

input in person, by mail, e-mail, or phone at any time during the rulemaking process.

Executive Order 13211

This Executive Order requires agencies to prepare Statements of Energy Effects when undertaking certain actions. However, this proposed rule is not a significant regulatory action under E.O. 13211, affecting energy supply, distribution, or use, and no Statement of Energy Effects is required.

Drafting Information

Theo Matuskowitz drafted these regulations under the guidance of Peter J. Probasco of the Office of Subsistence Management, Alaska Regional Office, U.S. Fish and Wildlife Service, Anchorage, Alaska. Additional assistance was provided by:

- Daniel Sharp, Alaska State Office, Bureau of Land Management;
- Sandy Rabinowitch and Nancy Swanton, Alaska Regional Office, National Park Service;
- Dr. Glenn Chen, Alaska Regional Office, Bureau of Indian Affairs;
- Jerry Berg, Alaska Regional Office, U.S. Fish and Wildlife Service; and
- Steve Kessler, Alaska Regional Office, U.S. Forest Service.

List of Subjects

36 CFR Part 242

Administrative practice and procedure, Alaska, Fish, National forests, Public lands, Reporting and recordkeeping requirements, Wildlife.

50 CFR Part 100

Administrative practice and procedure, Alaska, Fish, National forests, Public lands, Reporting and recordkeeping requirements, Wildlife.

Proposed Regulation Promulgation

For the reasons set out in the preamble, the Federal Subsistence Board proposes to amend 36 CFR part 242 and 50 CFR part 100 for the 2012–13 and 2013–14 regulatory years. The text of the proposed amendments to 36 CFR 242.24, 242.25, and 242.26 and 50 CFR 100.24, 100.25, and 100.26 is the final rule for the 2010–12 regulatory period (75 FR 37918; June 30, 2010), as modified by any subsequent Federal Subsistence Board action.

January 13, 2011.

Peter J. Probasco,

Acting Chair, Federal Subsistence Board.

January 13, 2011.

Steve Kessler,

Subsistence Program Leader, USDA–Forest Service.

[FR Doc. 2011–2679 Filed 2–7–11; 8:45 am]

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R9–IA–2008–0123; MO 92210–1113FWDB B6]

RIN 1018–AI83

Endangered and Threatened Wildlife and Plants; Reclassifying the Wood Bison (*Bison bison athabasca*) Under the Endangered Species Act as Threatened Throughout Its Range

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule and notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose to reclassify the wood bison (*Bison bison athabasca*) from endangered to threatened under the Endangered Species Act of 1973, as amended (Act). This proposed action is amended based on a review of the best available scientific and commercial data, which indicate that the endangered designation no longer correctly reflects the status of the wood bison. This proposal also constitutes our 12-month finding on the petition to reclassify this subspecies. We are seeking data and comments from the public on this proposed rule.

DATES: We must receive your written comments on this proposed rule by April 11, 2011 in order to consider them. We must receive your written request for a public hearing by March 25, 2011.

ADDRESSES: You may submit written comments and other information by either of the following methods:

- *Federal eRulemaking Portal:* <http://www.regulations.gov>. Follow the instructions for submitting comments.
- *U.S. mail or hand-delivery:* Public Comments Processing, Attn: FWS–R9–IA–2008–0123; Division of Policy and Directives Management; U.S. Fish and Wildlife Service; 4401 N. Fairfax Drive, Suite 222; Arlington, VA 22203.

We will post all comments on <http://www.regulations.gov>. This

generally means that we will post any personal information you provide us (see the Public Comments section below for more information).

FOR FURTHER INFORMATION CONTACT:

Marilyn Myers at U.S. Fish and Wildlife Service, Fisheries and Ecological Services, 1011 E. Tudor Road, Anchorage, Alaska 99503, or telephone 907–786–3559 or by facsimile at (907) 786–3848. If you use a telecommunications device for the deaf (TDD), please call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Public Comments

We intend that any final action resulting from this proposed rule will be based on the best scientific and commercial data available and be as accurate and as effective as possible. Therefore, we request comments or information from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule to reclassify the wood bison as threatened. The comments that will be most useful and likely to influence our decisions are those that are supported by data or peer-reviewed studies and those that include citations to, and analyses of, applicable laws and regulations. Please make your comments as specific as possible and explain the basis for them. In addition, please include sufficient information with your comments (such as scientific journal articles or other publications) to allow us to authenticate any scientific or commercial information you include. We particularly seek comments concerning:

(1) Information on taxonomy, distribution, habitat selection and use, food habits, population density and trends, habitat trends, disease, and effects of management on wood bison;

(2) Information on captive herds, including efficacy of breeding and reintroduction programs, origin of parental stock, stock supplementation for genetic purposes, growth rates, birth and mortality rates in captivity, location of captive herds in comparison to wild populations, effects of captive breeding on the species, and any other factors from captive breeding that might affect wild populations or natural habitat;

(3) Information on the adequacy of existing regulatory mechanisms; trends in domestic and international trade of live specimens, sport-hunted trophies, or other parts and products; poaching of wild wood bison; illegal trade and enforcement efforts and solutions; and

oversight of reintroduction or introduction programs;

(4) Information on the effects of other potential threat factors, including contaminants, changes of the distribution and abundance of wild populations, disease episodes within wild and captive populations, large mortality events, the effects of climate change, or negative effects resulting from the presence of invasive species;

(5) Information on management programs for wood bison conservation in the wild, including private, tribal, or governmental conservation programs that benefit wood bison; and

(6) Current or planned activities within the geographic range of the wood bison that may impact or benefit the species including any planned developments, roads, or expansion of agricultural enterprises.

Please note that submissions merely stating support for or opposition to the action under consideration without providing supporting information, although noted, will not be considered in making a determination, as section 4(b)(1)(A) of the Endangered Species Act (16 U.S.C. 1531 *et seq.*) directs that a determination as to whether any species is a threatened or endangered species must be made “solely on the basis of the best scientific and commercial data available.”

Prior to issuing a final rule on this proposed action, we will take into consideration all comments and any additional information we receive. Such information may lead to a final rule that differs from this proposal. All comments and recommendations, including names and addresses, will become part of the administrative record.

You may submit your comments and materials concerning this proposed rule by one of the methods listed in the **ADDRESSES** section. We will not accept comments sent by e-mail or fax or to an address not listed in the **ADDRESSES** section.

We will post your entire comments—including your personal identifying information—on <http://www.regulations.gov>. If your written comments provide personal identifying information, you may request at the top of your documents that we withhold this information from public review. However, we cannot guarantee that we will be able to do so.

Comments and materials we receive, as well as supporting documentation we used in preparing this proposed rule, will be available for public inspection on <http://www.regulations.gov>, or by appointment, during normal business hours, at the U.S. Fish and Wildlife

Service, Anchorage Regional Office (*see FOR FURTHER INFORMATION CONTACT*).

Public Hearing

Section 4(b)(5)(E) of the Act provides for one or more public hearings on this proposal, if requested. We must receive requests for public hearings, in writing, at the address shown in **FOR FURTHER INFORMATION CONTACT** by the date shown in **DATES**. We will schedule public hearings on this proposal, if any are requested, and announce the dates, times, and places of those hearings, as well as how to obtain reasonable accommodations, in the **Federal Register** at least 15 days before the first hearing.

Background

Section 4(b)(3)(A) of the Act requires the Service to make a finding known as a “90-day finding,” on whether a petition to add, remove, or reclassify a species from the list of endangered or threatened species has presented substantial information indicating that the requested action may be warranted. To the maximum extent practicable, the finding shall be made within 90 days following receipt of the petition and published promptly in the **Federal Register**. If the Service finds that the petition has presented substantial information indicating that the requested action may be warranted (referred to as a positive finding), section 4(b)(3)(A) of the Act requires the Service to commence a status review of the species if one has not already been initiated under the Service’s internal candidate assessment process. In addition, section 4(b)(3)(B) of the Act requires the Service to make a finding within 12 months following receipt of the petition on whether the requested action is warranted, not warranted, or warranted but precluded by higher-priority listing actions (this finding is referred to as the “12-month finding”). Section 4(b)(3)(C) of the Act requires that a finding of warranted but precluded for petitioned species should be treated as having been resubmitted on the date of the warranted but precluded finding, and is, therefore, subject to a new finding within 1 year and subsequently thereafter until we take action on a proposal to list or withdraw our original finding. The Service publishes an annual notice of resubmitted petition findings (annual notice) for all foreign species for which listings were previously found to be warranted but precluded.

In this notice, we announce a warranted 12-month finding and proposed rule to reclassify the wood

bison from an endangered species to a threatened species under the Act.

Previous Federal Actions

The listing history is reconstructed here based on **Federal Register** documents and the Code of Federal Regulations (CFR). Wood bison became listed in the United States under the 1969 Endangered Species Conservation Act when it was included on the first List of Endangered Foreign Fish and Wildlife, which was published in the **Federal Register** on June 2, 1970 (35 FR 8491). A column labeled “where found” indicated “Canada,” but the introduction to the list stated that “[t]he ‘Where Found’ column is a general guide to the native countries or regions where the named animals are found. It is not intended to be definitive.”

In 1974, the first list under the 1973 Endangered Species Act appeared in the CFR. Because the wood bison was listed under the 1969 Endangered Species Conservation Act, there is not a separate **Federal Register** notice that defined the population(s) and analyzed threats to the species. Like the 1970 list, the list for foreign species at 50 CFR 17.11 listed the wood bison, with a “where found” column indicating “Canada.” Section 17.11 further specified that “[t]he ‘where found’ column is provided for the convenience of the public, is not exhaustive, is not required to be given by law, and has no legal significance.”

Population-based listings, the precursor to the current Distinct Population Segments (DPS) approach first appeared with the 1975 list. In the 1975 CFR, wood bison appeared listed with “N/A” (not applicable) under “Population.” Section 17.11(b) stated that the “Population” column, along with the scientific and common names, “define[s] the ‘species’ of wildlife within the meaning of the Act.” This section for the first time also indicated that “[t]he prohibitions in the Act and in this Part 17 apply to all specimens of the ‘species’ listed, wherever they are found, and to their progeny.” The “Known Distribution” column for wood bison again indicated “Canada.” Paragraph (d) of § 17.11 reiterated that the “known distribution” column was “[f]or information purposes only” and also advised that the column “does not imply any limitation on the application of the prohibitions in the Act and in this Part 17. Such prohibitions apply to all specimens of the species, wherever found.” Wood bison remained listed in this manner until 1979.

In 1979, the Service published a notification in the **Federal Register** that questioned the listing status of the wood bison along with six other species. The

notification advised that the Service had failed to follow a procedural requirement of the 1969 Act for these species (consulting with the governor of any state in which the species is found), and thus concluded that the U.S. populations of these species were not covered by the listing, although the foreign populations would continue to be covered. The notice was also clear that the Service had always intended for all populations—foreign and domestic—of all seven species to be covered by the listing. The Service followed up on the notification on July 25, 1980, with a rule for five of the species in which it proposed to include the U.S. populations in the listing to correct the procedural error (45 FR 49844). The 1980 proposed rule did not include the wood bison. The Service indicated that the procedural error did not apply to wood bison because no non-hybridized wood bison were found in the United States. If no pure wood bison occurred in the United States as of the subspecies' listing under the 1969 Act, there would have been no States to consult with and, therefore, no procedural listing error.

Although the Service had found no error with the original listing of the entire wood bison subspecies, the 1980 CFR for the first time mistakenly indicated that the listed entity for wood bison was a DPS. The CFR indicated "Canada" in the "Vertebrate population where endangered or threatened" column. The listing has remained in this form through the current CFR. Despite this 1980 designation, it is clear that the wood bison is listed at the subspecies level. The CFR through 1980 indicates the Service's intent of the original listing, and we have conducted no rulemaking since that time to change the scope of the listed entity. The entire "population" of wood bison in Canada is the full extent of the subspecies' current range and no individuals occur in the wild outside this population. Therefore, the wood bison in Canada would not qualify for a population-based listing (*i.e.*, a DPS).

On May 14, 1998, the Service received a petition from a private individual requesting that the Service remove the wood bison from the List of Endangered and Threatened Wildlife, primarily because it had been downlisted under CITES. In a 90-day finding published on November 25, 1998 (63 FR 65164), we found that the petitioner did not provide substantial information to indicate that the delisting may be warranted.

On November 26, 2007, we received a petition from the co-chairs of Canada's National Wood Bison Recovery Team requesting that we reclassify the wood bison from endangered to threatened. The petition contained information about recovery efforts in Canada and referred to information provided to the Service. On February 3, 2009, we published a 90-day finding (74 FR 5908) acknowledging that the petition provided sufficient information to indicate that reclassification may be warranted and that we would initiate a status review. This document represents both our 12-month finding for wood bison and a proposed rule to downlist the species.

