

Recovery of Wood Bison in British Columbia

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ABSTRACT

Wood bison (*Bison bison athabasca*) were nearly eliminated by uncontrolled hunting during the fur trade in the late 1800s. In British Columbia, the last confirmed wood bison was shot in 1906. Canadian populations began to recover in the early 1900s, but the genetic isolation of the original population was transgressed with the introduction of plains bison (*Bison bison bison*) into Wood Buffalo National Park (WBNP) in the late 1920s. Bovine tuberculosis and brucellosis were also introduced with the plains bison. Wood bison salvaged in 1965 from WBNP were used to establish a disease-free, national captive-breeding herd that has since provided stock for 6 free-ranging populations. Recent studies confirm the descendant herds resemble wood bison, despite the earlier hybridization event. One goal of the Canadian wood bison recovery program is the establishment of at least 4 herds of more than 400 animals each, with at least 1 of them in British Columbia. Two herds outside of British Columbia have reached the minimum size threshold, and the total number of animals in specific disease-free, free-ranging populations is now over 2,800, although tuberculosis- and brucellosis-infected herds in and around WBNP remain a significant threat. An estimated 70 wood bison now occur in British Columbia. Large areas of unoccupied wood bison habitat exist in northeastern British Columbia. In the late 1980s, British Columbia established a "bison control area" to prevent hybridization between wood bison and plains bison. Forty-nine wood bison were translocated to the Liard River area in 1995. The goals of the updated Management Plan for Wood Bison in British Columbia are to continue to reestablish herds through translocation (e.g., Etthithun Lake), to maintain their separation from plains bison, to maintain their disease-free status, and to allow populations to increase to a level sufficient to support nonconsumptive and consumptive use. The biggest obstacle to successful implementation of the plan is the presence of game-farmed and free-ranging plains bison within the historic range of wood bison. Developing and maintaining public support for recovery efforts is essential.

Key words: *Bison bison athabasca*, *Bison bison bison*, game-farming, Liard River, plains bison, recovery, reintroduction, translocation, wood bison.

Prior to European settlement, wood bison (*Bison bison athabasca*) were widely distributed over a large area of the western boreal forest in Canada (Fig. 1), including northern British Columbia, although they were unevenly distributed and never as numerous as plains bison (*Bison bison bison*; Gates et al. 1992). Soper (1941) roughly estimated wood bison numbers at 168,000 in the early 1800s. Like the plains bison, wood bison were nearly eliminated by uncontrolled hunting for the fur trade during the late 1800s. Populations declined most rapidly after 1860, and reached an estimated low of 250 between 1896 and 1900 (Soper 1941). Although legislation designed to protect bison was passed in Canada in 1877 and 1893, enforcement was not effective until after the turn of the century. It was only when the Northwest Mounted Police were given responsibility for enforcing the Buffalo

Protection Act in 1897, and formal patrols began in 1907, that wood bison populations began to recover south of Great Slave Lake (Gates et al. 1992). In British Columbia, the last bison from the primordial population was shot near Fort St. John in 1906 (MacGregor 1952). They remained extirpated until recovery actions were implemented in 1980.

Between 1925 and 1928, more than 6,000 plains bison were translocated to historic wood bison range at Wood Buffalo National Park (WBNP) in order to relieve overcrowded conditions at Buffalo Park in Wainwright, Alberta (Wood Bison Recovery Team 1987, Gates et al. 1992). Two cattle diseases, brucellosis and tuberculosis, were introduced with the plains bison (Tessaro et al. 1992). All contemporary stocks of wood bison, including those in and originating from WBNP, are derived from the hybridization of wood and plains bison (van Zyll de Jong 1986, Wilson and Strobeck 1998). However, the influence of the wood bison genome remains strongly expressed in the phenotype of WBNP bison and descendant populations (van Zyll de Jong et al. 1995).

