity of some African nation in regard to a particular species, repercussions could result in a major block of international votes being mobilized against a Canadian recommendation to the Convention, for the modification of the status of *Bison bison athabascae*. Whereas it is relatively easy to have a species declared endangered, especially if the species is contained within the boundaries of the proponent nation, it is difficult to secure a down-listing. A well-documented, persuasive, scientific case carries no assurance of vindication in this forum.

MODELS OF THE BIOLOGICAL
AND
ECONOMIC POTENTIAL OF THE WATERHEN PROJECT

The use of models to simulate perception of reality is widely practiced to explain observations and suggest the processes which may have brought them about. Models are also used to predict what may occur at some time in the future, based on past and present observations and assumptions. Assumptions generally follow the pattern that present trends will continue or similar observed situations will be repeated. The model attempts to embody the factors which determine future events. Obviously there is a high potential for error. Subjective analysis has identified and eliminated what appear to be extraneous factors and subjective judgement has defined the assumptions. Bartlett (1981) offered the following observations regarding models, and cautions against an over-reliance on the predictive value of models:

"One thing to be quite clear about, and that is the purpose of mathematical models. They will not tell you what is, but what may be, and how what is may have arisen, or what it may become. In population biology the present situation is interesting, because, perhaps for the first time, we are beginning

to have a superfluity of models, so that, as in all good science, we have to try to discriminate between them, not only against known facts, but against future observation or experiment actually suggested by the models."

While recognizing the inherent limitations of models, the relocated wood bison population was nevertheless modelled to estimate population growth potential. The predictive value of the model is, however, undoubtedly compromised by the limited scale and scope, as well as the wide variability of the data base upon which the assumptions are based.

The Model

A modification of "General Ungulate Model, Version 3.0" (Johnson, 1984) known as 'PolarPop' (Johnson and Knudsen, 1985) was used to conduct the simulations. Although the model was originally designed for polar bears, it permits forecasting of wild ungulate population dynamics to be made, when data on recruitment and various forms of mortality are inserted. Because it is a mathematical model, and given the comparable life-span potentials of polar bears and wood bison (i.e. forty years), it is also well suited to the modelling of a wood bison population. The following information is required

to run the model:

1. The number of animals in the herd;
2. The age and sex structure of the herd;
3. The postnatal survivorship;
4. The number of animals lost to each mortality factor impinging on the population.
5. The relative vulnerability of age and sex classes to each mortality factor (equal vulnerability will normally be assumed).
6. The age specific reproductive rates.

Background Information and Assumptions

The total number of animals introduced to the compound and their age and sex was known. Data on the remaining four characteristics of the bison were severely lacking and were derived by estimates based on observations recorded in the literature or in files of other wildlife agencies engaged in the management of wood bison. Two herds in particular exhibited potential for providing data upon which to base assumptions - the herd in Elk Island National Park in Alberta and the MacKenzie Bison Sanctuary herd in the Northwest Territories. Both

herds were established in the early 1960s following an outbreak of anthrax in Wood Buffalo National Park which threatened the survival of the remaining rediscovered wood bison. Growth of the Elk Island herd was inhibited by the presence of disease up to 1973, and herd development was thereafter limited by out-migration when animals were used as foundation stock to establish other populations. Fortunately the animals relocated to the MacKenzie Bison Sanctuary had fared well and its population growth indicated a disease free herd. In addition, the Government of the Northwest Territories was able to supply population estimates based on surveys over a twenty-year period. Trial runs of the model revealed that reproductive rates and postnatal survivorship were high and that mortality in general was low, otherwise the population data derived from observation could not be replicated in the model. Twinning was assumed not to occur but the generally held belief that bison cows would only calve twice every three years had to be rejected. Hence, to replicate the biological productivity observed in the Mackenzie Bison Sanctuary in the model, the following assumptions were made:

1. Ninety percent of all cows over three years of age will produce a calf each year;
2. Eighty percent of all calves born will survive;

3. The sex distribution of the calves and survivorship by sex will be equal;
4. There are no other measurable mortality factors in the herd;
5. Twinning will not occur.

It is not to be inferred from the foregoing that any of the above assumptions are true. What is implicit is that their combined effect permits the observations from the MacKenzie Bison Sanctuary to be replicated in the model. A degree of flexibility in the manipulation of variable factors can be incorporated, i.e. the reproductive rate can be increased and the postnatal survivorship lowered or other mortality increased. However, the outcome must remain unchanged.

To predict population potential at Waterhen, the assumptions necessary to replicate population growth in the MacKenzie Bison Sanctuary were combined with the age and sex data of the starting population and subsequent additions. The resulting projections were used to determine the number of animals that would be available for release to the wild in future years without overly depleting the captive stock. In order to assess the magnitude of variance from the reproductive and postnatal survivorship assumed in effect in the MacKenzie, the rates were bracketed and the model was re-run with the insertion of various assumptions. A wide range of population growth

possibilities resulted. Although it is not possible to assign a probability of accuracy to the results there is reason for optimism based on the experience in the MacKenzie Bison Sanctuary, the disease free status of the herd and the supportive intervention which can be applied as required.

Population Projection for the Captive Herd

Figures 6 through 9 depict various population growth scenarios, depending on the management strategy adopted. The following assumptions, relative to the biological reproductive capacity and survival of bison, apply to these figures:

1. Ninety percent of all bison cows will produce one calf annually once they attain three years of age;
2. Twinning will not occur;
3. Eighty percent of all calves born will survive to at least one year of age;
4. The sex distribution of the calves and their survivorship will be equal;
5. Losses to the herd for undefined reason will be five percent.

Figure 6 shows the anticipated growth in the absence of any management strategy which would serve to reduce the population. The population is broken down into bull, cow and calf segments. In the twelve-year scenario the population is projected to grow from 83 to 364 animals. The proportion of bulls to cows moves toward equalization during this period because the probability of mortality in the male segment of the herd is higher than in the female segment due to their higher number. The male to female sex ratio changes from 56%:44% to 51%:49%.

Population Projections with Releases to the Wild and a Harvesting Strategy

Figure 7 incorporates the plan to remove 14 animals in 1987 for release to the wild in 1988 and to remove 10 each year thereafter through 1993. It also incorporates the removal of selected bulls and cows (1994-1997, see pages 95-104). The released animals have a 50%:50% male:female sex ratio and are evenly distributed in the one- and two-year-old age classes. The proportion of bulls to cows decreases from 56%:44% to 34%:66%.