Species Information

Taxonomy and Species Description

Wood bison (*Bison bison athabascae*) belongs to the family Bovidae, which also includes cattle, sheep and goats. Debate over the generic name *Bison* continues with some authorities using *Bos* and others using *Bison* depending on the methodology used to determine relationships among members of the tribe Bovini (Asian water buffalo, African buffalo, cattle and their wild relatives, and bison) (Boyd *et al.* 2010, pp. 13–15.). In this discussion, we will use *Bison*, which is consistent with "Wild Mammals of North America" (Reynolds *et al.* 2003, p. 1010), "Mammal Species of the World" (Wilson and Reeder 2005, p. 689), and the Wood Bison Recovery Team (Gates *et al.* 2001, p. 25). Wood bison was first described as a subspecies in 1897 (Rhoads 1897, pp. 498–500). One other extant bison subspecies, the plains bison (*B. b. bison*), occurs in the United States and Canada. Based on the historical physical separation, and quantifiable behavioral, morphological, and phenological (appearance) differences between the two subspecies, the scientific evidence indicates that subspecific designation is appropriate (van Zyll de Jong *et al.* 1995, p. 403; FEAP 1990, p. 24; Reynolds *et al.* 2003, p. 1010; Gates *et al.* 2010, pp. 15–17).

Wood bison is the largest native extant terrestrial mammal in North America (Reynolds *et al.* 2003, p. 1015). Average weight of mature males (age 8) is 910 kilograms (kg) (2,006 pounds (lb)) and the average weight of mature females (age 13) is 440 kg (970 lb) (Reynolds *et al.* 2003, p. 1015). They have a large triangular head, a thin beard and rudimentary throat mane, and a poorly demarcated cape (Boyd *et al.*

2010, p. 16). In addition, the highest point of their hump is forward of their front legs; they have reduced chaps on their front legs; and their horns usually extend above the hair on their head (Boyd *et al.* 2010, p. 16). These physical characteristics distinguish them from the plains bison (Reynolds *et al.* 2003, p. 1015; Boyd *et al.* 2010, p. 16).

Distribution

The exact extent of the original range of wood bison cannot be determined with certainty based on available information, but was limited to North America (Gates *et al.* 2001, p. 11). However, historically, the range of the wood bison was generally north of that occupied by the plains bison and included most boreal regions of northern Alberta; northeastern British Columbia east of Cordillera; a small portion of northwestern Saskatchewan; the western Northwest Territories south and west of Great Slave Lake; the Mackenzie River Valley; most of The Yukon Territory; and much of interior Alaska (Reynolds *et al.* 2003, pp. 1011–1012). Skinner and Kaisen (1947, pp. 158, 164) suggested that the prehistorical U.S. range extended from Alaska to Colorado, and Stephenson *et al.* (2001, p. 140) concluded that wood bison were present within the boundaries of what is now defined as Alaska until their disappearance during the last few hundred years. Currently, there is neither a wild population in Alaska nor the continental United States (Harper and Gates 2000, p. 917; Stephenson *et al.* 2001, p. 140).

During the early 1800s, wood bison numbers were estimated at 168,000, but by the late 1800s, the subspecies was nearly eliminated with only a few hundred remaining (Gates *et al.* 2001, p. 11). In the words of Soper (1941, p. 362), wood "bison appear to have been practically exterminated," and based on the fate of plains bison, in which 40 to 60 million animals were reduced to just over 1,000 animals in less than 100 years (Hornaday 1889; Wilson and Strobeck 1998, p. 180), overharvest may have been the cause for the decline (Harper and Gates 2000, p. 915). The fact that populations began to rebound once protection was in place and enforced supports this idea (Soper 1941, pp. 362–363). In 1922, Wood Buffalo National Park (WBNP) was set aside for the protection of the last remnant population of wood bison. Since that time several additional herds have been established (Table 1).

TABLE 1—SIZES OF WOOD BISON HERDS IN CANADA FROM 1978 TO 2008 (DATA PROVIDED BY CANADIAN WILDLIFE SERVICE)

Herd category and name	1978	1988	2000	2002	2004	2006	2008
Free-ranging, disease-free herds:							
Mackenzie	300	1718	1908	2000	2000	~2000	1600
Nahanni		30	160	170	399	400	400
Aishihik			500	530	550	700	1100
Hay-Zama			130	234	350	600	750
Nordquist			50	60	112	140	140
Eththun				43	70	124	124
Chitek Lake			70	100	150	225	300
Free-ranging, diseased herds:							
Wood Buffalo ¹ National Park			2178	4050	² 4947	³ 5641	⁴ 4639

¹ Excluding adjacent diseased Wentzel, Wabasca, and Slave River Lowlands herds.

² Population estimate for year 2003.

³ Population estimate for year 2005.

⁴ Population estimate for year 2007.

Another factor that is thought to have played a role in the decline in wood bison is a gradual loss of meadow habitat through forest encroachment (Stephenson *et al.* 2001, p. 143; Quinlan *et al.* 2003, p. 343; Strong and Gates 2009, p. 439). Although not quantified, it is likely that because of fire suppression, and subsequent forest encroachment on meadows, there was a net loss of suitable open meadow habitat for wood bison throughout their range through about 1990. More intensive fire management began in Canada in the early 1900s with the philosophy that fire was destructive and should be eliminated to protect property and permit proper forest management (Stocks *et al.* 2003, p. 2). However, wildfire is an integral component of boreal forest ecology (Weber and Flannigan 1997, p. 146; Rupp *et al.* 2004, p. 213; Soja *et al.* 2007, p. 277). Without fire, trees encroach on meadows and eventually the meadow habitat is lost and replaced by forest.

Habitat

The foraging habitats most favored by wood bison are grass and sedge meadows occurring on alkaline soils. These meadows are typically interspersed among tracts of coniferous forest, stands of poplar or aspen, bogs, fens, and shrublands. Meadows typically represent 5 to 20 percent of the landscape occupied by wood bison (Larter and Gates 1991a, p. 2682; Gates *et al.* 2001, p. 23). Wet meadows are rarely used in the summer, probably because of the energy required to maneuver through the mud, but they are used in late summer when they become drier, and in the winter when they freeze (Larter and Gates 1991b, pp. 133, 135; Strong and Gates 2009, p. 438). In the summer, when daily access to surface water is required for hydration,

availability of water is also important (Fortin *et al.* 2003, pp. 223, 225).

Biology

Characteristic of other grazing ruminants, bison have a four-chambered stomach that efficiently processes and digests a diet of grasses high in roughage (Reynolds *et al.* 2003, p. 1019). Because they can thrive on coarse grasses and sedges, they occupy a niche within the boreal forest that is not utilized by other northern herbivores such as moose or caribou (Gates *et al.* 2001, p. 25). Several studies indicate that wood bison prefer sedges (*Carex* spp.), which can comprise up to 98 percent of the winter diet (Reynolds *et al.* 1978, p. 586; Smith 1990, p. 88; Larter and Gates 1991a, p. 2679; Fortin *et al.* 2003, pp. 224–225). Seasonally, other important diet items include grasses, willow, and lichen (Reynolds *et al.* 1978, p. 586; Smith 1990, p. 88; Larter and Gates 1991a, pp. 2680–2681; Fortin *et al.* 2003, pp. 224–225).

Wood bison are gregarious, with cows, calves, and yearlings found in matriarchal groups ranging up to a few dozen animals (Stephenson *et al.* 2001, p. 125; Strong and Gates 2009, p. 438). Mature bulls seldom form groups of more than a few animals, and solitary bulls are common (Fuller 1960, p. 11). Wood bison home range size varies with age, sex, and availability of forage (Larter and Gates 1994, p. 147). Home ranges of females are larger than those of males (Larter and Gates 1994, p. 147). For wood bison in the Mackenzie Bison Sanctuary, mean area of home range for females was 897 square kilometers (km²) (346 square miles (mi²)) and for males 433 km² (167 mi²) (Larter and Gates 1994, p. 146). Most likely females need larger areas because they occur in larger groups than the males (Larter and Gates 1994, p. 142). The large home ranges of both sexes may be a response

to limited forage availability and widely spaced meadows (Strong and Gates 2009, p. 438).

Free-ranging wood bison roam extensively with annual maximum traveling distance from each individual's center-of-activity averaging from 45 to 50 km (28 to 31 mi) (Chen and Morley 2005, p. 430). However, some captive animals released into the wild have traveled over 250 km (155 mi) (Gates *et al.* 1992, pp. 151–152). Herds are fluid and individuals interchange freely (Fuller 1960, p. 15; Wilson *et al.* 2002, p. 1545). Wood bison travel between favored foraging habitats along direct routes including established trails, roads, river corridors, and transmission lines (Reynolds *et al.* 1978, p. 587; Mitchell 2002, p. 50). Bison are also powerful swimmers and will cross even large rivers such as the Peace, Slave, Liard, and Nahanni to reach forage, provided that there are low banks for entry and exit (Fuller 1960, p. 5; Mitchell 2002, pp. 32, 50; Larter *et al.* 2003, pp. 408–412).

The wood bison's breeding season is from July to October. The age of first reproduction depends on nutritional condition and disease status and is, therefore, variable (Gates *et al.* 2010, p. 49). Females typically produce their first calf when they are 3 years old and may be reproductively successful up to age 20 (Wilson *et al.* 2002, p. 1545). Although capable of reproduction at age 2, males typically do not participate in the rut until they are 5 or 6, and reproductive success is at its maximum between ages 7 and 14 (Wilson *et al.* 2002, pp. 1538, 1544). Bison have a polygynous mating system, in which one male mates with several females (Wilson *et al.* 2002, p. 1538). When habitat is adequate and there are no other limiting factors such as disease and predation, wood bison populations have expanded exponentially (FEAP

1990, pp. 34–35; Gates and Larter 1990, p. 233). Consequently, newly introduced populations have the capacity to grow quickly, as demonstrated by the Mackenzie herd (Gates and Larter 1990, p. 235).

Wood bison are susceptible to a variety of diseases that may affect their population dynamics. The most important are anthrax, bovine brucellosis, and bovine tuberculosis, none of which are endemic to wood bison (Gates *et al.* 2010, pp. 28–32). Anthrax is an infectious bacterial disease that is transmitted through the inhalation or ingestion of endospores (Gates *et al.* 2010, p. 28). The disease is rapidly fatal with death usually occurring within several days once the clinical signs appear (Dragon *et al.* 1999, p. 209). Between 1962 and 1993, nine outbreaks were recorded in northern Canada, killing at least 1,309 bison (Dragon *et al.* 1999, p. 209). Additional outbreaks continued to occur through at least 2007 (GNT 2009, p. 13). Factors associated with outbreaks are high ambient temperatures, high densities of insects, and high densities of bison as they congregate in areas of diminishing forage and water (Dragon *et al.* 1999, p. 212). Sexually mature males are more susceptible than cows, juveniles, or calves, perhaps because of elevated levels of testosterone (Dragon *et al.* 1999, p. 211). Anthrax is not treatable in free-ranging wildlife, but captive bison can be vaccinated effectively and treated with antibiotics (Gates *et al.* 2001, p. 22).

Bovine brucellosis is caused by the bacterium *Brucella abortus* (Tessaro 1989, p. 416). Although the primary hosts are bovines, other ungulates such as elk can be infected. The disease is primarily transmitted through oral contact with aborted fetuses, contaminated placentas, and uterine discharges. Greater than 90 percent of infected female bison abort during their first pregnancy (Gates *et al.* 2010, p. 30). Naturally acquired immunity reduces the abortion rate with subsequent pregnancies (Aune and Gates 2010, p. 30). Male bison experience inflammation of their reproductive organs and in advanced cases, sterility. Both sexes are susceptible to bursitis and arthritis caused by concentrations of the bacterium in the joints, which may make them more susceptible to predation (Joly 2001, pp. 97–98). Two vaccines, S19 and SR B51, have been developed in an attempt to prevent bovine brucellosis (Aune and Gates 2010, pp. 30–31). S19 induces abortion in cows and is only about 39 percent effective in preventing infection (Davis *et al.* 1991, p. 262). SR B51 also induces

abortion in pregnant cows, but calfhood vaccination appears to be an effective tool in preventing transmission of the disease (Palmer *et al.* 1996, p. 1607; Olsen *et al.* 2003, p. 22). Brucellosis is extremely difficult to eradicate in ungulates; the combined use of quarantine protocols, serum testing, slaughter, and vaccination is being explored as a means of controlling the disease (Nishi *et al.* 2002, pp. 230–233; Bienen and Tabor 2006, pp. 324–325; Aune and Gates 2010, p. 31).

Bovine tuberculosis is a chronic infectious disease caused by the bacterium *Mycobacterium bovis* (Tessaro 1989, p. 417). Historical evidence indicates that bovine tuberculosis did not occur in bison prior to contact with infected domestic cattle (Tessaro 1989, p. 416). Wood bison were infected in the 1920s when plains bison were introduced into the range of wood bison (Tessaro 1989, p. 417). Currently, the disease is concentrated in bison in and near (Wabasca, Wentzel, and Slave River Lowlands herds) WBNP. The disease is primarily transmitted by inhalation and ingestion of the bacterium, but may also pass to offspring through the placenta or contaminated milk (FEAP 1990, p. 11). Bovine tuberculosis is a chronic disease that progressively becomes debilitating; advanced cases are fatal. There is not an effective vaccine for immunization against tuberculosis (FEAP 1990, p. 2).