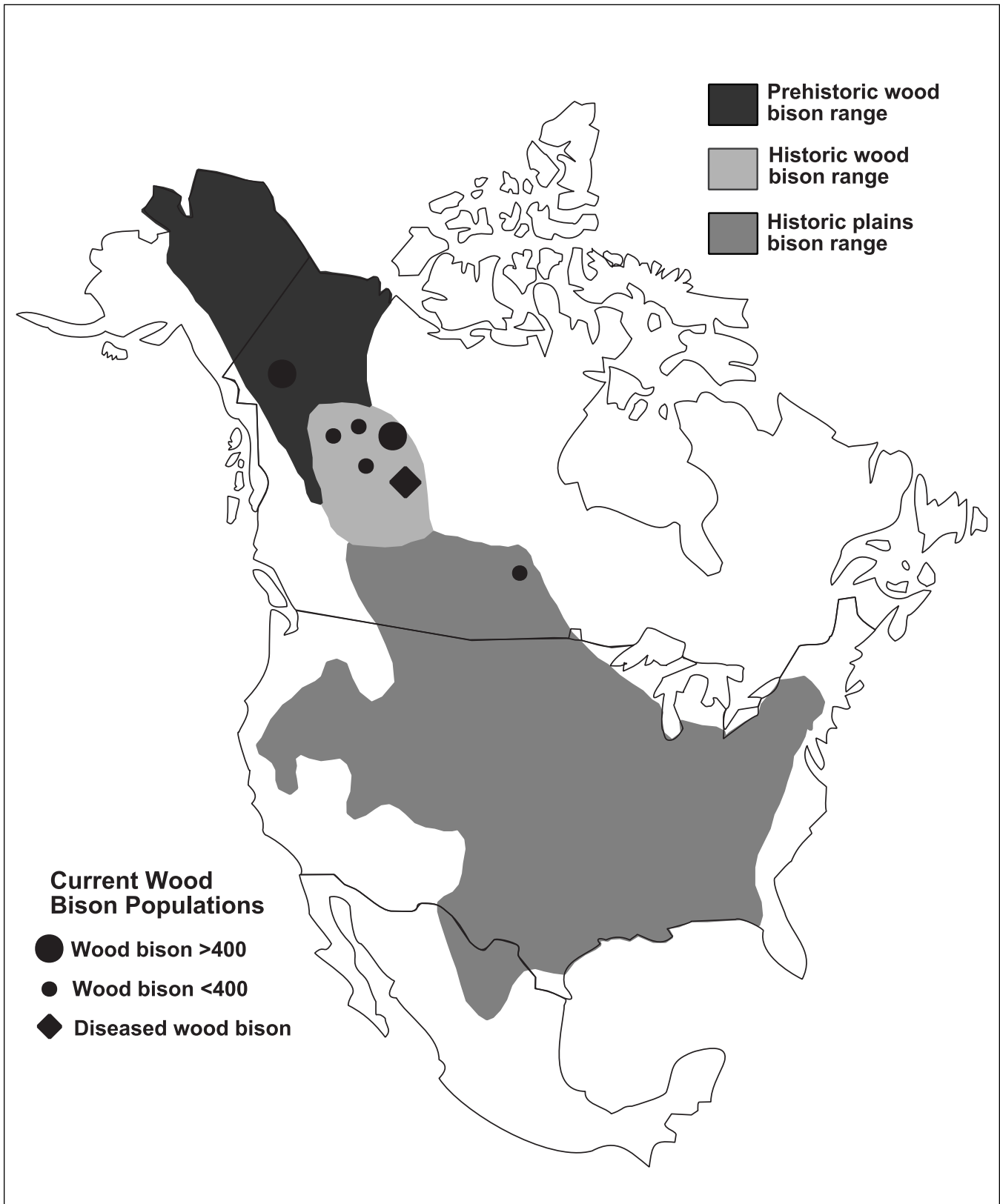


Figure 1. Historic distribution of bison in North America.

Speculation starting in 1959 about the existence of an isolated northern population of pure wood bison (Banfield and Novakowski 1960) resulted in the capture and translocation of bison from the Nyarling River area of WBNP in 1963. Eighteen wood bison were successfully translocated to the Mackenzie Bison Sanctuary (MBS) near Fort Providence, Northwest Territories. A second translocation occurred in 1965, when 21 wood bison were moved to a fenced enclosure at Elk Island National Park (EINP) in central Alberta. Another salvage project was conducted during 1996–98, when 62 neonates were captured from the Slave River Lowlands in the Northwest Territories and transferred to a captive breeding facility in Fort Resolution (Gates et al. 1998).