NON-MANIPULATED HERD GROWTH, 1986-1997				
YEAR	MALE	FEMALE	CALVES	TOTAL
1986	42	30	11	83
1987	48	36	12	95
1988	54	42	15	112
1989	60	48	18	127
1990	67	56	22	145
1991	76	64	24	165
1992	86	74	28	187
1993	97	85	32	214
1994	109	98	37	244
1995	124	112	43	279
1996	140	129	49	318
1997	158	150	56	364

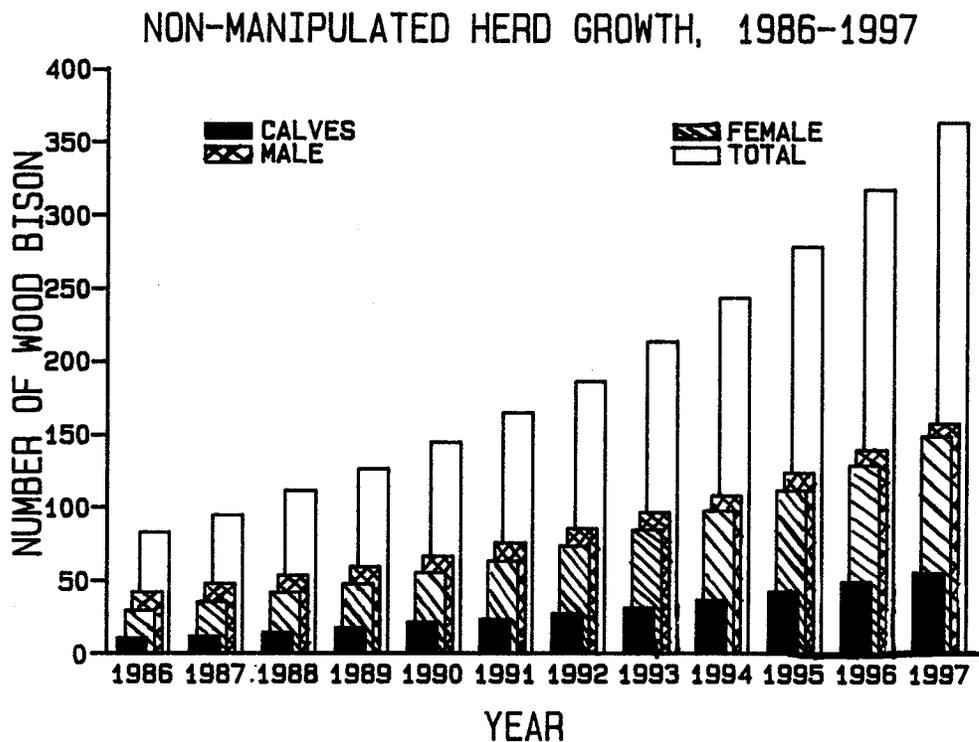


Figure 6 Projected growth of the unstructured 1986 population, in the absence of age-sex structure manipulation, through additions or removals.

MANIPULATED HERD GROWTH, 1986 - 1997				
YEAR	MALE	FEMALE	CALVES	TOTAL
1986	42	32	11	85
1987	39	30	20	89
1988	57	48	20	125
1989	64	55	11	130
1990	62	57	14	133
1991	61	61	19	141
1992	58	66	23	147
1993	51	69	24	144
1994	46	73	33	151
1995	45	81	33	158
1996	50	78	33	161
1997	43	82	33	158

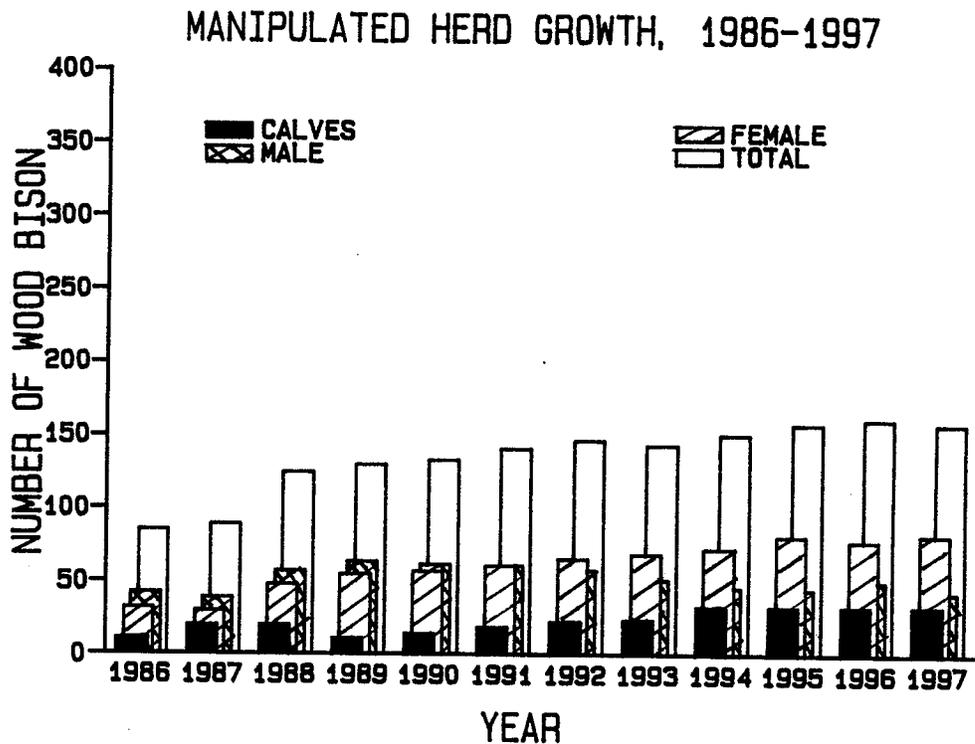


Figure 7. Projected growth of the unstructured 1986 population, with additions and removals, to structure the age-sex ratios.

Growth of the Wild Herd

The potential growth of the wild herd is shown in Figure 8. The assumptions used to model the captive herd have been modified to reflect the anticipated lower biological performance of the wild herd. The following assumptions were made:

1. Eighty (not ninety) percent of all cows over three years of age will annually produce a calf;
2. Seventy-five (not eighty) percent of all the calves born will survive;
3. Other assumptions remain the same.

These alterations were made to the assumptions to allow for the anticipated reduced herd productivity in the wild, due to a reduced intensity of management and higher hazard and mortality factors.