Wood bison herds in and around WBNP, Alberta and the Northwest Territories, Canada, are infected with brucellosis and bovine tuberculosis. These diseased herds account for about half of the free-ranging wood bison and are the only known reservoirs of tuberculosis and brucellosis among the herds (Gates *et al.* 2010, pp. 4, 35). Approximately 30 percent of the animals in these herds test positive for brucellosis and 21 to 49 percent test positive for tuberculosis. The combined prevalence of the two diseases is 42 percent (Tessaro *et al.* 1990, p. 174; Gates *et al.* 2010, p. 35). Wood bison cows infected with both tuberculosis and brucellosis are less likely to be pregnant, and infected herds are more likely to have their populations regulated by wolf predation (Tessaro *et al.* 1990, p. 179; Joly and Messier 2004, p. 1173; Joly and Messier 2005, p. 549). Unlike anthrax which occurs in outbreaks in which many animals die at one time, brucellosis and tuberculosis are chronic diseases that weaken animals over time.

Conservation Status

In Canada, the Committee on the Status of Endangered Wildlife in Canada

(COSEWIC) was established in 1977, to assess species' status and evaluate their risk of extinction. In 1978, the COSEWIC designated wood bison as endangered based primarily on the fact that there were only about 400 disease-free wood bison; 100 in a captive herd and 300 in a free-ranging herd. In 1988, wood bison was downlisted to threatened in Canada because of data presented in a status report prepared by the National Wood Bison Recovery Team which documented progress towards recovery (Gates *et al.* 2001, p. 28; Gates *et al.* 2010, p. 65). A review by the COSEWIC in 2000 confirmed that "threatened" was the appropriate designation at that time (Gates *et al.* 2010, p. 65).

The wood bison was placed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on July 1, 1975, when the treaty first went into effect. On September 28, 1997, it was downlisted to Appendix II based on a proposal from Canada that described progress in implementation of the Canadian recovery plan (Government of Canada 1997, entire). CITES Appendix-II species are not necessarily considered to be threatened with extinction now but may become so unless trade in the species is regulated. The United States voted in support of the downlisting.

Recovery Actions

Section 4(f) of the Act directs us to develop and implement recovery plans for the conservation and survival of endangered and threatened species, unless the Director determines that such a plan will not promote the conservation of the species. The Service has not developed a recovery plan for wood bison, because no wild populations of wood bison currently exist in the United States. In Canada, the National Wood Bison Recovery Team published a national recovery plan in 2001 (Gates *et al.* 2001) and is currently preparing a revision to the plan. The purpose of the recovery plan is to advance the recovery of the wood bison; specific criteria for delisting under SARA were not specified. Management plans for the provinces support the goals and objectives of the National Recovery Plan (*e.g.*, Harper and Gates 2000, p. 917; GNT 2009, p. 4). Four goals were established to advance the recovery of wood bison (Gates *et al.* 2001):

(1) To reestablish at least four discrete, free-ranging, disease-free, and viable populations of 400 or more wood bison in Canada, emphasizing recovery in their original range, thereby

enhancing the prospects for survival of the subspecies and contributing to the maintenance of ecological processes and biological diversity.

(2) To foster the restoration of wood bison in other parts of their original range and in suitable habitat elsewhere, thereby ensuring their long-term survival.

(3) To ensure that the genetic integrity of wood bison is maintained without further loss as a consequence of human intervention.

(4) To restore disease-free wood bison herds, thereby contributing to the aesthetic, cultural, economic, and social well-being of local communities and society in general.

Revisions to the List of Endangered and Threatened Wildlife (adding, removing, or reclassifying a species) must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine whether a species is endangered or threatened, as defined by the Act, because of one or more of the five factors outlined in section 4(a)(1). In other words, an analysis of the five factors under 4(a)(1) can result in a determination that a species is no longer endangered or threatened. Section 4(b) requires the determination made under section 4(a)(1) be based on the best scientific and commercial data available and after taking into account those efforts, if any, being made by any State or foreign nation to protect such species. In the absence of a recovery plan for wood bison in the United States, we rely on the five-factor analysis and progress towards meeting the recovery goals outlined in the Canadian recovery plan in this proposed rule to determine if it is appropriate to reclassify wood bison. We also take into consideration the conservation actions that have occurred, are ongoing, and are planned.

In 1978, there was one free-ranging, disease-free herd with 300 individuals, the MacKenzie herd (Table 1). By 2000, when the last Canadian status review was conducted, the number of disease-free herds had grown to 6, with a total of approximately 2,800 individuals (Table 1). Since 2000, an additional herd has been established bringing the total number to 7, and the number of disease-free, free-ranging bison has increased to approximately 4,400 (Table 1). Four of the herds have a population of 400 or more, meeting recovery goal number 1 (Table 1). The free-ranging, disease-free herds are discussed in detail below.

Free-ranging Herds, Disease-free Herds

The Mackenzie bison herd was established in 1963 with the translocation of 18 wood bison that were originally captured in an isolated area of WBNP. This herd is currently the largest free-ranging, disease-free herd of wood bison, with approximately 1,600 to 2,000 animals (Reynolds *et al.* 2004, p. 7). The Mackenzie Bison Sanctuary was established in 1979 and encompasses an area of 6,300 km² (2,432 mi²) northwest of Great Slave Lake. The current range of the Mackenzie bison herd (12,000 km² (4,633 mi²)) extends well beyond the boundaries of the sanctuary. Habitat protection within the range of the Mackenzie bison herd is facilitated through the SARA, Canada's equivalent to the Act, and the Mackenzie Valley Resource Management Act of 1998. Although the Mackenzie Valley Resource Management Act does not specifically provide protection to wood bison, it did create a Land and Water Board (LWB), which is given the power to regulate the use of land and water, including the issuance of land use permits and water licenses. Under current management, an annual harvest is allowed (described in Factor B below), and the Mackenzie herd size has been greater than the recovery target of 400 since 1987, with approximately 1,600 to 2,000 animals (Gates and Larter 1999, p. 233; Table 1). Thus, the Mackenzie herd contributes to recovery goals 1 and 4.

Five releases of wood bison totaling 170 animals from 1988 to 1991 established the Aishihik herd in southwestern Yukon, in a remote area west of Whitehorse, Canada. Herd size has totaled over 400 since 1999 (Gates *et al.* 2001, p. 14; Table 1). With a current population of approximately 1,000 animals, it is the second-largest herd. The herd inhabits approximately 9,000 km² (3,475 mi²) of largely undeveloped habitat near the community of Haines Junction, adjacent to Kluane National Park. Less than 5 percent of the range of the Aishihik herd is on private lands (First Nation Settlement Lands), and these landowners participate in a management planning team specifically for this herd. The remainder of the herd's range is owned by the Government of Canada, and there are no threats to habitat in this area (Reynolds *et al.* 2004, p. 9). The herd has room to expand or shift its range, because there are no large-scale developments east, west, or north of the present range for several hundred kilometers. Small-scale agricultural development to the south of

the present range, however, could restrict range expansion in that direction (Reynolds *et al.* 2004, p. 9). Regulated hunting occurs on this herd (described in Factor B below). Other than regulated harvest, no other limiting factors have been identified (Reynolds *et al.* 2004, p. 17). The Aishihik herd contributes to recovery goals 1, 2, and 4.

The Hay-Zama herd was established in 1984, when 29 wood bison were transferred from Elk Island National Park to the holding corral site near Hay-Zama Lakes, Alberta (Gates *et al.* 2001, p. 17). A herd of 48 wood bison became free-ranging when portions of the corral they were being held in collapsed in 1993 (Gates *et al.* 2001, p. 17). Since then, the free-ranging herd has grown to approximately 750 animals (Table 1), thus contributing to recovery goals 1, 2, and 4. In 1995, the Government of Alberta established a 36,000 km² (13,900 mi²) Bison Management Area around the Hay-Zama herd in the northwestern corner of the province. In this area, all wood bison are legally protected from hunting under Alberta's Wildlife Act; outside of the area they are not protected. Collisions with vehicles are the largest source of known mortality for individuals in this herd (Mitchell and Gates 2002, p. 9).

The Nahanni herd, established in 1980 with the release of 28 wood bison, occurs primarily in southeast Yukon and northeast British Columbia. Population size has been approximately 400 animals or more since 2004 (Table 1). Availability of suitable habitat may limit this herd's size (Gates *et al.* 2001, p. 17). The Nordquist herd was established in 1995, near the Laird River in northeastern British Columbia (Table 1). Because the majority of the herd occupies habitat near the Alaska Highway, vehicle collisions are the primary source of mortality (Reynolds *et al.* 2009, p. 6). It is anticipated that the Nordquist and Nahanni herds will eventually coalesce into one herd because of their close proximity and the presence of river corridors that provide travel corridors (Gates *et al.* 2001, p. 18). Although it has not yet occurred, combination of the two herds would create a herd with numbers that exceed the recovery criterion of 400 (Table 1).

The Etthithun herd was established in 2002, near Etthithun Lake, British Columbia. Factors limiting the size of this herd include the amount and location of suitable habitat, conflicts with humans and industrial development, and potential contact with commercial plains bison (BC MOE, pers. comm., 2010). Current population size is approximately 124 (Table 1);

consequently, this herd does not currently meet the recovery criterion of 400 individuals. However, it does contribute to recovery goals 2 and 4.

The Chitek Lake herd was established in 1991, in Manitoba, Canada. The Chitek Lake Wood Bison Management Committee plans to maintain the herd at approximately 300 animals to keep the herd within carrying capacity of the habitat. The 100,300 hectare (ha) (25,452 acre (ac)) Chitek Lake Park Reserve provides habitat protection for the core range of the herd. Limiting factors for the herd include accidental mortality from drowning, starvation in bad winters, and predation from wolves (Manitoba Conservation, pers. comm., 2010). Although outside of the historic range of wood bison, Chitek Lake herd plays an important role in wood bison conservation because it is an isolated disease-free herd and, consequently, provides security to the species through population redundancy, thus contributing to recovery goal 2.

Captive Disease-free Herds

In addition to the free-ranging wood bison herds discussed above, four captive herds have been established, although only three are currently viable. The Elk Island National Park herd in Alberta, Canada, was established in 1965 from wood bison transferred from an isolated portion of WBNP. It is the national conservation herd and has provided disease-free stock for six of the free-ranging populations and several captive breeding herds in zoos and private commercial ranches (Gates *et al.* 1992, p. 153). Carrying capacity at Elk Island National Park is approximately 350 animals; animals above this number are regarded as surplus and are removed to establish and supplement free-ranging populations in former areas of their historic range (Parks Canada 2009a, unpaginated). Although the herd is fenced, the animals are semi-wild and spend the majority of their time roaming the 65 km² (25 mi²) enclosure, interacting with the environment in a largely natural manner (Gates *et al.* 2001, p. 18). The herd is rounded up annually to test for disease and to vaccinate for common cattle diseases. The age, sex, and condition of all the individuals are determined to inform management decisions. Using this information, individuals are selected for sale, donation, or the establishment of new herds, which also controls the population size of the herd (Parks Canada 2009b, unpaginated). This conservation herd contributes to recovery goals 2, 3, and 4.

The Hook Lake Wood Bison Recovery Project was initiated to establish a

captive, disease-free herd from a wild herd infected with brucellosis and tuberculosis. The overall objective of the project was to determine the feasibility of genetic salvage from a diseased herd (Nishi *et al.* 2002, p. 230). Specific objectives of the project were to conserve the genetic integrity of the wild herd by capturing an adequate number of calves; provide intensive veterinary and preventative drug treatment to eliminate disease from the calves; and raise a disease-free herd from the salvaged calves (Nishi *et al.* 2002, p. 229). From 1996 to 1998, 62 calves were captured. The disease eradication protocol included orphaning new-born wild-caught calves to minimize their exposure to *B. abortus* and *M. bovis*, testing calves for antibodies to brucellosis prior to inclusion in the new herd, treatment with antimycobacterial and anti-*Brucella* drugs, and intensive whole-herd testing for both diseases (Nishi *et al.* 2002, p. 229). By 2002, the herd size was 122. In 2006, after 9 years of intensive management, the herd was destroyed because bovine tuberculosis was discovered in 2005 in 2 founding animals and 10 captive-born animals, even though all animals initially tested disease-free. The herd provided valuable information on genetic salvage, genetic management, captive breeding for conservation, disease testing, and the difficulties involved in eradicating disease (Wilson *et al.* 2003, pp. 24–35). The Hook Lake Herd contributed to recovery goal 3.