In the mid 1970s, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated wood bison as Endangered, and a recovery program was established with representatives from federal, provincial, and territorial wildlife agencies and Parks Canada. Recovery efforts accelerated through the 1980s with the appointment of the Wood Bison Recovery Team (WBRT) and the down-listing of wood bison to Threatened (Wood Bison Recovery Team 1987). The most controversial problem then, as now, was the issue of what to do about the brucellosis- and tuberculosis-infected bison in and around WBNP. Various actions have been proposed, including the slaughter and replacement of all diseased bison inside and outside of the park (EAP 1990), and conservation and recovery of infected herds through a salvage and captive breeding program (Gates et al. 1998).

A bison management plan for British Columbia (B.C. Wildlife Branch 1991) was prepared in the late 1980s. The plan proposed reintroducing wood bison north of Fort Nelson, preventing further hybridization with plains bison by designating a “bison control area,” and not permitting commercial operations of game-farmed plains bison north of 57°N latitude. Since the initial plan was written, many biological and socio-political factors that affect wood bison conservation efforts have changed, making it necessary to update the 1991 plan.

The currently proposed *Management Plan for Wood Bison in British Columbia* (Harper et al. 1999) is designed to support key elements of *A Wildlife Policy for Canada* (Wildlife Ministers' Council 1990), the *Canadian Biodiversity Strategy* (Biodiversity Working Group 1994), and the *British Columbia Provincial Wildlife Strategy* (B.C. Wildlife Branch 1994). Most importantly, the proposed *Management Plan for Wood Bison in British Columbia* is a key component of the *National Recovery Plan for Wood Bison* (Gates et al. in prog.). In concert with other provincial and territorial bison plans and programs (e.g., Reynolds et al. 1985, Government of Northwest Territories 1987, Government of Yukon Territory 1998), the British Columbia management plan is designed to support the goals and objectives of the National Recovery Program.

CONSERVATION STATUS

The International Union for the Conservation of Nature (IUCN) includes North American bison on their list of Lower Risk–Conservation Dependent species (Baillie and Groombridge 1996). The Convention on the International Trade of Endangered Species of Fauna and Flora (CITES) lists wood bison in Appendix II. The United States listed wood bison as “Endangered in Canada” under their federal Endangered Species Act in 1970 and has not updated that listing since.

COSEWIC lists wood bison as Threatened. The British Columbia Conservation Data Centre categorizes wood bison as S1 (critically imperiled because of extreme rarity) under the Nature Conservancy ranking system. The British Columbia Ministry of Environment, Lands and Parks includes wood bison on its Red List.

CURRENT DISTRIBUTION OF WOOD BISON

CANADA

Free-roaming wood bison occur only in Canada at present. The 1998 population estimate for free-roaming, disease-free wood bison in Canada is 2,800 animals in 6 geographically separate herds (Gates et al. in prog.). There are also 860 wood bison in 4 co-managed, captive-breeding herds, and 500–700 animals on 45–60 private, commercial game farms. There are also approximately 2,300 wood bison infected with bovine tuberculosis and brucellosis in and around WBNP.

BRITISH COLUMBIA

Wood bison returned to British Columbia in 1980 as dispersing animals from the Nahanni Butte reintroduction in the Northwest Territories, and in 1995 and 1998 as the result of direct reintroductions of animals bred at EINP. All wood bison in British Columbia are descendants of the 21 Nyarling River animals captured near Needle Lake in WBNP in 1965, which were relocated to EINP (Wood Bison Recovery Team 1987). Reintroduced wood bison currently occur in 2 separate locations: Beaver River; and the Nordquist Flats area near the Yukon/Northwest Territories border (Fig. 2).

Nordquist Flats Herd

The first reintroduction of wood bison to British Columbia took place in March 1995. Forty-nine animals (4 adult males, 5 adult females, 5 yearling males, 10 yearling females, 10 male calves, and 15 female calves) were transferred from EINP to Aline Lake in the Nordquist Flats area of the Liard River valley (Fig. 2). This translocation site is approximately 80 km from the Nahanni Butte bison herd at the mouth of the Beaver River. A vegetation inventory of the translocation site in 1988 indicated large areas with upland grass

production between 500 and 900 kg/ha, and smaller wetland areas with sedge production of approximately 6,300 kg/ha (Elliott 1989).

Beaver River Herd

As of 1998, the herd reintroduced at Nahanni Butte had expanded its range upstream along Liard River to a point approximately 40 km south into British Columbia, near the mouth of the Beaver River (Fig. 2). An estimated 30 wood bison occur along the Liard River from the mouth of the Beaver River to the border with the Northwest Territories. Approximately half of these are animals that had dispersed, at 1 point, as far south as Fort Nelson after being released near Nahanni Butte in April 1998 (J. Nishi, Northwest Territories Resources, Wildlife and Economic Development, pers. comm.).