These models assist in the development of management plans for both the captive and wild herds in the Waterhen area.

PROJECTED WILD HERD GROWTH, 1986-1997				
YEAR	MALE	FEMALE	CALVES	TOTAL
1986	0	0	0	0
1987	7	7	2	16
1988	8	8	14	30
1989	13	13	14	40
1990	17	16	16	49
1991	20	21	18	59
1992	24	27	22	73
1993	31	34	16	81
1994	37	40	20	97
1995	44	46	24	114
1996	52	52	30	134
1997	60	60	36	156

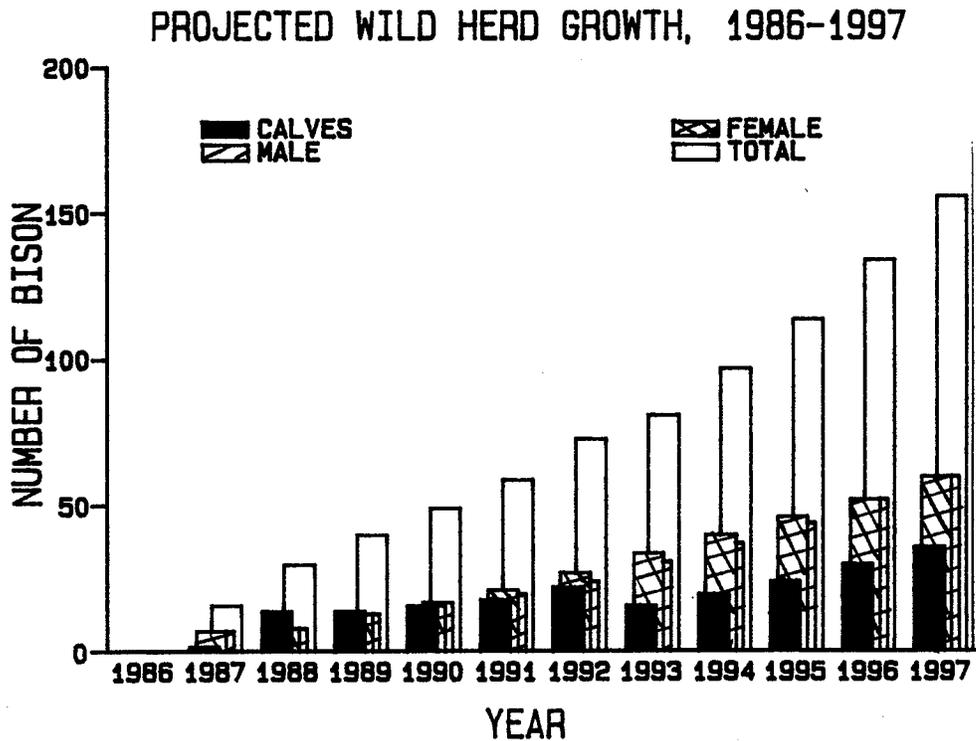


Figure 8 Projected growth of wild herd, 1986-1997.

Economic Projections for the Waterhen Project

The economic potential of the Waterhen Project is determined by the number of wood bison available for live sale or harvest. The potential harvest is illustrated in Figure 9. All animals for harvest, by various means, will be individually identified in the model. This management strategy advocates only a modest refinement of conventional wildlife management practice, which readily resorts to harvest composition selection being defined by sex and minimum age criteria.

The following discussion of the economic potential of the Waterhen Project presumes down-listing of the status of wood bison by C.O.S.E.W.I.C. (from endangered to threatened) and by C.I.T.E.S. (from Appendix 1. to Appendix 2).

It is difficult to gauge the market potential of the wood bison. Its status as an endangered species has precluded development of market demand. Except for some small zoo populations, the wood bison is restricted to Canada. There has been virtually no poaching and consequently it may be assumed that no black market exists. Nonetheless, it is reasoned that a strong latent demand exists and it is only on this reasoning that market demand can be estimated. Trophy hunting, live sales, meat production and tourism are estimated to possess the potential of ensuring a sound economic future for the

HERD HARVEST, 1986-1997				
YEAR	MALE	FEMALE	CALVES	TOTAL
1986	0	0	0	0
1987	0	0	0	0
1988	0	0	0	0
1989	0	0	0	0
1990	5	0	0	5
1991	5	0	0	5
1992	10	0	0	10
1993	15	5	0	20
1994	15	5	0	20
1995	15	5	0	20
1996	10	15	0	25
1997	20	10	0	30

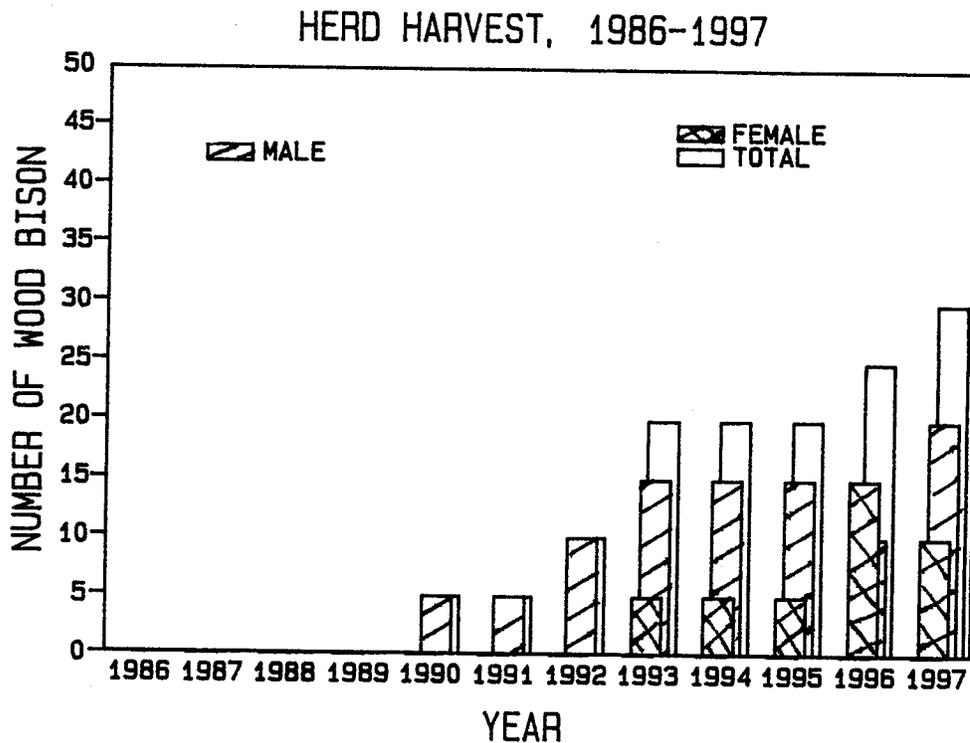


Figure 9 Projected harvest of wood bison, 1986-1995.