In April 2006, 30 wood bison calves were transferred from Elk Island National Park to Lenski Stolby Nature Park near Yakutsk, Sakha Republic (Yakutia), Russia. An additional 30 head are to be transferred in 2011. Although outside the historical range, this was an opportunity to create another geographically separate population which provides added security to the species through population redundancy, thereby contributing to recovery goal 2. Transfer of wood bison to Russia was specifically mentioned in the recovery plan because it would contribute to the global security of the species (Gates *et al.*, 2001, p. 14).

In June 2008, 53 disease-free wood bison were transferred from Elk Island National Park to the Alaska Wildlife Conservation Center in Portage, Alaska. Consequently, this captive herd currently contributes to recovery goal number 2 through population redundancy. Ultimately, the Alaska Department of Fish and Game (ADFG) plans to restore wood bison populations in one to three areas in interior Alaska, with potential herd size of 500 to 2,000

or more depending on the location (ADF&G 2007, p. 79). Environmental analysis of the project is currently under review. The National Wood Bison Recovery Team in Canada recommended establishing one or more populations in Alaska in areas that can support 400 or more animals (Gates *et al.* 2001, p. 31). Establishment of one or more herds in Alaska would be a significant contribution to increasing the number of secure, disease-free, free-roaming herds.

Summary of Progress Toward Recovery

In summary, since 1978, the number of free-ranging, disease-free herds has increased from 1 to 7, and the number of wood bison has increased from approximately 400 to over 4,000. The first recovery goal of establishing 4 free-ranging, disease-free herds with 400 or more animals has been met, and planning is underway to create one or more herds in Alaska. Although the number of herds needed to meet recovery goal 2 was not specified, progress has been made on the second goal with the establishment of disease-free herds in Russia; Manitoba, Canada; and Alaska. The Hook Lake Bison Recovery Project was a well-planned, science-based attempt to conserve the genetic diversity of a diseased herd and would have contributed greatly to recovery goal 3. Although ultimately the project was unsuccessful, a great deal of knowledge was gained (Wilson *et al.* 2003, pp. 62–67). The wood bison recovery team is very aware of the need to maintain genetic diversity in the herds and establishes new herds with the goal of maintaining genetic diversity through multiple introductions (*i.e.*, the Aishihik herd and Hook Lake herd). The establishment of six additional herds on the landscape since 1978 contributes to recovery goal 4. In addition, the captive population at Elk Island National Park has provided disease-free stock for those six additional herds and two captive herds. It is clear that there is active management of the herds, and multiple avenues of research are being funded and pursued regarding the biology and management of wood bison. Progress towards the recovery goals outlined in the national recovery plan, published by the National Wood Bison Recovery Team, is moving forward steadily.

Summary of Factors Affecting the Subspecies

Section 4 of the Act and implementing regulations (50 CFR part 424) set forth procedures for adding species to, removing species from, or reclassifying species on the Federal Lists of Endangered and Threatened

Wildlife and Plants. Changes in the List can be initiated by the Service or through the public petition process. Under section 4(a)(1) of the Act, a species may be determined to be endangered or threatened based on any of the following five factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

We must consider these same factors in downlisting a species. In making this 12-month finding on the petition, we evaluate whether the species must be listed as endangered or threatened because of one or more of the five factors described in section 4(a)(1) of the Act. For species that are already listed as endangered or threatened, we evaluate both the threats currently facing the species and the threats that are reasonably likely to affect the species in the foreseeable future following the delisting or downlisting and the removal or reduction of the Act's protections.

Under section 3 of the Act, a species is "endangered" if it is in danger of extinction throughout all or a significant portion of its range and is "threatened" if it is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. "Foreseeable future" is determined by the Service on a case-by-case basis, taking into consideration a variety of species-specific factors such as lifespan, genetics, breeding behavior, demography, threat projections, timeframes, and environmental variability. The word "range" in the phrase "significant portion of its range" (SPR) refers to the range in which the species currently exists, and the word "significant" refers to the value of that portion of the range being considered to the conservation of the species.

For the purposes of this analysis, we will evaluate all five factors currently affecting, or that are likely to affect, the wood bison to determine whether the currently listed species is threatened or endangered.

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

Loss of Foraging Habitat

Fire Suppression

Wood bison depend on a landscape that includes sufficient grasslands and meadows for foraging habitat (Larter and Gates 1991b, p. 133). It appears that primarily through fire suppression, there was an overall loss of meadow habitat in Canada through the 1900s. More intensive fire management began in Canada in the early 1900s with the philosophy that fire was destructive and should be eliminated to protect property and permit proper forest management (Stocks *et al.* 2003, p. 2). However, wildfire is an integral component of boreal forest ecology (Weber and Flannigan 1997, p. 146; Rupp *et al.* 2004, p. 213; Soja *et al.* 2007, p. 277). Without fire, trees encroach on meadows and eventually the meadow habitat is lost and replaced by forest.

Fire alone, or in combination with grazing, can facilitate the conversion and maintenance of grasslands (Lewis 1982, p. 24; Chowns *et al.* 1997, p. 205; Schwarz and Wein 1997, p. 1369). Burning by Native groups within the range of wood bison was apparently a common practice through the 1940s outside WBNP but ended within the park when it was established in 1922 (Lewis 1982, pp. 22–31; Schwarz and Wein 1997, p. 1369). An examination of aerial photographs taken at WBNP over time showed that a semi-open grassland that covered about 85 ha (210 ac) in 1928 supported a grassland of only 3 ha (7.4 ac) in 1982 (Schwarz and Wein 1997, p. 1369). In addition, a number of sites previously identified as prairie are now dominated by trembling aspen (Schwarz and Wein 1997, p. 1369). Although not quantified, it is likely that because of fire suppression and forest encroachment on meadows, there was a net loss of suitable open meadow habitat for wood bison throughout their range through about 1990. More recently, several factors may be counteracting the loss of open meadow habitat including controlled burns, timber harvest, oil and gas development, and the effects of climate change, as discussed below.

Controlled Burns

Controlled burns have been implemented since 1992 in wood bison habitat in the Northwest Territories to increase meadow habitat (Chowns *et al.* 1997, p. 206). Approximately 4,400 to 26,900 ha (10,873 to 66,471 ac) were burned from 1992 to 1997 with some

sites being burned up to three times (Chowns *et al.* 1997, pp. 206–207). In addition, lightning fires burned 300,000 ha (741,316 ac), or almost 20 percent of the wood bison range in this area, from 1994 to 1996 (Chowns *et al.* 1997, p. 209). Plants favored by bison were more abundant in unburned areas and in meadows that had burned only once (Quinlan *et al.* 2003, p. 348), indicating that prescribed burns must be used judiciously to be effective in creating foraging habitat for wood bison. A study of vegetation recovery and plains bison use after a wildfire near Farewell, Alaska (Campbell and Hinkes 1983, p. 18) showed that grass and sedge-dominated communities increased from 38 percent to approximately 97 percent of the study area. Plains bison use also increased in subsequent years after the fire, and winter distribution of the Farewell herd expanded due to fire-related habitat changes (Campbell and Hinkes 1983, pp. 18–19). Because sedges are important winter forage for wood bison, the amount of such habitat has a major influence on herd size. Newly created habitats will be used by wood bison when these habitats are contiguous with existing summer or winter ranges (Campbell and Hinkes 1983, p. 20).

In summary, studies that have looked at the exclusion of fire or the effect of wildfire on wood bison habitat have concluded that fire is a necessary component of the landscape to maintain clearings and create conditions that favor forage preferred by wood bison. Controlled burns can have the same effect as wildfire by creating openings in the forest. However, repeated burns in the same location can be detrimental to creating suitable forage.

Timber Harvest

The volume of timber logged in Canada rose 50 percent from 1970 to 1997; in Alberta, the logging rate increased 423 percent from 3.4 to 17.8 million m³ (120 to 628 million feet (ft)³) per year during the same time (Timoney and Lee 2001, p. 394). These values are conservative because forests logged on private land and those harvested on government land after fire, insect outbreaks, or disease may go unrecorded (Timoney and Lee 2001, p. 395). The primary method of harvest is clearcutting (Timoney and Lee 2001, p. 394). Compared to a closed canopy forest, clearcuts improve the amount of suitable habitat available to wood bison because they create openings and increase the amount of summer forage available. However, the quantity and quality of forage is less than what is found in preferred wood bison foraging

habitats, and the increased productivity seen after a clearcut is not maintained, as woody vegetation becomes more dominant over time (Redburn *et al.* 2008, p. 2233). In addition, clearcuts do not provide adequate winter forage because wood bison's preferred food, sedges, typically do not colonize these areas. Clearcutting is not being used as a management tool to increase wood bison habitat currently, and whatever gains in habitat that have occurred from clearcutting are most likely low.

In summary, although timber harvest occurs throughout the range of wood bison, it is unclear to what extent it is creating suitable habitat. Clear cuts can increase summer forage, but they need to be in proximity to sedge meadows (wintering habitat) to increase the annual carrying capacity for wood bison, and the openings created by the clear cuts must be maintained over time. Although timber harvest has the potential to increase the amount of suitable habitat for wood bison, the amount that may have been created is most likely low and is undocumented.

Oil and Gas Development

Oil and gas exploration and production in Canada has increased in the last 20 years (Timoney and Lee 2001, pp. 397–398). Seismic mapping to determine the oil and gas reserves below the surface involves cutting paths 5 to 8 meters (m) (16.4 to 26 ft) wide across the landscape. The seismic lines become persistent features in the forested boreal landscape (Lee and Boutin 2006, p. 249). Approximately 70 percent of landscape disturbance for non-renewable resource extraction in Alberta is due to seismic lines (Timoney and Lee 2001, p. 397). There are an estimated 1.5 to 1.8 million km (932,000 to 1,100,000 mi) of seismic lines in Alberta (Timoney and Lee 2001, p. 397). Lee and Boutin (2006, p. 244) found that only 8.2 percent of seismic lines in Alberta's northeastern forested stands recovered to greater than 50 percent woody vegetative cover after 35 years, and 64 percent of these seismic lines maintained a cover of grasses and herbs. In terms of creating forest openings, more suitable foraging habitat, and linear paths, seismic lines may be beneficial for wood bison. However, because vehicular routes were established in 20 percent of the seismic lines, they also become corridors for off-road vehicles, recreationalists, and poachers (Trombulak and Frissell 2000, pp. 19–20; Timoney and Lee 2001, p. 400; Lee and Boutin 2006, p. 244). Although wood bison are known to occupy linear clearings such as roads, and seismic lines have increased

dramatically within their range, potentially creating suitable habitat, we do not have documentation of wood bison use of this type of habitat.

Agricultural Development

The popularity of bison as an alternative to beef in human diets has led to a growth of commercial bison ranches in Canada and the United States (Gates *et al.* 1992, p. 155). Exports of bison meat from Canada doubled to over 2 million kilograms (2.3 tons) from 2001 to 2006 (Statistics Canada 2009a, unpaginated). Plains bison dominate agricultural production in Canada because commercial production of this subspecies has been in place much longer than it has been for wood bison (Gates *et al.* 1992, p. 156; Harper and Gates 2000, p. 919). Bison production in Canada is concentrated in the western provinces, within the historical range of wood bison. In 2006, there were 195,728 plains bison on 1,898 farms reporting in the Canadian National Census; an increase of 35 percent from 2001 (Statistics Canada 2009b, unpaginated). Thus, plains bison represented approximately 95 percent of the total bison on the landscape in Canada in 2006. Existence and expansion of commercial plains bison production reduces the amount of land available for wild wood bison populations and increases the risk of hybridization when plains bison escape captivity (Harper and Gates 2000, p. 919; Gates *et al.* 2001, pp. 24, 29). Demand currently exceeds supply; therefore, expansion of commercial plains and wood bison operations is expected to continue (Gates *et al.* 2001, p. 24)

Escape of plains bison from fenced enclosures within the range of the wood bison in Canada poses a threat to the genetic integrity of wood bison (Gates *et al.* 1992, p. 156; Gates *et al.* 2001, p. 24). Because of their size, strength, and undomesticated nature, typical fences are insufficient to restrain bison (FEAP 1990, p. 29; Harper and Gates 2000, p. 919). Maintenance of fences can be a challenge in harsh environments where tree-fall, snow, ice, and frost heave can impair the integrity of the fence and necessitate frequent repairs. The import of plains bison to a private ranch near Pink Mountain, British Columbia, led to the establishment of a free-ranging herd of plains bison after they escaped their enclosure (Gates *et al.* 1992, p. 156).