Etthithun Lake Herd

In March 1996, 18 wood bison that had been maintained for 2 years at Northern Lights College in Dawson Creek, B.C. for captive studies were released to the wild near the headwaters

of the Etthithun River near the Alberta border (Fig. 2). Habitat primarily consists of a mixture of domestic and native grasses that occur along road allowances, seismic lines, pipelines, and well sites. Fifteen bison were observed in January 1997; by March 1997, 3 of the 15 had been killed in collisions with industrial road traffic (Churchill and Maundrell 1998). In the summer of 1997 the herd spent an increasing amount of time up to 100 km south, on the fringe of agricultural development. They eventually joined a small herd of feral commercial bison that had escaped from a ranch. The mixed herd of 26 plains and wood bison was captured later that summer and ultimately sold to a private ranch 120 km south of the original release site.

In March 1999, 19 wood bison from EINP were moved to a recently constructed captive breeding facility in the Etthithun Lake area. The herd will be held for several years to habituate the bison before they are released to the wild.

Hay River

Wood bison from the Hay-Zama reintroduction in Alberta occasionally wander into the Hay River drainage in northeastern

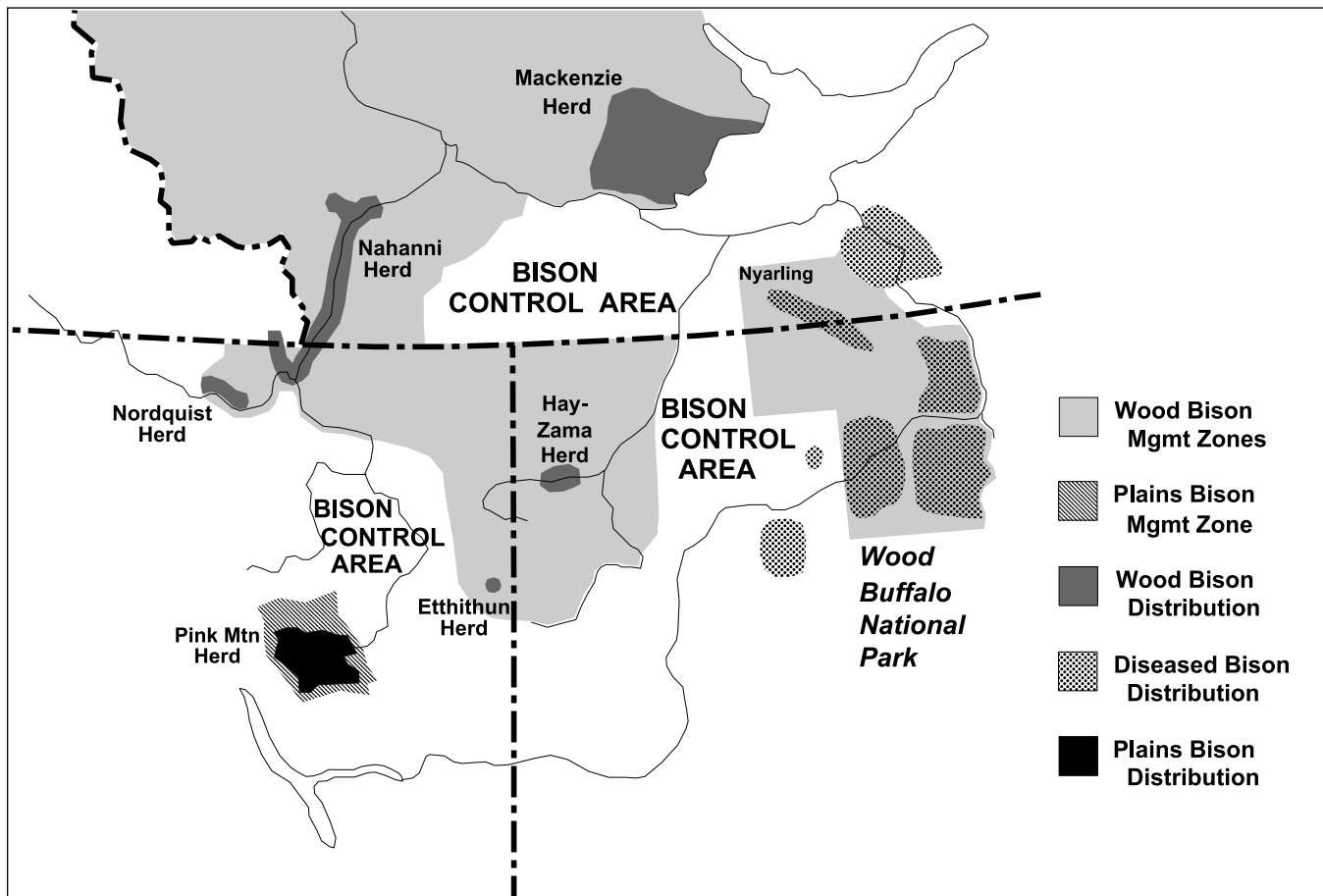


Figure 2. Distribution of management zones and free-roaming herds of bison.

British Columbia (Fig. 2). As the Alberta population grows, it is likely it will eventually expand to establish a more permanent population in this part of British Columbia.

CURRENT DISTRIBUTION OF PLAINS BISON IN BRITISH COLUMBIA

Plains bison accidentally introduced in the Pink Mountain–Sikanni Chief River area in 1971 have increased in distribution and abundance, particularly over the past 15 years. The herd is largely confined to grass/sedge meadows in the upper Sikanni River and Halfway River valleys (Fig. 2). In 1990 an estimated 500 animals ranged over an area of 500 km². The current population ranges over an area of similar size, but it has increased to an estimated 1,400 animals (J. Elliott, B.C. Ministry of Environment, Lands and Parks, pers. comm.). Potential exists for forage competition between free-ranging plains bison and wood bison if the ranges of the two would overlap, but the policy of restricting each subspecies to mutually exclusive ranges to prevent hybridization means this should never occur.

SOCIO-POLITICAL CONSIDERATIONS

LEGAL

British Columbia Wildlife Act