Waterhen Project. Detailed cost : benefit analyses have not been conducted, as the required range of assumptions and impossibility of controlling and isolating events would render the results of such exercises into mere speculation.

These projections of economic potential have, therefore, been based on the operation of free enterprise supply and demand principles in the market place, together with experience gained elsewhere in North America in the management and marketing of plains bison. These projections are based on conservative assumptions; monetary estimates are made only where magnitudes are known or to indicate an order of magnitude.

The annual cost of operating the Waterhen Project is relatively accurately estimated at \$120,000 per year. It is presumed that the project has the potential to more than offset this cost. The following prospects are envisaged:

1. Hunters will desire wood bison trophies to complement those of plains bison they already possess, due to the morphological differences in the sub-species which are particularly evident when viewed in a side-by-side situation. Initially, the marketplace can be expected to place a high monetary value on trophy animals.

2. Ranchers still extoll the virtue of hybrid vigor. The larger size of the wood bison and

the fact that it readily cross-breeds with the plains bison, will ensure a market for breeding stock with bison ranchers. Purebred ranches will also develop.

3. Meat production is the primary objective of most ranching operations. Buffalo meat currently sells on the specialty market at a considerable premium relative to beef. The meat is low in cholesterol, stimulates no known allergies and is in demand in the restaurant and health food trade. Demand continues to exceed supply; this situation is expected to prevail for some time. Personal communications with bison ranchers (Lenton, 1985, Eisner 1986 and Throlson 1986) indicates that they have not endured the economic difficulties encountered by cattle ranchers in recent years.

4. The wood bison can serve as an additional tourist attraction to the Waterhen area, which is already renowned for pickerel fishing, duck hunting, bear hunting, white pelican viewing etc. Roy (1961) assured the Waterhen area a place in history, in her historical novel of its early European settlement, "Where Nests the Waterhen".

Even though it cannot yet be conclusively demonstrated, indications are that the Waterhen Project has good prospects of becoming an economic success. As the wood bison become more numerous, the opportunities for their economic utilization may be expected to change. A

pattern of adaptation including selective trophy harvesting, representing the highest economic return for an individual animal, through sales of breeding stock (a moderately high return per animal), to meat sales where only a moderate return is forecast, may be expected to emerge.

An age and sex distribution structured to meet specific economic objectives is prerequisite to successful financial herd management. In 1986, the age and sex distribution of the wood bison at Waterhen was grossly unstructured (Figure 10). This distribution was used to project the future prospects of the herd. No mortality other than anticipated natural losses is reflected in Figure 10, nor did any in fact occur. To optimize economic return through trophy hunting (males) and sales of breeding stock (females and males), a herd structure similar to that projected for 1995 is desirable (Figure 11). In that year, surplus males are sold through hunting (older animals) and live sales (younger animals). Older, non-productive females are sold for meat sales.

Following down-listing of the wood bison to threatened status, the wood bison may be made available as trophy animals. In such event, an economic return on the order of \$10-20,000 per animal might well be realized, at least during the initial years. A herd structure, similar to that presented in Figure 12, would make available 10 trophy wood bison annually. Revenue would be supplemented