In addition to commercial production, free-ranging, publicly managed plains bison herds have been established outside their historical range and within the historical range of wood bison in Alaska and Canada (Gates *et al.* 2010, p. 56). Because of the potential for

hybridization, these herds limit where wood bison can be reintroduced. Five plains bison herds occur in Alaska and one occurs in British Columbia, Canada (Gates *et al.* 2010, p. 56). None of these plains bison herds occur in close proximity to free-ranging wood bison herds with the exception of one herd—the Pink Mountain herd, British Columbia, which also occupies habitat that could have been used for wood bison (Harper *et al.* 2000, p. 11). Preventing interbreeding between free-ranging plains bison and wood bison is a management objective in British Columbia and is accomplished by maintaining a large physical separation between the herds and having a management zone around the plains bison herd that allows harvest of plains bison within this zone (Harper *et al.* 2000, p. 23).

Agricultural development, including plains bison ranching, is the least compatible land use for wood bison recovery (Harper and Gates 2000, p. 921). Loss of habitat for agricultural production is a threat to wood bison because of the large areas involved. Agricultural development near Fort St. John and Fort Nelson, British Columbia, has reduced habitat for wood bison, and continuing expansion of agriculture in the north will further limit the ability to meet population recovery objectives (Harper and Gates 2000, p. 921). Based on a conservative estimate of historical habitat only in Canada, Gates *et al.* (1992, p. 154) estimated that human activities and development exclude wood bison from approximately 34 percent of their historic range. When an updated Canadian historical range (Stephenson *et al.* 2001, p. 136) and the Alaskan historical range are included in the calculation, the amount of compromised habitat drops to approximately 16.5 percent if only Canada is considered, and 13 percent if the historical habitat in Canada and Alaska are combined (Stephenson 2010, pers. comm.). Sanderson *et al.* (2002, pp. 894–896; 2008, p. 257) found that the level of human influence in the range occupied by wood bison to be extremely low (less than 10 percent). Although human development and influence is very low over the majority of range occupied by wood bison, we assume that because of human population growth, increased commercial production of plains bison, and increased agricultural production, there will be continued loss of suitable wood bison habitat into the foreseeable future.

Climate Change

Climate change models project that the largest temperature increases will occur in the upper latitudes of the northern hemisphere, and that there will be an increase in extreme climate events in these areas (IPCC 2007, 11.5.3.1). This area includes the boreal forest of Canada and Alaska in the range of wood bison. Some of the predicted outcomes of climate change are: an increase in temperature; an increase in insect outbreaks; an increase in wildfire severity, area burned, and fire season length with potential landscape scale ecotype effects; and a shift northward of boreal forest (Hamann and Wang 2006, pp. 2780–2782; Soja *et al.* 2007, p. 277). These aspects of climate change have the potential to increase the amount of habitat suitable for wood bison over the next 100 years.

The mean annual temperature of interior Alaska and northern Canada has increased by 2 degrees Celsius (°C) (3.6 degrees Fahrenheit (°F)) in the last four decades (Serreze *et al.* 2000, p. 163). Warming has triggered bark beetle outbreaks in western North America, including south-central Alaska and British Columbia. In British Columbia, by the end of 2006, 130,000 km² (50,193 mi²) of forested lands were affected (Kurz *et al.* 2008, p. 987). The outbreak in British Columbia was an order of magnitude greater in area and severity than all previous recorded outbreaks (Kurz *et al.* 2008, p. 987). In the boreal regions of Alaska, the cumulative insect damage from 1993 to 1998 was 1.6 to 2.4 million ha (3.9 to 5.9 million ac) (Matthews 1997, p. 4; Malström and Raffa 2000, p. 36) with 90 percent of the spruce on the Kenai Peninsula being affected (Soja *et al.* 2007, p. 282).

The warmer minimum winter temperatures increased survival of beetles during the winter, while increased summer temperatures and reduced summer precipitation stressed the trees and contributed to the intensity of the bark beetle infestation (Kurz *et al.* 2008, p. 987). In addition, the warmer temperatures quickened the maturation rate of the beetles from 2 years to 1 year, hastening population growth (Berg *et al.* 2006, p. 219; Werner *et al.* 2006, p. 195). The effect of insect outbreaks on wood bison habitat includes a potential increase in suitable wood bison habitat, and an increase in susceptibility to fire. In insect-infested plots studied on the Kenai Peninsula, cover of bluejoint grass (*Calamagrostis canadensis*), a summer forage species, increased to more than 50 percent compared to uninfested forest stands (Werner *et al.* 2006, p. 198). These

results indicate forests affected by beetle kill may become more suitable to wood bison by creating openings and changing the vegetative composition. This would be particularly true in areas where, because of climate change, there was a permanent change in landscape cover from forest to grassland (Rizzo and Wiken 1992, p. 53; Flannigan *et al.* 2000, pp. 226–227). Werber and Flannigan (1997, p. 157), and Malmström and Raffa (2000, p. 36), indicate that insect outbreaks increase an area's susceptibility to fire ignition and spread.

Since the mid-1980s, wildfire frequency in western forests has nearly quadrupled compared to the average frequency during the period 1970–1986. The total area burned is more than six and a half times the previous level (Westerling *et al.* 2006, p. 941). In addition, the average length of the fire season during 1987–2003 was 78 days longer compared to that during 1970–1986, and the average time between fire discovery and control was 29.6 days longer (Westerling *et al.* 2006, p. 941). In Alaska, the largest fire on record was in 2004, and the third largest was in 2003 (Soja *et al.* 2007, p. 281).

The area burned by forest fires in Canada has increased over the past 4 decades (Stocks *et al.* 2003, p. 2; Gillett *et al.* 2004, p. 4; Soja *et al.*, 2007, p. 281). In Canada, weather/climate is the most important natural factor influencing forest fires (Gillett *et al.* 2004, p. 2; Flannigan *et al.* 2005, p. 1). Projections based on the Canadian and Hadley General Circulation Models, which predict future carbon dioxide and temperature increases, indicate that the area burned in boreal forests of Canada will double by the end of the century (Flannigan *et al.* 2005, pp. 11–12), the area exhibiting high to extreme fire danger will increase substantially, and the length of the fire season will increase (Stocks *et al.* 1998, pp. 5–11).

In the absence of fire, vegetation changes would occur relatively slowly in response to relatively slow changes in the climate. Because of its immediate and large-scale effect, fire is seen as an agent of change that will hasten the modification of the landscape to a new equilibrium with climate. Area burned may overshadow the direct effects of climate change on plant species distribution and migration (Werber and Flannigan 1997, p. 157). The new fire regime is expected to affect the age class distribution, species composition, landscape mosaics, and boundaries, including a retraction of the southern boreal forest (Werber and Flannigan 1997, p. 157, 160).

The increase in temperature, predicted by the Canadian and Hadley General Circulation Models described above, is expected to cause major shifts in ecosystems (Rizzo and Wiken 1992, p. 37; Hogg and Schwarz 1997, p. 527). The amount of grassland in Canada may increase by about 7 percent and shift northward (Rizzo and Wiken 1992, p. 52). Several modeling efforts suggest that boreal forests will shift northward into the area now characterized as subarctic (Rizzo and Wiken 1992, pp. 48–50; Rupp *et al.* 2002, p. 214). These changes may favor the expansion of suitable habitat for wood bison over the next century. Because one of the anticipated outcomes under climate change and the new fire regime is a retraction of the southern boreal forest and expansion of grasslands, we anticipate that habitat for wood bison, which require meadows intermixed with forest, will increase over the next century.

Summary of Factor A

Our analysis of habitat threats to wood bison under Factor A includes management actions that are being taken (controlled burns, timber harvest, oil and gas development), anticipated changes to the landscape based on climate change (increased insect outbreaks, increased fire, ecotype transition), and agricultural development. In summary, most likely there was loss of suitable meadow foraging habitat for wood bison from fire suppression in the 20th century. Several factors including fire, timber harvest, oil and gas exploration, and insect infestations could create more forest openings and grassland habitat. However, neither the loss, nor potential gain in habitat from these sources has been quantified, and the suitability of habitat for wood bison created as a by-product of resource development is largely unknown. The primary loss of habitat for wood bison has occurred from agricultural development (including commercial production of plains bison). Although the current level of human influence in the range of wood bison is low, we anticipate human population growth will continue, and loss of suitable habitat from agricultural development is expected in the foreseeable future. In the short term, habitat loss is expected to outstrip gain because of the increasing demand and production of commercial bison. Based on model projections of the effects of climate change, it is anticipated that there will be increased insect infestations, increased fire frequency and area burned, and warmer temperatures, leading to shifts in

ecosystems. In the long term, these changes will likely create more forest openings and landscapes in early successional stages and may increase the amount of suitable habitat available to wood bison. Whether the potential gain in habitat will offset the loss from development in the long term is unknown. Consequently, based on the best scientific and commercial data available, we conclude that loss of habitat remains as a significant threat to wood bison in the foreseeable future.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Overharvesting for the fur trade and westward expansion by Europeans resulted in near extinction of wood bison by the late 1800s (Gates *et al.* 1992, pp. 143–145). Currently, the utilization of free-ranging, disease-free wood bison populations is closely regulated and managed for sustainability. Under the Species at Risk Act (SARA), a species listed as threatened may not be killed on Federal lands such as National Parks or National Wildlife Areas, except where permitted under a national recovery strategy (GNT 2009, p. 15). Harvest is used as a recovery management tool to regulate herd size when other limiting factors, such as predation or disease, do not. Without harvest, herd size can expand beyond the carrying capacity of the landscape, may grow to the point where overlap with either plains bison or diseased herds is more likely, or may expand into areas such as highway right-of ways. Regulated harvest is allowed from the disease-free Mackenzie herd, Nahanni herd (quota of two bison annually), the Aishihik herd, and the Hay-Zama herds under permit systems controlled by the respective territorial wildlife agencies, and is managed on a conservative sustained-yield basis. The regulated harvests for the Mackenzie, Aishihik, and Hay-Zama herds are described below.

Hunting of the Mackenzie wood bison herd is regulated under a quota system based on population size, and through consideration of Native community interests in subsistence hunting, through a co-management process with the Fort Providence Resource Management Board. Regulated hunting was initiated in 1987. Non-resident hunting licenses were first issued for the winter hunt in 1992/1993. The quota for resident and non-residents has been adjusted over time based on herd size and community input. The allowable quota for harvest has never been taken and has ranged from 20 to 93.6 percent of the quota (Reynolds *et al.* 2004, p.

39). The current annual allowable harvest is 47 bison, which is 2.5 percent of the population estimate (Reynolds *et al.* 2004, pp. 15, 39).

Sport hunting is the primary method of regulating the growth of the Aishihik herd, because natural predation on the herd is low. The Yukon Wood Bison Technical Team provides advice on wood bison management that is sensitive to local conditions (*i.e.*, to remove wood bison from highway right-of-ways, competition of bison with other native ungulates), and consistent with the National Wood Bison Recovery Plan (Yukon Environment 2009, p. 1). The annual allowable harvest is determined each year based on population size and calf recruitment rate. Harvest from 1999 to 2007/2008 winter season ranged from 65 to 75 animals. In the 2008/2009 winter season, the allowable harvest increased to 200 because the population continued to grow under the old quota. Increased harvest is expected to restrict the movement of wood bison away from their traditional range, address highway safety concerns, and achieve bison management objectives (Government of Yukon 2009, p. 1). Resident, non-resident, and First Nations hunters are required to have a permit to hunt wood bison. Harvest regulations are strictly enforced by Yukon Department of Environment conservation officers, often in collaboration with local First Nations Game Guardians.

Hunting in the Hay-Zama herd began in 2008 for the first time. Hunting was initiated to regulate the population size, reduce wood bison conflicts with humans in the communities of Zama City and Chatey, reduce wood bison-vehicle collisions on two highways, and limit wood bison distribution eastward, preventing potential contact with diseased bison from WBNP (Government of Alberta 2010a, unpaginated). Harvest removed 128 and 155 animals in the 2008/09 and 2009/10 seasons, respectively (Government of Alberta 2010b, unpaginated). Three hundred licenses were issued each year, 200 to Aboriginal hunters and 100 to recreational hunters. Because the objectives of reducing herd size and human conflicts have been met, the total number of licenses has been reduced in the 2010/11 season to 105 (Government of Canada 2010b, unpaginated). Based on the success rate of the past two seasons, approximately 50 animals will likely be harvested. It is estimated that a population objective of 400–600 wood bison can be sustained by harvesting approximately 60 to 70 animals per season (Government of Canada 2010b, unpaginated).

In addition to regulating herd size, harvest is also used to prevent the spread of bovine tuberculosis and brucellosis infection in wood bison. Under the Northwest Territories Big-Game Hunting Regulations, hunters may shoot any bison sighted within the Bison Control Area (BCA), an area located between the WBNP diseased herd and the Mackenzie and Nahanni disease-free herds. The goal is to reduce the risk of bovine tuberculosis and brucellosis infection of the Mackenzie and Nahanni herds by removing infected animals dispersing from WBNP (see discussion under Factor C). Thirteen bison were removed from the BCA in the mid-1990s (Nishi 2002, pp. 12–13). There is currently no authorized harvest of wood bison in British Columbia.