Bison are designated as “wildlife” and “big game” under the British Columbia Wildlife Act. This designation vests ownership of all wild bison with the provincial government, and protects them from deliberate killing, capturing, or personal possession, except as authorized by permit. Once a game-farmed bison escapes captivity, or is released or abandoned, the provincial government acquires ownership of that animal. Wildlife Act permits are required for the movement of bison across the borders of British Columbia, both to import live animals, and to export bison or bison products.

British Columbia Game Farm Act

The British Columbia Game Farm Act defines “game” as fallow deer, bison, and reindeer. Under this act, a licence or licence renewal may be issued by the Ministry of Agriculture and Food (MAF) to a person to raise a type of game for agricultural purposes. Provisions of the Wildlife Act with respect to escaped animals do not apply to licensed game if the licensee recaptures the animal within 30 days. The Game Farm Act also includes provisions enabling Cabinet to make regulations specifying regions of British Columbia in which a licence for a specified type of game must not be issued. Regulations may also establish different terms and conditions for different licensees based on geographical area. There are currently no regulations that specify regions or conditions that pertain to licences for bison game farms.

COMMERCIAL BISON FARMING

Commercial bison farming is an established agricultural industry, and most bison in North America are now managed as livestock. Commercial production is expected to increase by at least 25% annually until 2005 (Marchello 1998) reaching over one-half million behind fence by the year 2000 (Hudson 1998). Plains bison dominate commercial production of bison, since commercial production of wood bison did not begin until 1989. In northeastern British Columbia there are currently 49 producers of commercial bison registered under the British Columbia Game Farm Act. Problems can arise if farmed animals become diseased, or if escaped animals are allowed to mix with free-roaming herds. The Peace Country Bison Association lists 250 members in northern Alberta and British Columbia (D. Patten, Canadian Bison Association, Bezanon, AB, pers. comm.).

DISEASE CONSIDERATIONS

Three significant infectious diseases (tuberculosis, brucellosis, and anthrax) are present in wild populations of wood bison in the Northwest Territories and northern Alberta. Bovine tuberculosis and brucellosis were introduced to WBNP by plains bison in the late 1920s. The population of bison in WBNP has declined to 21% of its former level in the past 27 years (Joly et al. 1998). This decline is attributed to chronic tuberculosis and brucellosis infections and a resultant loss of productivity and recruitment. At this point, none of these bovine diseases have been diagnosed in wild ungulate populations in British Columbia. “Bison control areas” established by Alberta and the Northwest Territories (Fig. 3) will hopefully help prevent spread of these diseases from WBNP.