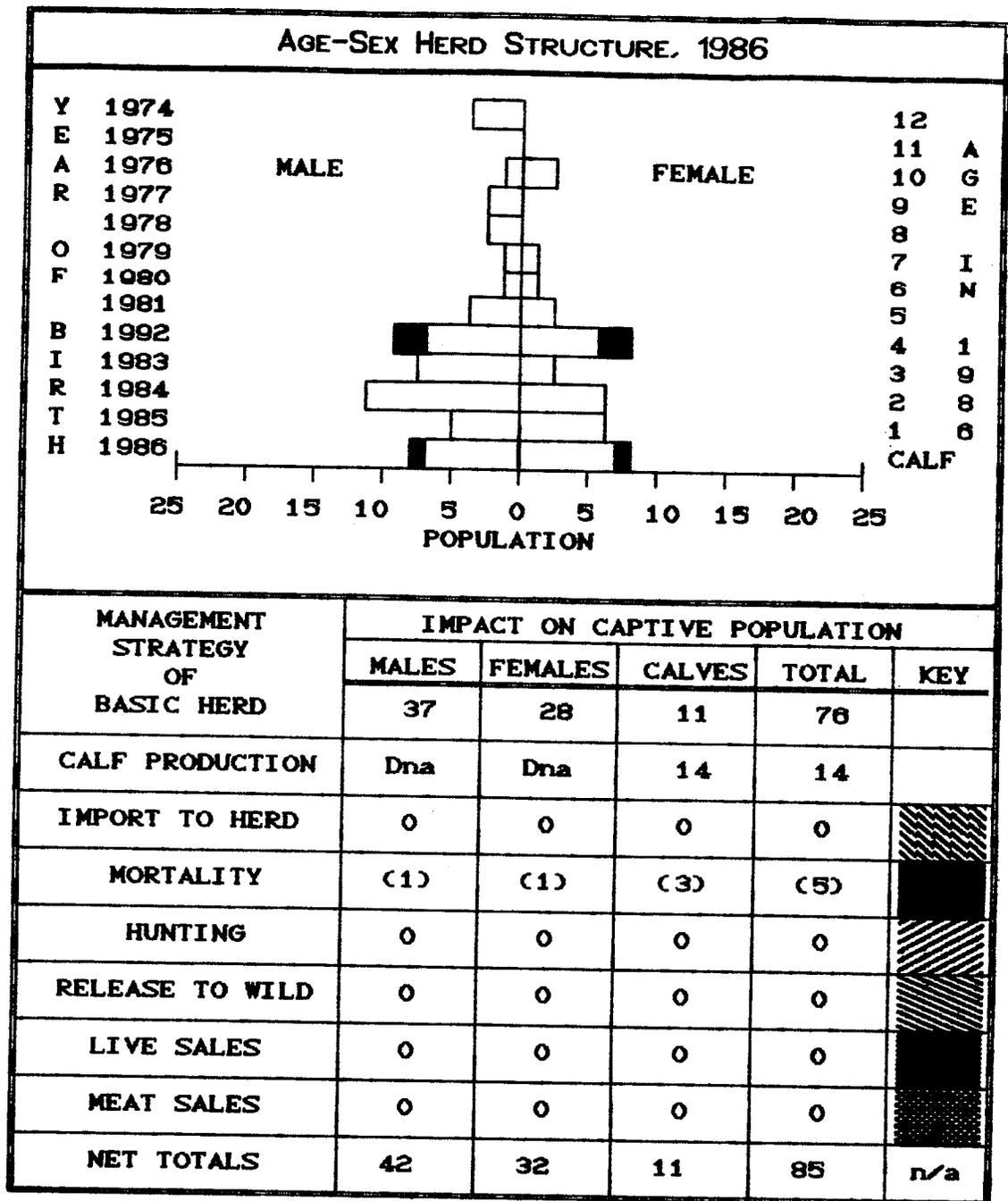


Figure 10: Graph showing the unstructured 1986 population and the disposition of wood bison for that year. The graph reflects calves born and natural losses to the herd. The figure reflects no other additions or removals during 1986. The key in the lower right relates the table to the graphic pyramid above. "Dna" denotes "data not available" and "n/a" denotes "not applicable". Mortality losses are randomized and not intended to identify any particular cohort as more probable to suffer the indicated mortality than any other, except in the case of calves.

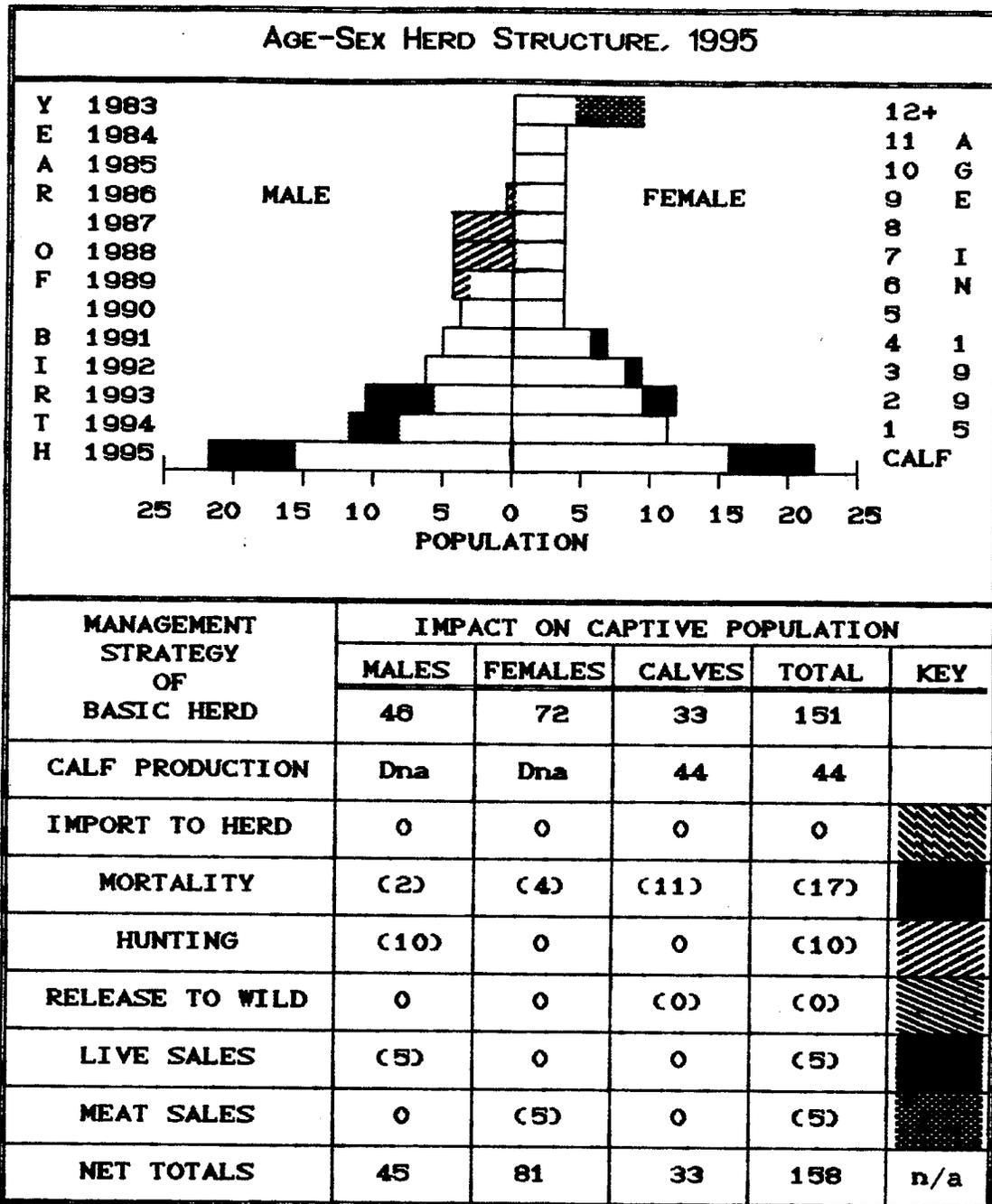


Figure 11: Graph showing the projected population and the disposition of wood bison for 1995. The key in the table (lower right) relates the table to the graphic pyramid above. "Dna" denotes "data not available" and "n/a" denotes "not applicable". In this year, surplus males are sold through hunting (older animals) and live sales (younger animals). Older, non-productive females are sold for meat sales. Mortality losses are randomized and not intended to identify any particular cohort as more probable to suffer the indicated mortality than any other, except in the case of calves.