Under Canada's SARA, all collection of listed species such as wood bison for scientific purposes is closely regulated. Scientific research on disease, genetics, diet, and other aspects of wood bison life history can and has been done using animals that have been legally taken by hunters, animals that died through natural factors, or road kill (*e.g.*, Tessaro *et al.* 1990, p. 175). Scientific research must relate to the conservation of the species and be conducted by qualified persons; the activity must benefit the species or enhance its chance of survival in the wild. In addition, activities affecting the species must be incidental to carrying out an otherwise lawful activity. Researchers must demonstrate awareness of the provisions of SARA, that measures are being taken to minimize harm to listed species, and that the most effective measures for minimizing harm are adopted.

Harvest of wood bison does not occur and only a small number of wood bison have been sporadically taken from disease-free herds for display in zoos or wildlife parks. This occurs only when surplus animals are available and these surplus animals have typically come from Elk Island National Park (Gates *et al.* 2010, p. 81).

The wood bison was placed in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on July 1, 1975, when the treaty first went into effect. CITES is an international agreement between governments to ensure that the international trade of CITES-listed plant and animal species does not threaten species' survival in the wild. There are currently 175 CITES Parties (member countries or signatories to the Convention). Under this treaty, CITES Parties regulate the import, export, and reexport of CITES-protected plants and

animal species (also see Factor D). Trade must be authorized through a system of permits and certificates that are provided by the designated CITES Scientific and Management Authorities of each CITES Party (CITES 2010, unpaginated). Species included in CITES Appendix I are considered threatened with extinction, and international trade is permitted only under exceptional circumstances, which generally precludes commercial trade.

Beginning in 1993, the European Economic Community CITES Working Group authorized the import of wood bison trophies from the Mackenzie population, one of the disease-free herds with regulated harvest. On September 28, 1997, the wood bison was downlisted to Appendix II based on a proposal from Canada, which described progress made in recovery plan implementation (Government of Canada 1997, entire). The United States voted in support of the downlisting. Appendix II allows for regulated trade, including commercial trade, as long as the exporting country issues a CITES permit based on findings that the specimen was legally acquired and the export will not be detrimental to the survival of the species.

Between the time the wood bison was first listed in CITES in 1975 and 2009, 169 CITES-permitted shipments have been reported to the United Nations Environment Programme–World Conservation Monitoring Center (UNEP–WCMC). Of these, 132 shipments have occurred since 1997, when the wood bison was downlisted to Appendix II. Of these 132 shipments, 49 (37 percent) were reportedly imported into the United States and six (four percent) were shipments permitted for export from the United States (UNEP–WCMC 2010, unpaginated). With the information given in the UNEP–WCMC database, of the 132 shipments recorded between 1997 and 2009, approximately 17 shipments consisted of live wood bison: 13 shipments (165 individuals) of captive-born/captive-bred wood bison were traded for commercial, zoological, or captive-breeding purposes; two shipments of ranched wood bison (13 individuals) were traded for commercial purposes; and two shipments of wild wood bison (18 individuals) were traded for commercial and captive-breeding purposes. There has been no trade in live, wild wood bison reported since 2002. The other 115 shipments since 1997 involved trade in parts and products (15 trophies, 1,628 kg (3,589 lb) of meat, 9 carvings, 8 skulls and horns, 304 teeth, 17 skins, 629 scientific specimens, and 6 garments, leather products, and hair) of wild, captive-

born/captive-bred, pre-Convention, and confiscated wood bison.

As a species listed in Appendix II of CITES, commercial trade of wood bison is allowed. However, CITES requires that before an export can occur, a determination must be made that the specimens were legally obtained (in accordance with national laws) and that the export will not be detrimental to the survival of the species in the wild. Because CITES requires that all international shipments of wood bison must be legally obtained and not detrimental to the survival of the species, we believe that international trade controlled via valid CITES permits is not a threat to the species. Furthermore, we have no information indicating that illegal trade is a threat to this species.

Summary of Factor B

It is possible that, with the ongoing recovery actions, a status review of wood bison in Canada could lead to delisting under SARA within the next 10 years. If this were to happen, we expect that regulations for recreational hunting, import of wood bison trophies, and permitting would change. Our ability to predict how these changes would affect the status of the species is limited; consequently we can only reliably project for a short time into the future.

Because harvest rates of free-ranging wood bison are based on sustainability, harvest is closely monitored and regulated, scientific collecting is tightly controlled, commercial harvest does not occur in wild populations, and import and export are controlled via CITES permits, we have determined that overutilization for commercial, recreational, scientific, or educational purposes is not a threat to wood bison now or in the foreseeable future.

C. Disease or Predation Disease

A decision in the early 1920s led to the transfer of 6,673 plains bison into WBNP, Alberta, Canada, where approximately 1,500 disease-free wood bison resided (FEAP 1990, p. 6; Gates *et al.* 1992, pp. 146–147). Although initially separated by fairly large distances, the plains bison eventually co-occurred and interbred with the wood bison and also transmitted bovine tuberculosis and brucellosis to them (FEAP 1990, p. 6; Gates *et al.* 1992, pp. 146–147). By the late 1940s and early 1950s, the population of wood bison in WBNP increased to between 12,500 and 15,000 animals (Fuller, 1950, p. 450). From that level, wood bison numbers

began to decline from 11,000 in 1971 to approximately 2,300 by 1998 (Carbyn *et al.* 1998, p. 464). The reasons for the population decline are not known with certainty, but disease, predation by wolves, and habitat condition may all have played a role (Carbyn *et al.* 1998, pp. 467–468; Joly and Messier 2004, pp. 1165–1166). Population numbers at WBNP have stabilized at about 4,000 to 5,000 since 2002 (Table 1).

Bovine tuberculosis and bovine brucellosis receive special attention because they cause production losses in domestic animals, they can potentially infect humans, and they are required to be reported under the Canadian Food and Inspection Agency's (CFIA) Health of Animals Act and Regulations (FEAP 1990, p. 7). Although wildlife is not under their jurisdiction, the CFIA recognizes the threat of reportable diseases to the commercial livestock industry and international trade. The CFIA follows a strict testing and eradication program for bovine tuberculosis and brucellosis in domestic animals, requiring that all infected animals and all exposed susceptible animals be destroyed (Canadian Food Inspection Agency 2002, unpaginated). Consequently, there is great concern from the Canadian cattle industry, which is currently recognized as disease-free, that disease will spread from the wood bison to domestic cattle (GNT 2009, p. 13). The goal of the CFIA's National Bovine Tuberculosis/Brucellosis Eradication Program is to detect and eradicate tuberculosis and brucellosis in farmed animals in Canada in order to protect the health of food-producing and companion animals, safeguard human health, and safeguard the health of free-roaming wildlife. Canada recognizes an obligation to detect, identify, report, and contain important diseases in wildlife, especially those with the potential to impact biodiversity, human and livestock health, the environment, and the economy within and beyond their borders.

The wood bison in and around WBNP are a reservoir for bovine brucellosis and bovine tuberculosis. Because there is a risk that these diseases could spread to uninfected free-ranging bison herds or to commercial cattle and bison operations, limits are placed on herd expansion to minimize the chance that the diseased animals come into contact with either free-ranging, disease-free herds, or domestic cattle or bison operations. In addition, the diseased herds occupy suitable habitat that could be used for the establishment of disease-free herds of wood bison. Therefore, the existence of diseased bison herds in and

around WBNP compromises further recovery of wood bison in northern Alberta, the Northwest Territories, and British Columbia (Gates *et al.* 2001, p. 29). The total area compromised by diseased herds is approximately 218,516 km² (84,369 mi²) or about 12 percent of the original range of the wood bison in Canada (Gates *et al.* 2001, p. 24). As mentioned earlier there are no effective vaccines for the treatment of animals in free-ranging populations.

The disease-free herds most at risk from infection from animals at WBNP are the Mackenzie, Hay-Zama, and Nahanni. Regulated harvest is allowed from the Mackenzie herd, Nahanni herd, and the Hay-Zama herds under permit systems (as described under Factor B), in part to prevent overlap with the diseased herd. In addition, the Governments of the Northwest Territories, Alberta, and British Columbia have designated management zones to reduce the risk of dispersing animals transmitting disease to disease-free herds in their provinces. In 1987, the Government of the Northwest Territories implemented a program to reduce the risk of contact between infected bison in and around WBNP and disease-free bison in the Mackenzie and Nahanni herds by establishing a Bison Free Management Area (BFMA) (Nishi 2002, pp. 5–6). The BFMA (39,000 km² (15,058 mi²)) encompasses the area between the Alberta–Northwest Territories border and southern shoreline of the Mackenzie River. In 1992, the Government of the Northwest Territories established the Nuisance Bison Control Regulations under the Northwest Territories Wildlife Regulations Act, permitting eligible hunters to legally shoot any bison sighted in the BFMA. All bison within this area are presumed disease carriers. The objectives of the program are to detect and remove any bison, and to prevent establishment of herds in the management area (Nishi 2002, p. 6). No bison were observed in the area during annual aerial surveys in the period 1988–2006, but 13 bison were killed in the mid-1990s (Nishi 2002, pp. 12–13; Hartop *et al.* 2009, p. 41). Aerial surveillance occurs annually.

In 1995, the Government of Alberta established a 36,000 km² (13,900 mi²) bison management area around the Hay-Zama herd to protect all bison from hunting. Within this area, all wood bison are legally protected under Alberta's Wildlife Act; outside of the area they are not protected and can be hunted. The area outside of the protected management area creates a large buffer zone between the disease-free Hay-Zama herd and the diseased

herds within WBNP (Gates *et al.* 2001, p. 38).

Control areas and buffer zones between diseased and non-diseased populations may not prevent disease transmission (Canadian Food Inspection Agency 2002, unpaginated) because they are sporadically patrolled and imperfectly enforced. As discussed earlier, fences are an ineffective method to contain herds long term, especially those in large areas (FEAP 1990, p. 29). Consequently, a long-term, more sustainable solution is needed to address this problem.

A Federal Environmental Assessment Panel (FEAP) was assembled to evaluate four courses of action to address the diseased herds at WBNP. These actions were initially proposed by the Bison Disease Task Force: (1) Do nothing; (2) fence WBNP to contain the diseased bison and prevent the spread of disease; (3) use a combination of strategically placed fences, buffer zones exterior to the Park from which all bison would be eliminated, and institute land-use restrictions on cattle grazing; and (4) phased elimination of the diseased herd and replacement with disease-free wood bison (FEAP 1990, p. 15). After public hearings, and consultation with technical experts, the panel recommended eradication of the existing diseased bison population to eliminate the risk of transmission of disease from bison in and around WBNP to domestic cattle, wood bison, and humans (FEAP 1990, p. 2). Public response to this recommendation was largely negative (Carbyn *et al.* 1998, p. 464). The recommendation was not implemented; consequently, control of disease spread currently depends on the buffer zones.

Annual examinations and serological studies of bison harvested from the Mackenzie herd indicate that the herd continues to be disease free (Nishi 2002, p. 23). Over 220 samples from the Hay-Zama herd were received as a result of the hunts that could be tested for disease. All samples tested negative (Government of Canada 2010a, unpaginated). There is also no evidence of bovine brucellosis and bovine tuberculosis in reintroduced herds in the Yukon Territory, British Columbia, western Alberta, or Manitoba. Free-ranging, disease-free herds currently include approximately 4,414 wood bison (Table 1). Because of their distance from WBNP, the Aishihik and Chitek Lake herds are the most secure from disease.

Recovery and conservation efforts for wood bison emphasize the importance of preventing the spread of tuberculosis and brucellosis to disease-free

populations, and eliminating diseases in infected populations (Gates *et al.* 2001, p. 30). The focus on disease prevention and control is consistent with the recovery goals of increasing the number of disease-free populations. Parks Canada, through Elk Island National Park, has worked with the recovery team and others to develop and maintain a disease-free captive-breeding herd, which has provided healthy stock for several restoration projects (Gates *et al.* 2001, p. 18).

Because the northern latitudes are experiencing the greatest changes in climate, this area may also be at the greatest risk for the emergence of diseases and parasites that may threaten the stability of wildlife populations (Kutz *et al.* 2004, pp. 109, 114). Warming may be of particular concern for wildlife in northern regions because the life-history patterns of most hosts and parasites are currently constrained by climatic conditions (Kutz *et al.* 2004, p. 114). Researchers have hypothesized that climate change will accelerate pathogen development rates, lead to greater overwinter survival of pathogens, and modify host susceptibility to infection in such a way that the effects of disease will increase (Ytrehus *et al.* 2008, p. 214). Wood bison are susceptible to many diseases and parasites (Reynolds *et al.* 2003, pp. 1030–1032). How climate change may affect the number of animals infected, the pathogen virulence, and, consequently, wood bison viability is unknown.