Domestic bison ranches are also a potential threat to the disease-free status of recovering populations of free-ranging wood bison. Various livestock diseases, if present in game-farmed animals, could spread to wild populations by contact through fences, or from escaped animals.

GENETIC CONSIDERATIONS

Interbreeding with Plains Bison

Escapes and unauthorized translocation of commercial bison are substantial threats to the genetic isolation and recovery of free-ranging wood bison in Canada (Gates et al. in prog.). The rapid expansion of the commercial bison ranching industry in British Columbia has resulted in an increased number of escapes and rising potential for additional hybridization with free-ranging wood bison. The size and strength of the bison make it a difficult animal to permanently contain behind fencing. Policies within MAF are in place to report escaped animals, which become the property of the government if not recaptured within 30 days. Problems can exist with effective enforcement of policies to round up or dispose of feral domestic bison abandoned by ranchers.

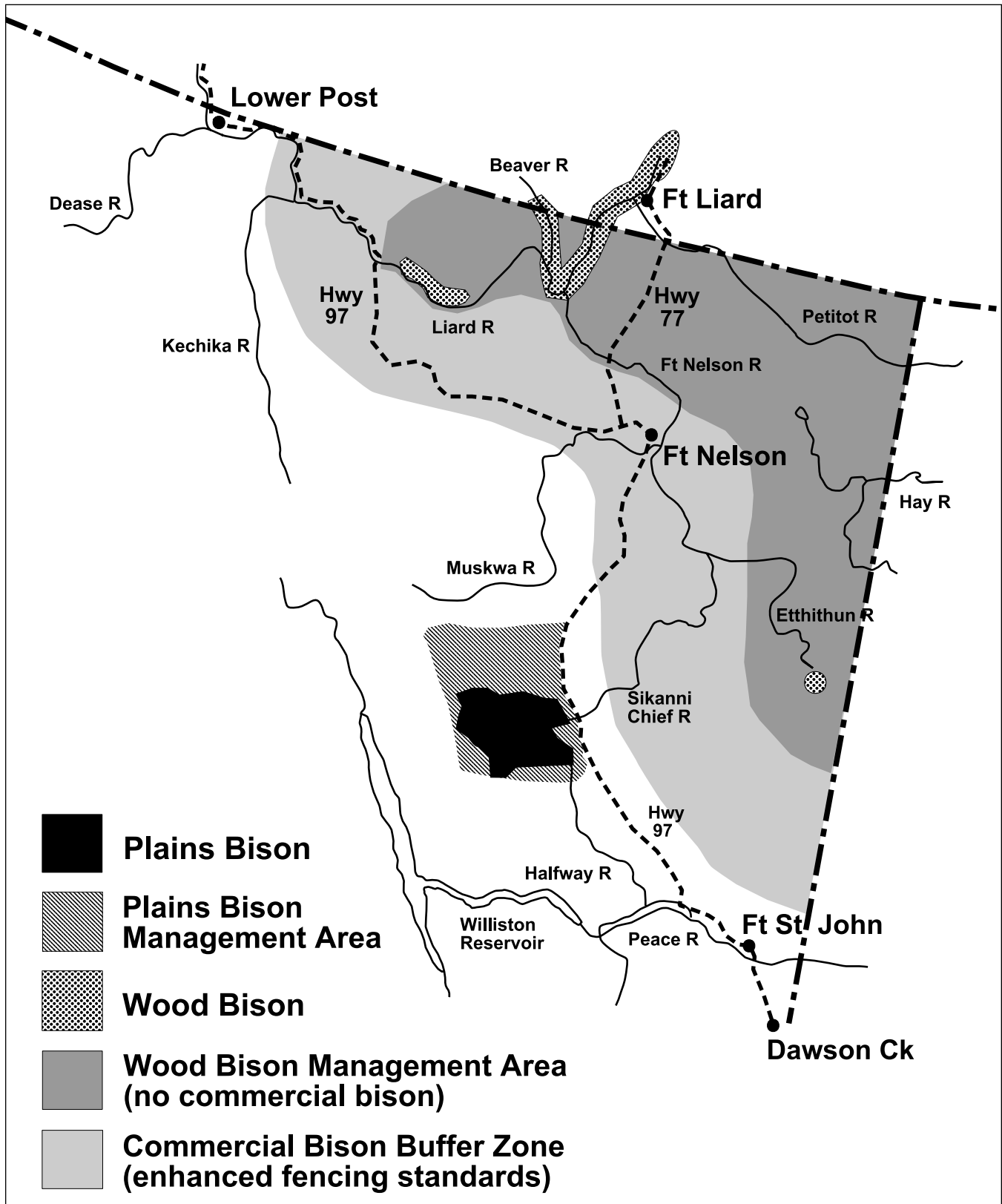


Figure 3. Proposed management zones for bison in British Columbia.