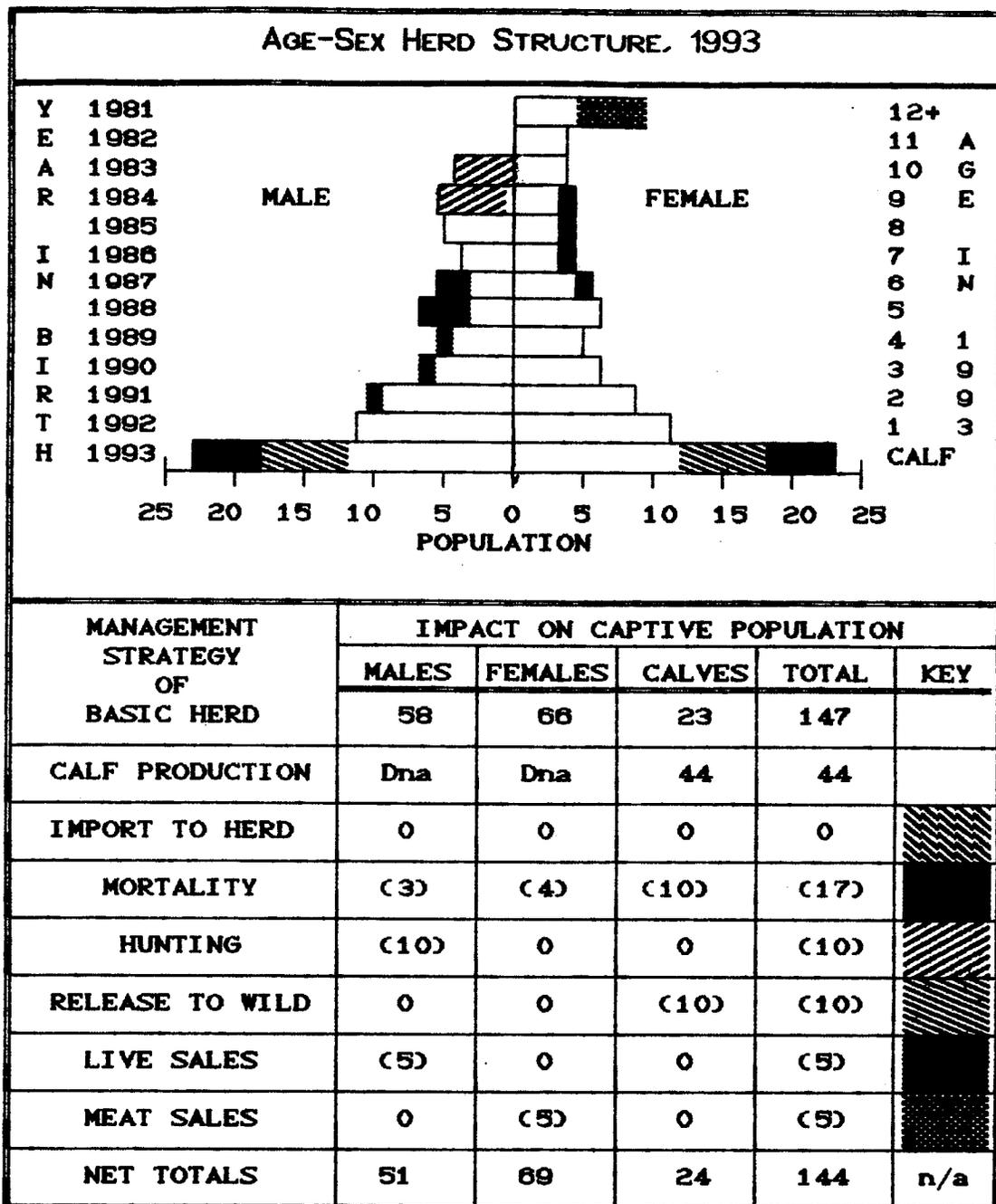


Figure 12: Graph showing the projected population and the disposition of wood bison for 1993. The key in the table (lower right) relates the table to the graphic pyramid above. "Dna" denotes "data not available" and "n/a" denotes "not applicable". In this year, removals from the herd are accounted for through hunting, releases to the wild, live sales of male and female animals and natural losses. Mortality losses are randomized and not intended to identify any particular cohort as more probable to suffer the indicated mortality than any other, except in the case of calves.

by sales of female breeding stock and limited sales of males unsuited for the trophy market.

Manipulating the herd from the abnormal structure resulting from the manner in which it was assembled, into a rationalized age:sex configuration will require several years of successful biological production and selective harvesting.

The structural evolution will be further complicated by the commitment to release calves from the captive herd in the effort to establish a herd in the wild. Nonetheless, the process of rationalization could be well established by 1990, as illustrated in the projected population pyramid for that year (Fig.13). In manipulating the herd structure, the introduction of new management practice, e.g. trophy hunting, was postponed until such time as the practice could be maintained on an annual basis. Trophy harvesting of up to five bulls could be introduced in 1989, the year in which C.I.T.E.S. may down-list the wood bison. From that time on, a minimum of five, and a maximum of ten, will be available for annual harvest. The management strategy of culling cows, and of live sales of male and female breeding stock, would follow a comparable pattern, in that once the practice was introduced, it could be maintained.