One potential effect of climate change may be an increase in anthrax outbreaks because of increased summer air temperatures. Between 1962 and 1993, nine anthrax outbreaks were recorded in northern Canada, killing at least 1,309 wood bison (Dragon *et al.* 1999, p. 209). Additional outbreaks continued to occur through at least 2007 (GNT 2009, p. 13). Wood bison appear most susceptible to outbreaks when they are stressed, including heat stress and high densities of biting insects (Dragon *et al.* 1999, p. 212; Gates *et al.* 2010, p. 28). In addition, if climate change leads to widespread or intense drought, there could be changes in the quality and availability of forage that may cause animals to concentrate around available food and water. These factors could contribute to stress levels and increase susceptibility to anthrax (Dragon *et al.* 1999, p. 212; Gates *et al.* 2010, p. 28). Although isolated anthrax outbreaks occur currently, it is possible that outbreaks may become more frequent, widespread, or affect a greater number of animals in the future. Thus far, anthrax outbreaks have occurred

sporadically when the necessary factors have come together to affect portions of one herd at a time. Anthrax is not currently having a population-level effect, and we do not have enough information to predict with confidence if anthrax will have a population-level effect on wood bison in the future as a result of climate change.

Predation

Wolf predation can be a significant limiting factor for diseased populations of wood bison (Reynolds *et al.* 1978, p. 581; Van Camp 1987, p. 25). Wood bison were the principle food of two wolf packs from 1975 to 1977 in the Slave River lowlands (Van Camp 1987, pp. 29, 32). Of the adult and subadult wood bison that died in 1976–1977, wolves killed 31 percent; however, hunters killed 39.3 percent (Van Camp 1987, p. 33). Joly and Messier (2004, p. 1173) found that productivity of the diseased WBNP herd was insufficient to offset losses to both predation and disease, but that in the absence of either factor, positive population growth was possible. Presence of disease likely increased the killing success of wolves through bison debilitation (Joly and Messier 2004, p. 1174). Wood bison evolved with wolves and we have no data showing that predation by wolves is limiting the recovery of any of the disease-free herds or would cause the extirpation of a herd (ADF&G 2007, p. 98).

Summary of Factor C

The presence of disease and diseased herds is recognized as a factor limiting recovery (Mitchell and Gates 2002, p. 12). The effectiveness of current management actions such as maintaining spatial separation between diseased and disease-free herds by limiting herd size is yet to be determined over long timeframes. Research is continuing on creation of disease-free herds. No effective vaccines exist for brucellosis, tuberculosis, or anthrax for free-ranging populations. In addition, although recommendations for the management of the diseased herds in and around WBNP have been suggested (FEAP 1990, p. 2) they have not yet been implemented, it is unknown if they will be implemented, or how implementation of the recommendations would affect the status of the subspecies.

Predation by wolves is a natural threat that will persist indefinitely into the future. Although diseased herds may be more susceptible to predation, healthy herds, which now represent approximately half of the free-ranging wood bison, are not. As long as wolves

are present on the landscape, they will present an ongoing, low level of threat, especially to diseased herds.

The presence of disease in the largest potential donor population of wood bison (WBNP herd) has limited the number of animals available for establishing or augmenting herds throughout the wood bison's historical range and has removed otherwise optimal habitat from consideration for expansion of wild populations. The presence of reportable diseases will continue to lead to actions that impact conservation, in particular restriction of herd expansion and the reintroduction of herds in particular areas. Although brucellosis and tuberculosis may limit wood bison population growth and productivity in some herds, they are unlikely to cause extirpation of any population (Bradley and Wilmshurst 2005, p. 1204; Gates *et al.* 2010, p. 60), but when combined with predation herd size can be limited. Anthrax outbreaks occur sporadically when critical factors come together. Climate change could affect the frequency of outbreaks if increased temperatures or drought caused increased levels of stress in the animals, especially during the rut. Because disease constrains and inhibits full recovery of the species, until a solution for the diseased animals at WBNP is found, or effective vaccines are discovered and utilized, disease will continue to be a threat to wood bison now and in the foreseeable future.

D. The Inadequacy of Existing Regulatory Mechanisms

The first protective legislation for wood bison, making it illegal for anyone to molest the species, was passed by the Canadian Government in 1877, but not until the law was enforced beginning in 1897 did the population increase (Soper 1941, pp. 362–363; Gates *et al.* 2001, p. 12).

As previously mentioned, the wood bison was recognized by the COSEWIC as an endangered subspecies of Canadian wildlife in 1978. It was reclassified to threatened in June 1988, based on a status report prepared by the National Wood Bison Recovery Team.

The Species at Risk Act (SARA), enacted on December 12, 2002, became fully effective on June 1, 2004, and is the Canadian counterpart to the U.S. Endangered Species Act. The purpose of SARA is to prevent listed wildlife species from becoming extinct or lost from the wild (extirpated); to help in the recovery of extirpated, endangered, or threatened species; and to ensure that species of special concern do not become endangered or threatened. SARA also requires the development of

recovery strategies and action plans for covered species. In the SARA, the COSEWIC was established as the scientific body that identifies and assesses a species' status; however, the government makes the final decision on whether to list a species.

Species such as wood bison that were designated as threatened or endangered by the COSEWIC before SARA had to be reassessed before being included on the official list of wildlife species under SARA. The wood bison is currently listed as a threatened species under Schedule 1 of SARA. The National Recovery Plan for wood bison was published in 2001 (Gates *et al.* 2001) and is currently under revision. As discussed in the Recovery section above, many recovery actions have been implemented and more are in progress. As discussed under Factor B, SARA requires permits for all scientific collection of listed species.

The SARA covers all species on Federal lands such as national parks, national wildlife areas, Prairie Farm Rehabilitation Administration pastures, aboriginal reserve lands, and military training areas. It prohibits the killing, harming, harassing, or taking of extirpated, endangered, or threatened species, and the destruction of their residences (*e.g.*, nest or den) on Federal lands, except where permitted under a national recovery strategy (GNT 2009, p. 15). Because the recovery strategy includes managing herd size for the health of the habitat and herds (Gates *et al.* 2001, pp. 35–39), bison hunting is allowed under a quota system in the Nahanni, Mackenzie, and Aishihik herds (described under Factor B). The Northwest Territories *Big Game Hunting Regulations* consider bison in the Slave River Lowlands to be hybrids, which General Hunting License holders may hunt without limit or closed season. In the Yukon, the Aishihik herd size is managed through hunting. In Alberta, Hay-Zama herd size is managed by hunting to reduce the likelihood that the herd will come into contact with animals from WBNP (GNT 2009, p. 15).

Habitat protection within the range of the Mackenzie bison herd is facilitated through the SARA and the Mackenzie Valley Resource Management Act of 1998. Although the Mackenzie Valley Resource Management Act does not specifically provide protection to wood bison, it did create a Land and Water Board (LWB), which is given the power to regulate the use of land and water, including the issuance of land use permits and water licenses. The LWB's Environmental Impact Review Board is the main instrument in the Mackenzie Valley for the examination of the

environmental impact of proposed developments. The LWB's Land Use Planning Board is given the power to develop land use plans and to ensure that future use of lands is carried out in conformity with those plans.

As described below, several wood bison herds occur wholly or partially in National Parks, ecological reserves, or Provincial Parks (Table 2). In 1922, WBNP was established in Alberta and the Northwest Territories for the protection of wood bison. Habitat protection of 44,807 km² (17,300 mi²) within WBNP occurs through the Canada National Parks Act, the purpose of which is to maintain or restore the ecological integrity of parks, through the protection of natural resources and natural processes. With respect to a park, ecological integrity means a condition characteristic of its natural region, including abiotic (nonliving) components and the composition and abundance of native species and

biological communities. Renewable harvest activities can be regulated or prohibited, and is enforced through this legislation (Canada National Parks Act, 2000). National parks are protected by Federal legislation from all forms of extractive resource use such as mining, forestry, agriculture, and sport hunting. Only activities consistent with the protection of park resources are allowed. Efforts are directed at maintaining the physical environment in as natural a state as possible. Sport hunting is prohibited; however, traditional subsistence-level harvesting by First Nations is allowed in some areas as long as the resources are conserved (The Canadian Encyclopedia 2010a, unpaginated).

Ecological reserves are established in part for the protection of rare and endangered plants and animals in their natural habitat; preservation of unique, rare, or outstanding botanical, zoological, or geological phenomena;

and perpetuation of important genetic resources. Research and educational functions are the primary uses for ecological reserves, but are open to the public for non-consumptive, observational uses. Plans are developed by the Ministry of Environment to provide protection and management to ensure long-term maintenance. Resource use, such as tree cutting, hunting, fishing, mining, domestic grazing, camping, lighting of fires and removal of materials, plants or animals, and the use of motorized vehicles are prohibited (British Columbia 2010, unpaginated).

Although there are numerous parks and ecological reserves throughout the range of the wood bison, these areas do not necessarily encompass all of the individuals of a herd. Individuals frequently move into and out of these areas; therefore, wood bison herds are only afforded protection while within the boundaries of the park or ecological reserve.

TABLE 2—FREE-RANGING WOOD BISON HERDS AND LAND MANAGEMENT UNITS THAT PROVIDE PROTECTION TO THEM

Herd category and name	Canadian province	Protected area
Free-ranging, disease-free herds:		
Mackenzie	Northwest Territories ..	Mackenzie Bison Sanctuary.
Aishihik	Yukon	None identified, but occupied habitat is government-owned.
Hay-Zama	Alberta	Wildlife Management Area.
Nordquist	British Columbia	Portage Brule Rapids Ecological Reserve, Smith River Ecological Reserve, Smith River
Etthithun	British Columbia	Falls—Fort Halkett Park, Liard River Corridor Park, Liard River Hotspots Park, Liard
Nahanni	British Columbia,	River West Corridor Park, Liard River Corridor Protected Area, Hyland River Park, Muncho
Chitek Lake	Northwest Territories	Lake Park, and Milligan Hills Park.
	Manitoba	Chitek Lake Reserve.
Free-ranging, diseased herds:		
Wood Buffalo National Park.	Alberta, Northwest Territories.	Wood Buffalo National Park.

The Federal Environmental Assessment and Review Process (EARP) was introduced in Canada in 1973. In 1995, the Canadian Environmental Assessment Act replaced EARP and strengthened the Environmental Impact Assessment (EIA). The Canadian Environmental Assessment Act outlines responsibilities and procedures for the EIA of projects for which the Federal Government holds decisionmaking authority. The purposes of EIAs are to minimize or avoid adverse environmental effects before they occur and incorporate environmental factors into decisionmaking. All projects in National Parks must have an EIA. An EIA is also required under the law of the provinces and territories. Municipalities and corporations are subject to the EIA requirements of their respective provincial, territorial, or land claim jurisdictions, and are also subject to the

Canadian Environmental Assessment Act if the Federal Government holds some decisionmaking authority concerning the proposed development or the acceptability of its impacts. This legislation ensures that any projects conducted on Federal lands, including National Parks, are carefully reviewed before Federal authorities take action so that projects do not cause significant adverse environmental effects, including areas surrounding the project. It encourages Federal authorities to take actions that promote sustainable development (Canadian Environmental Assessment Agency 2010, unpaginated). If a project is likely to cause significant adverse environmental effects that cannot be justified in the circumstances, even after taking into account appropriate mitigation measures the project shall not be carried out in whole

or in part (Canadian Environmental Assessment Act (20)(b) and (37)(b)).

The wood bison is listed on Appendix II of CITES. CITES, an international treaty among 175 nations, including Canada and the United States, became effective in 1975. In the United States, CITES is implemented through the U.S. Endangered Species Act. The Secretary of the Interior has delegated the Department of the Interior's responsibility for CITES to the Director of the Service and established the CITES Scientific and Management Authorities to implement the treaty.

CITES provides varying degrees of protection to more than 32,000 species of animals and plants that are traded as whole specimens, parts, or products. Under this treaty, member countries work together to ensure that international trade in animal and plant species is not detrimental to the survival

of wild populations by regulating the import, export, and reexport of CITES-listed animal and plant species (USFWS 2010, unpaginated). Under CITES, a species is listed on an Appendix and receives varying levels of regulation in international trade through permit and certification requirements depending upon the particular Appendix in which the species is listed (CITES 2010b, unpaginated). CITES Appendix-II species are not necessarily considered to be threatened with extinction now but may become so unless trade in the species is regulated. Appendix II allows for regulated trade, including commercial trade, as long as the exporting country issues a CITES permit based on findings that the specimen was legally acquired and the export will not be detrimental to the survival of the species. As discussed under Factor B, we do not consider international trade to be a threat impacting the wood bison. Therefore, protection under this treaty is an adequate regulatory mechanism.

Provincial and territorial governments within Canada can use the Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act (WAPPRIITA) to control transport of wood bison across their borders. This law applies to wood bison because it is on the CITES control list. The WAPPRIITA prohibits the import, export, and interprovincial transportation of CITES-listed species or any Canadian species whose capture, possession, and transportation are regulated by provincial or territorial laws, unless the specimens are accompanied by the appropriate documents (licenses, permits). In all cases, the WAPPRIITA applies to the animal, alive or dead, as well as to its parts and any derived products (Environment Canada 2010, p. 1).