Improving Genetic Diversity

Microsatellite DNA indicates that wood bison from EINP and MBS animals are less genetically variable than subpopulations from WBNP, confirming suspicions regarding the effect of small founding populations (Wilson and Strobeck 1998). The genetic diversity of reintroduced populations originating from EINP could be augmented by introduction of disease-free animals from WBNP, the Slave River Lowlands, or the Mackenzie bison population.

BISON-VEHICLE COLLISIONS

Due to the large size of bison, collisions with vehicles are a substantial public safety and property damage issue. Wood bison in the Yukon Territory have caused traffic hazards along the Alaska Highway, with 8 killed in collisions, 5 killed as "problem" wildlife, and 36 captured and relocated to a game farm. The Yukon government has a "bison-free" policy in the vicinity of the Alaska Highway involving deterrence, capture, and, ultimately, disposal of "problem" animals (Government of Yukon Territory 1998). Three of 15 animals reintroduced to Etthithun Lake in 1996 were killed in collisions with industrial road traffic during the first winter (Churchill and Maundrell 1998).

HUNTING

Hunter harvest can be used to achieve a number of objectives. It can be used to control the distribution of animals in order to implement "bison control areas" designed to prevent disease transmission or interbreeding with plains bison. It can also be used to control population size and density if the objective is to reduce the impact of bison grazing on other components of the ecosystem. The policy of the British Columbia government is that Red-listed species such as the wood bison are managed for recovery and not hunter harvest. Once populations have built up to a level that supports a harvestable surplus, hunting can also provide a source of food, recreation, and input to the provincial economy.

LAND USE CONSIDERATIONS

Urban and agricultural development is the land use that is least compatible with wood bison population objectives. Wood bison are rarely tolerated near human habitations. Alienation of habitat for agricultural production is even more of a threat because of the large areas involved. Agricultural development in the Fort St. John and Fort Nelson areas has greatly reduced bison habitats, and continuing expansion of agriculture in the north will further limit the ability to meet population recovery objectives. Geographic expansion of the bison ranching industry may also limit the amount of land available for establishing free-ranging wood bison.

Forestry is increasingly becoming a resource use within the historic range of wood bison. There are substantial opportunities to maintain or increase available habitats for

wood bison through forest management because of the wood bison's preference for open habitats. Bison are adapted to forage in open grassy environments and may benefit from certain alterations to the environment associated with oil and gas exploration (e.g., seismic lines).

Intensive habitat management can be used to improve foraging opportunities for wood bison. Suppression of wildfire has led to an alteration of natural fire regimes that encourages shrubs and trees at the expense of bison meadow habitats (Gates et al. in prog.). Prescribed burning has been used to replace these natural fire regimes in the Northwest Territories, with up to 27,000 ha treated in some years (Chowns et al. 1998). On a smaller scale in British Columbia, prescribed fire has been used to improve habitat conditions on bison range in the vicinity of the Nordquist Flats.

PROPOSED MANAGEMENT PLAN FOR BRITISH COLUMBIA

Although wood bison are no longer in immediate threat of extinction in Canada, further work is required to ensure their long-term survival (Gates et al. in prog.). The provincial management plan (Harper et al. 1999) is designed to recover the species in British Columbia, down-list wood bison from the Red List, contribute to the goals of the national recovery plan, and eventually build up populations to levels that could support sustainable human use. The management plan outlines the goals, objectives, and specific actions required to recover wood bison populations in British Columbia, recognizing that it is no longer feasible to return wood bison to their original distribution or abundance. There are 4 basic principles on which the management plan is based:

1. The recovery of wood bison in British Columbia will be based on the establishment and maintenance of wild, free-roaming populations in suitable habitats, within their original geographic range in British Columbia.
2. All efforts will be made to preserve the genetic isolation and diversity of wood bison and maintain their current genetic distinctiveness from plains bison.
3. In order to provide for continued natural evolution of wood bison, the normal interaction between free-roaming wood bison and their native environment will be maintained.
4. To the greatest extent possible, the management plan will support the goals of the national recovery program and the objectives of wood bison management plans in adjacent jurisdictions.