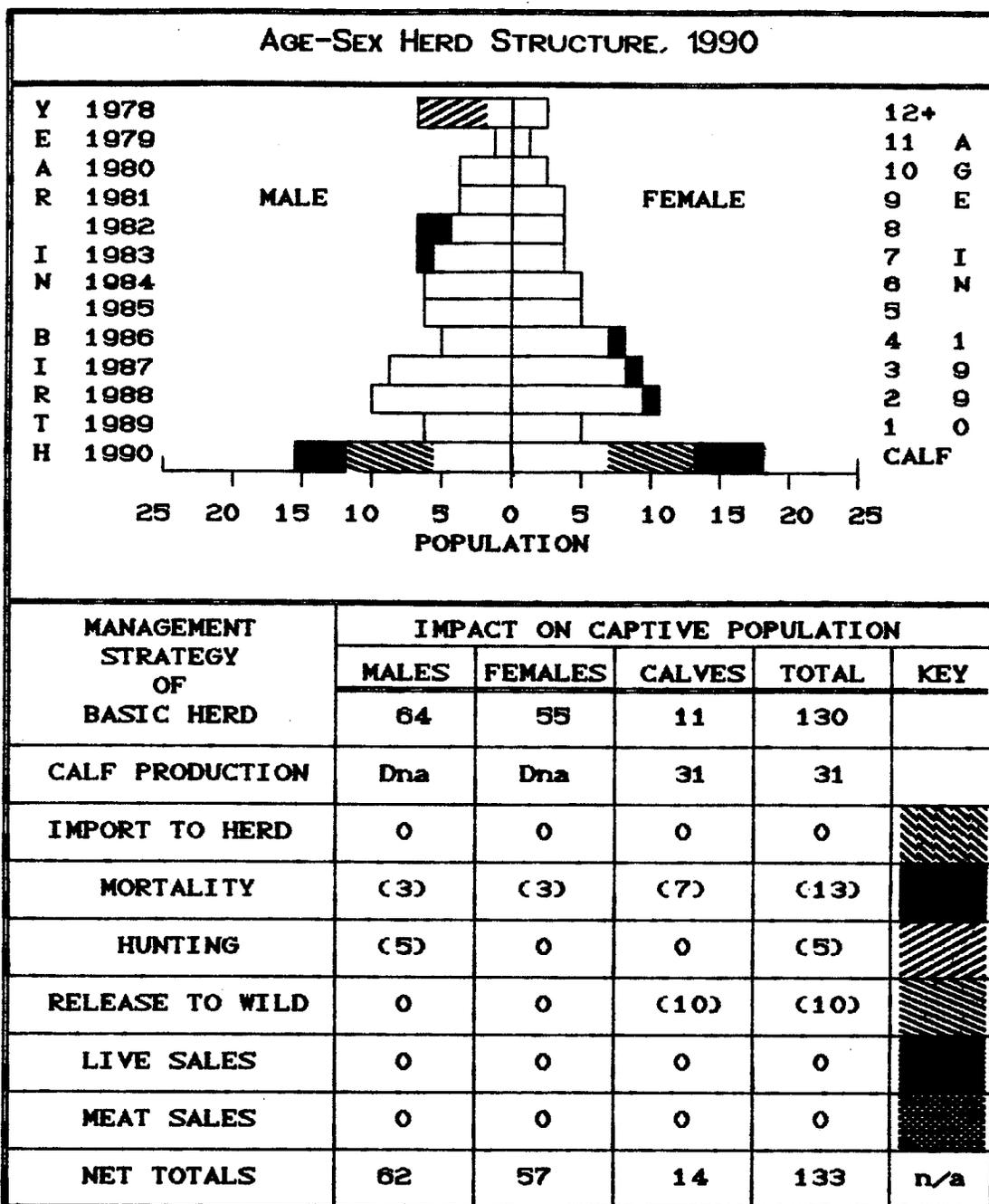


Figure 13: Graph showing the projected population and the disposition of wood bison for 1990. The key in the table (lower right) relates the table to the graphic pyramid above. "Dna" denotes "data not available" and "n/a" denotes "not applicable". In this year, removals from the herd are accounted for through hunting, releases to the wild and natural mortality. Mortality losses are randomized and not intended to identify any particular cohort as more probable to suffer the indicated mortality than any other, except in the case of calves.

DISCUSSION

The Waterhen project is capable of being subjected to a variety of interpretations. One is that the guarantees made by the negotiators for the Crown at time of Treaty, in 1875, are being honored, in a manner appropriate to the 20th century. There is no doubt that, at the time the treaties were negotiated, the Government clearly recognized the dependence of the Indians on wildlife, at least as a source of food. There is also a strong suggestion of wildlife being recognized as the very basis of their livelihood, in essence the basis of their vocation. In the space of more than a century the perceived rights of the Indians have been encroached upon in a variety of ways. The lands to which they have right of access have diminished and wildlife populations have become reduced. The provision of wire for fencing could be regarded as compensation for the 'twine and ammunition' which was promised but never provided. Through the Waterhen project, some members of the Waterhen Band of Indians may conceivably again be in a position to pursue a wildlife-based vocation on the land. The project may also provide an opportunity for the Waterhen Band to enter the mainstream market economy.

Through wise use and management, the wild herd, once

successfully established, can provide additional socio-economic benefits. The herd could be managed in a manner that not only fulfilled the mandate of the Manitoba Wildlife Branch and the Canadian Wildlife Service, but can also contribute to meeting some of the needs and ambitions of the Waterhen people whose interest and persistence developed the project. The wild herd should, with careful management, provide not only a source of meat, but additional economic opportunities, through the exploitation of hunting by non-native hunters.

At the time of treaty the negotiators for the Crown were of the view that the Indian people would in a matter of time enter the market economy of the day, through agricultural pursuits or other activities. History reveals that such has not generally been the case, at least not in the century and more that has elapsed since the treaties were signed and in terms of definitions of market economy which have prevailed. The lot of the Indian has, to say the least, been an unenviable one. His culture was ill-equipped to deal with the society which the Europeans imposed on his environment. Euro-Canadian society could function on part of the land but the Indian culture could not prevail without the wildlife, which in turn demanded the whole environment. The incompatibility of conventional land-use and the wild buffalo is well known. The life of the Indians of the Great Plains focused on the buffalo - so much so that without the

buffalo the culture of the Indian as previously known was so wrenched out of its essential context that only remnants of it could survive.

Let us momentarily assume that, in 1817, both the Indians and the negotiators for the Crown willingly and knowingly entered into Treaty. This assumption challenges the interpretation that the Indians were cajoled into Treaty with the Crown. It embodies the premise that neither the Indians nor the negotiators were blessed with a clear vision of Canada as it would change in the century that followed. When the Selkirk Treaty was signed in 1817, more than half a century would elapse before Sir John A. MacDonald presented his vision of Canada - a vision of a manifest destiny that held little brief for native "rights" and concerns. The North West was an unsettled, untamed land far removed from civilization in the minds of most men. To perceive, at that stage of its development, how it was to evolve, would not have been possible. The Sifton settlers were yet to be born. In 1817, in exchange for a few hundred pounds of tobacco, (albeit the best tobacco, to paraphrase Lewis Carroll) the Indians had surrendered half of what is today southern Manitoba to the Right Honorable Thomas Earl of Selkirk. By any standards the transaction was as ludicrous as that involving Manhattan Island two centuries before. By the legal standards of the late 20th century such a deal would be deemed unconscionable and might well be declared criminal.

Nonetheless, on July 18th, 1817 such a deal was struck. History indicates that it was not arrived at by intimidation or coercion. It was fully negotiated and understood by the Indians who, nevertheless, were by today's standards, duped. Assuming that a relatively fair exchange was being made and that the Indians and the negotiators were aware of what was being given and what was being taken, relative to today's value system there was a significant value difference attributed to land. Tobacco also cost a lot less in those days.

The natives had concepts of usufruct, but no conception of exclusionary proprietorship in relation to land. It is quite reasonable to suppose that they entered into treaty with Selkirk on the assumption that they, sharing the usufruct right, would be compensated by a regular allotment of a scarcity item - tobacco - which was of great importance in their religious observances and secular conclaves. On such terms, it might have seemed a "fair exchange". The Indians assuredly did not envision the Europeans coming in such droves as to fill the land, establish exclusive proprietorship, expunge the buffalo - and therefore the Indians' hereditary usufruct - and thereby not so much drive as crowd them out.