GOALS AND OBJECTIVES OF THE BRITISH COLUMBIA MANAGEMENT PLAN

Goal 1

Reestablish a viable population of at least 1,000 disease-free, free-roaming wood bison within their former range in a

designated area in British Columbia (Fig. 3). More than 1 or 2 populations are required to reduce the risk of random events exterminating the British Columbia population. Ultimately the goal would be to have all populations in British Columbia interconnected as 1 metapopulation.

Goal 1 Objectives

(a) Ensure wood bison are reestablished within their historic range, and in areas with sufficient habitat to support viable populations; (b) evaluate high-priority translocation sites based on a detailed evaluation of habitat and potential land-use conflicts; (c) translocate wood bison to at least 3 geographically separated sites with sufficient suitable habitat to support population objectives; (d) augment existing free-roaming populations when feasible and necessary to achieve minimum viable population or improve genetic diversity; (e) manage each reintroduced population with adjacent jurisdictions to increase to at least 400 animals; and (f) manage habitats of established populations to achieve population recovery objectives.

Goal 2

Maintain the genetic isolation of free-ranging wood bison in British Columbia. Hybridization with plains bison 70 years ago threatened the wood bison as a distinct subspecies and remains 1 of the greatest threats to provincial and national recovery programs.

Goal 2 Objectives

(a) Prevent interbreeding between free-ranging plains bison at Pink Mountain and populations of reintroduced wood bison; (b) prevent interbreeding between game-farmed commercial bison and populations of reintroduced wood bison; and (c) evaluate the potential for improving the genetic diversity of existing free-roaming populations. A management zone will be established in which limitations will be imposed on bison ranching activities (Fig. 3).

Goal 3

Maintain the disease-free status of free-ranging wood bison in British Columbia. The presence of introduced bovine diseases in bison herds in and around WBNP is the single greatest obstacle to the recovery of wood bison in Canada. All efforts must be made to prevent these diseases from entering British Columbia.

Goal 3 Objectives

(a) Ensure all free-roaming and domestic bison that enter British Columbia are free of serious diseases such as anthrax, tuberculosis, and brucellosis; and (b) monitor the disease status of free-roaming and domestic bison.

Goal 4

Allow free-roaming, disease-free wood bison populations to increase to a level that would allow for long-term, sustainable human use. There is significant potential for ecotourism, wildlife viewing, resident hunting, nonresident guide-outfitting, and native subsistence use. Achieving population levels that allow human use of wood bison is consistent with, and supports, conservation objectives.

Goal 4 Objectives

(a) Monitor changes in population distribution, size, and demographics; (b) manage both habitat and populations to achieve overall population objectives, prevent overgrazing, and maintain natural ecosystem function; (c) optimize opportunities for residents and visitors to view free-roaming wood bison; and (d) eventually adopt conservative hunting seasons consistent with the British Columbia Wildlife Harvest Strategy.

Goal 5

Work cooperatively with public groups, rural communities, aboriginal peoples, and adjacent jurisdictions to develop mutually agreeable objectives for establishing and maintaining healthy, free-roaming wood bison herds in British Columbia. Conservation objectives are easier to achieve if local communities have a direct stake in reestablishing and maintaining viable populations of wood bison in their area. Native peoples within the historic range of wood bison have a long history and cultural attachment to this species.

Goal 5 Objectives

(a) Involve government agencies, stakeholders, public groups, rural communities, and native groups in development of reintroduction plans; (b) consider the development of long-term cooperative management programs with rural communities and native groups for reestablishing healthy, free-roaming wood bison herds; and (c) consult neighbouring jurisdictions during the development of reintroduction plans and wood bison policy changes.

ACKNOWLEDGEMENTS

We thank H. Schwantje, J. Elliott, I. Hatter, D. Fraser, M. Hoefs, and J. Nishi for comments on an early draft of the provincial wood bison plan. G. Diemert, D. Moyles, A. Ackerman, and M. Wetzstein also participated in discussions on how to address commercial bison farming issues.

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