Obviously, we can never fully understand the thinking of either the Crown or the Indians at the time of Treaty. We know that it was the policy of the British Empire expansion program to assimilate, and not eliminate

aboriginal people. It is also true that among the British, there was an unquestioned belief in British supremacy and cultural superiority. Clearly, the lifestyle envisioned for Canada's native people, if one was envisioned, was not in the mainstream of the market economy which was evolving but rather in some 'lower class' station, such as laborers or servants or as small farmers wresting a modest existence from the land. However, the Indians failed to adopt such a lifestyle, and adapted to a different culture from that of the settlers, one largely based on life on the Reserves. There they were wards of the Crown, dependent on the good and bad graces of administrators in Ottawa and the local Indian Agent. This situation, which fostered material and spiritual poverty and their associated pathologies, largely prevails to the present time. The Waterhen Reserve and the Waterhen Band fit this categorization. It was against this background that the Waterhen Project evolved.

CONCLUSIONS

At the time that this dissertation was in preparation (1987) the Waterhen Project had achieved several of its objectives. The captive herd had increased to 102 wood bison and the animals were reproducing in their new environment. Short-term and long-term employment had been generated and a multiple-agency management philosophy prevailed.

More intensive range management will be required to enhance bison productivity and reduce the winter feeding requirement. Further research in range management will be necessary.

The difficulties encountered by the bison in adjusting to the Waterhen environment might have been considered in the planning stages of the project. Such consideration could have resulted in contingency plans to deal with tabanid harassment in 1984 and adjustment to range conditions in the 1984-85 winter. Successful reproduction might have occurred one year earlier, had these considerations been taken into account.

Although the tabanid problem was less severe in 1985 and 1986 relative to 1984, partly due to weather and partly due to adjustment to environment by the wood bison, it is concluded that further research toward development

of a means to repel attack will be necessary.

As the Waterhen Project progresses toward attaining its other objectives, continued multiple agency involvement will be required. Market potential needs to be assessed and marketing strategies devised. Provincial wildlife management policy and the status of wood bison (i.e. "endangered", "threatened" or "rare") will determine which option(s) will be available.

Establishment of the wild herd will be attempted in 1988. The results of this venture will also influence the future focus and potential of the Waterhen Project.

Despite the uncertainties, it is concluded that the future of the wood bison and the Waterhen Project appear secure. Some development prospects may never unfold, but with the productive capacity of the wood bison established, and with the sustained enthusiasm of the Waterhen Indian Band, success in some avenue(s) of development appears promising.

In summary, the Waterhen Project has already proven successful. Its success can be largely attributed to following the guidelines for community resource development as outlined by Burch and MacKenzie in "Resource Development Flow Chart" (1976).

RECOMMENDATIONS

The following recommendations are drawn from the conclusions set out above:

1. That wildlife management and agricultural consultative services continue to be supplied on request.
2. That research in general be encouraged and that specific avenues be identified and pursued. Range management and tabanid management have already been identified as specific avenues.
3. That agricultural management principles guide development of the captive herd. Captive wild animals require compensation for loss of range; animal husbandry techniques are most appropriate to such conditions.
4. That wildlife management principles guide development of the wild herd.
5. That management responsibility for the captive herd be vested in the Waterhen Indian Band.
6. That management responsibility for the wild herd be retained by the Province of Manitoba.

7. That both herds (wild and captive) be managed in a complementary manner.

8. That the bull segment of the captive herd be proportionally reduced as soon as possible, and as profitably as possible. Excess bulls utilize limited range resources and are costly to feed.

9. That the wood bison be immediately down-listed by the Committee on the Status of Endangered Wildlife in Canada (C.O.S.E.W.I.C.) from "endangered" to "threatened" and that further down-listing from "threatened" to "rare" or "not in any category" be pursued, when C.O.S.E.W.I.C. criteria are met.

10. That the wood bison be down-listed from Appendix 1 to Appendix 2 by the Convention on International Trade in Endangered Species following down-listing to "threatened" by C.O.S.E.W.I.C..

11. That in the process of attempting to establish a wild herd, the least number of animals consistent with survival be released to the wild, to minimize problems in the event of failure and to safeguard the economic potential of the captive herd.

12. That the sex ratio of the animals released to the wild be equal. Releases of bulls for trophy harvesting are to be viewed as in addition to animals for propagation and need not be balanced by equal female numbers.

13. That harvesting strategies be implemented as soon as possible, with cautionary safeguards to ensure minimum losses of potential future revenues. For example , if some surplus bulls are harvested for domestic use by the Waterhen Band, only bulls of non-trophy status should be harvested.

14. That the Waterhen Project be further evaluated in light of the potentials identified in this dissertation. Such evaluations could embrace the time periods 1987-1992 and 1987-1997.

SUMMARY

The Waterhen Project was inaugurated in 1983, following a protracted planning period which resulted in the identification of multiple objectives and a complex multiple agency administrative structure. In essence the project presumes to alleviate some of the social and economic problems of the Waterhen Band of Saulteaux Indians, while at the same time contributing to the preservation and conservation of the endangered wood bison, *Bison bison athabascae*, and achieving progress toward down-listing its status to "threatened".

The project involves raising wood bison in captivity with the objective of releasing some of the progeny to the wild, of establishing a wild herd and developing a commercial captive herd of wood bison. The enclosure encompasses 2300 ha in the northern Interlake region of Manitoba: an adjacent release enclosure, where young animals are to be ranged prior to release, encompasses 1500 ha.

The first shipment of wood bison arrived in Waterhen in 1984. Supplementary shipments and natural reproduction resulted in a herd population of 102 in 1987, prior to calving season. The wood bison have fared well in the Waterhen environment, although a period of one year was

required for adjustment.

The Waterhen Project has already met many of its original objectives through creating long-term and short-term employment. Successful reproduction of wood bison at Waterhen has strengthened the argument for down-listing the status of wood bison from "endangered" to "threatened".

Although the future potential of the project cannot be accurately forecast, it appears probable that some of the identified potentials will be realized.

Early in 1987, young wood bison for release to the wild in 1988 were segregated from the main herd. These animals will be radio-collared and their behavior and movements will be monitored through radio telemetry. Successful establishment of a wild herd will increase the probability of down-listing the species by the Convention on International Trade in Endangered Species and enhance the economic potential of the Waterhen Project.

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