In addition to national-level legislation that provides protection to wood bison, there is also protection at the provincial level. Alberta, the Northwest Territories, British Columbia, Manitoba, and the Yukon Territory classify wood bison as wildlife, which is the property of the provincial or territorial government. In 1995, the Government of Alberta established a Wildlife Management Area to protect the Hay-Zama herd and listed the wood bison as endangered within the protected area under the Alberta Wildlife Act (Gates *et al.* 2010, p. 71). In this area, all wood bison are legally protected from hunting; outside of the area they are not protected.

The Northwest Territories Wildlife Act enables the Minister of the Department of Resources, Wildlife, and Economic Development to prohibit the

importation of any wildlife into the Northwest Territories without a permit. This prohibits uncontrolled importation of plains bison. In May 1964, wood bison were declared in danger of becoming extinct under the Northwest Territories Act and are now designated as a protected species in the Northwest Territories. As such, sport hunting and subsistence hunting by aboriginal people may occur, but is regulated.

Wood bison are on British Columbia's Red List of species and subspecies that are candidates for legal designation as endangered or threatened under the Wildlife Act (Harper 2002, p. 3). Wood bison are an endangered species under the Yukon Act and a "specially protected species" under the Wildlife Act (Yukon legislation) and are listed as protected under Manitoba's Wildlife Act. Bison are considered domestic when held in captivity under permit or license for game farming purposes. If a wood bison escapes captivity, the provincial or territorial government acquires ownership of the animal and it, therefore, becomes protected (Harper and Gates 2000, p. 919).

In the United States, as an endangered species under the Act, pure wood bison can be imported only by permit for scientific research or enhancement of propagation or survival of the species. Wood/plains bison hybrids, however, are not protected by the Act and can be imported if the required CITES Foreign Export Permits are obtained from Canada prior to the import. If the wood bison is reclassified to threatened, import of trophies legally taken and properly permitted under the Act could also occur. Because of the regulations in place in Canada for all hunts and the permits required for import/export under CITES, we do not anticipate that reclassification would cause any increase in the number of animals killed or have any effect on the herds that are hunted.

In addition to the protection of CITES and the Endangered Species Act, the import of live wood bison and trophies is also regulated by the U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services for health purposes (APHIS 2007, entire). Imported wood bison must be accompanied by a health certificate that certifies, among other things, that the animal is free of any evidence of communicable disease, was not in quarantine in Canada, is from a brucellosis-free province or territory, and has continuously resided in a tuberculosis accredited-free province.

Although there is tight control over the transmission of disease across the

Canadian border, control of disease within Canada is more challenging. As explained above (Factor C), there is a program to detect and eradicate tuberculosis and brucellosis in farmed animals in Canada in order to protect the health of food-producing and companion animals, safeguard human health, and safeguard the health of free-roaming wildlife. In addition, buffer zones in which dispersing animals may be harvested have been created around the diseased herds to reduce the risk of bovine tuberculosis and brucellosis infection of the Mackenzie and Nahanni herds, which are most at risk from infection from animals at WBNP. In addition, the Governments of the Northwest Territories, Alberta, and British Columbia have designated management zones to reduce the risk of dispersing animals transmitting disease to disease-free herds in their provinces. However, as noted above, buffer zones are not ideal for preventing the spread of disease because they are sporadically patrolled and imperfectly enforced. Existing regulations and policies address the transmission of disease within Canada, but it is impossible to regulate the movement of wild animals across a large, mostly uninhabited landscape. Thus, we conclude that regulatory mechanisms are in place to minimize the spread of disease but because of the difficulty in containing herds of wild animals, the mechanisms are inadequate to prevent the spread of disease.

Under Factor E, we conclude that loss of genetic integrity through hybridization is a threat to wood bison. Preventing hybridization between plains bison and free-roaming wood bison is a goal of the recovery plan and is important to the conservation of the subspecies (Gates *et al.* 2001, p. 33). There is one free-ranging plains bison herd in Canada, in British Columbia, which was established as a result of the plains bison escaping from their enclosure. Preventing interbreeding between free-ranging plains bison and wood bison is a management objective in British Columbia and is accomplished by maintaining a large physical separation between the herds and having a management zone around the plains bison herd that allows harvest of plains bison within this zone (Harper *et al.* 2000, p. 23).

As discussed earlier under Factor A, plains bison presence on the landscape is increasing and commercial plains bison operations in Canada are expanding. The presence of plains bison within the historical range of wood bison increases the probability that wood bison will come into contact with

them. Ranchers are most likely highly motivated by economics to prevent the escape of their animals and to recapture them if they do escape. It is unlikely that additional government regulations would improve on this basic incentive; therefore, although there may not be specific regulations regarding how plains bison should be contained, such regulations are not viewed as necessary or effectual. As mentioned above, buffer zones are not ideal for preventing the movement of free-ranging bison. Thus, although regulations are in place by which the Pink Mountain plains bison herd (a free-ranging herd) can be managed, and there is no indication that they have not been effective, they may not be 100 percent effective in preventing hybridization in the future because of the difficulty of managing wild animals over large areas of forested landscape.

Summary of Factor D

The wood bison is currently protected through a variety of regulatory mechanisms, and we anticipate those protections to continue. The wood bison is protected by Canadian Federal, provincial, and territorial law. Internationally, its trade is regulated by CITES. International trade is limited to animals surplus to recovery needs in Canada, as determined under guidance of the National Wood Bison Recovery Team. In the United States, activities involving wood bison are regulated by the Endangered Species Act, and with reclassification, they will continue to be regulated. Federal agencies will need to consult with the Service on activities that may affect the species, and Federal permits will be required for scientific collection or any other form of take.

Disease and hybridization have been identified as threats to wood bison. Although buffer zones have been established and regulations implemented for the management of the buffer zones to minimize the potential of disease spread and hybridization, buffer zones have limitations and are an imperfect means by which to prevent animal movement. Therefore, we conclude that existing regulatory mechanisms are inadequate to completely protect wood bison from these threats.

E. Other Natural or Manmade Factors Affecting its Continued Existence

Accidental Mortality

Because bison follow linear landmarks and prefer open areas, vehicles on roads and other linear developments, such as railroad lines, present a hazard to wood bison.

Collisions with vehicles are the largest source of known mortality for individuals in the Hay-Zama herd (Mitchell and Gates 2002, p. 9). For the Nordquist herd, vehicle collisions are a significant mortality factor (Wildlife Collision Prevention Program. 2010, pp. 22–23). The herd was established in the Nordquist Flats area, near the Liard River in northeastern British Columbia; however, individuals, and then the majority of the herd, moved to the Alaska Highway corridor. In January 2007, a limited aerial survey counted 97 wood bison, all of which were on the highway right-of-way, except for four bulls, which were observed within 500 m (1,640 ft) of the road (Reynolds *et al.* 2009, p. 6). Three of 15 wood bison introduced to the Etthithun Lake area in 1996 were killed in collisions with industrial road traffic during the first winter (Harper and Gates 2000, p. 921). The Yukon government has a “bison-free” policy in the vicinity of the Alaska Highway that includes deterrence, capture, and ultimately the destruction of problem animals (Yukon Fish and Wildlife Co-management undated, p. 1). During the growth phase of the Aishihik herd from 1988 to 1993, 49 wood bison were removed from the Alaska Highway right-of-way because of vehicle collisions and problem wildlife complaints (Boyd 2003, p. 187). Of these, 36 were captured and moved to a game farm, 8 were killed in collisions, and 5 were intentionally killed (Wildlife Collision Prevention Program 2010, unpaginated). From 1989 to 2007, collisions with vehicles killed from 1 to 30 wood bison annually from three herds combined in the Northwest Territories; fewer than 10 were killed annually in 11 of the 18 years (GNT 2009, p. 17; Wildlife Collision Prevention Program 2010, unpaginated).

Because of continued or increased resource development, tourism, and off-road vehicle use, it is anticipated that mortality from collisions with vehicles will be a source of individual mortality for several populations. Because mortality from road collisions represents a small portion of the total subspecies population, and efforts are made to reduce bison/highway conflicts, this source of mortality is not expected to have a significant impact at the subspecies population level.

Spring flooding in the Peace-Athabasca River Delta in 1958, 1961, and 1974 killed approximately 500, 1,100, and 3,000 wood bison, respectively (Reynolds *et al.* 2003, p. 1029). Autumn flooding in the same area in 1959 killed an estimated 3,000 (Reynolds *et al.* 2003, p. 1029). This region is within WBNP where the

diseased herds reside. Most likely a small number of animals drown each year when caught by floods or when they break through ice (Soper 1941, p. 403). Large drowning events have not been documented from other rivers, and no large mortality events have been documented in recent years. Drowning is also recognized as a cause of mortality in the Chitek Lake herd. Because mortality due to drowning typically affects only a portion of a herd and herd sizes are increasing (Table 1), drowning does not appear to be having a population-level effect on wood bison.

Although wood bison are hardy and very cold tolerant (Gates *et al.* 2010, p. 24), above-average snowfall, long periods of sub-zero temperatures, and midwinter thaws followed by freezing can cause mortality. Such severe winter conditions reduce forage availability (Reynolds *et al.* 2003, p. 1030). Rain on snow events can also form an ice layer that creates a barrier to forage for herbivores (Putkonen 2009, p. 221). Freezing rain in autumn that causes ground-fast ice to form before snow cover accumulates, ice layering in the snow cover, crusting of the snow, and the formation of ground-fast ice in spring increase the energy required to obtain forage or make forage unobtainable (Gunn and Dragon 2002, p. 58). Soper (1941, pp. 403–404) recounts several stories in which excessive snowfall caused mass mortalities of wood bison, and Van Camp and Calef (1987, p. 23) report that 33 percent of the diseased wood bison herd in the Slave River lowlands was lost during the severe winter of 1974–1975. Starvation in bad winters is recognized as a source of mortality for wood bison in the Chitek Lake herd. We have no information indicating that starvation is having a population-level effect on any of the herds currently.

Rain on snow events may likely increase in the face of climate change (Rennert *et al.* 2009, p. 2312). A doubling of carbon dioxide is estimated to cause a 40 percent increase in the area impacted by rain on snow events in the Arctic by 2080 (Rennert *et al.* 2009, p. 2312). Rain on snow events may become more prevalent primarily in northwestern Canada, Alaska, and eastern Russia (Rennert *et al.* 2009, p. 2312). We have no reports that rain on snow events have led to the deaths of bison, but they could be susceptible to starvation by such events.

Genetic Issues

Genetic diversity in wood bison has been reduced through the large historic reduction in overall population size and the starting of new populations with

very few individuals (founder effect). Genetic diversity is the primary means by which organisms can adapt to changing environmental conditions over time. Low levels of genetic diversity can reduce the ability of a population to respond to environmental changes. Current wood bison herds were established from relatively few founders (Wilson and Strobeck 1999, pp. 484–486). For example, the Elk Island National Park herd was started from 11 individuals, and the Mackenzie herd was started from 16 (Gates *et al.* 1992, p. 150; Wilson and Strobeck 1999, p. 494). Inbreeding, the mating of related individuals, can lead to lower fecundity, abnormalities, reduced growth rates, and other issues. Although inbreeding is more likely to occur in small herds or in herds that are isolated, it has not been documented in wood bison. Starting new populations with multiple groups of animals is one way to avoid or minimize the founder effect as was done in the establishment of the Aishihik herd. Moving disease-free animals from one herd to another is another method to maintain genetic diversity. One of the wood bison recovery goals is to ensure that the genetic integrity of wood bison is maintained. Because no effects of inbreeding have been documented and management actions have been shown to be effective, we conclude that loss of genetic diversity is not a threat to wood bison now or in the foreseeable future.

Hybridization occurs when individuals from genetically distinct groups such as wood bison and plains bison interbreed. The introduction of plains bison to WBNP in the 1920s put the two distinct subspecies in contact with each other and threatened the genetic purity of wood bison (Gates *et al.* 2010, p. 17). The discovery of an isolated subpopulation of wood bison in 1957, and subsequent translocation of individuals, created the Mackenzie and Elk Island National Park herds, which were thought to be pure wood bison. Genetic analysis has indicated that these bison did have limited contact with plains bison, but it was minimal enough that the animals exhibit predominantly wood bison traits and wood bison herds originating from these founders are genetically more similar to one another than they are to plains bison (van Zyll de Jong *et al.* 1995, pp. 401–404; Wilson and Strobeck 1999, p. 493). Although recovery actions emphasize maintaining the genetic integrity of wood bison (*i.e.*, recovery goal number 3) (Gates *et al.* 2001, p. 33), as discussed earlier under Factor A, plains bison presence on the landscape is increasing. Commercial plains bison operations in Canada are

expanding, and the Pink Mountain plains bison herd was established in British Columbia as a result of plains bison escaping from an enclosure. The commercial plains bison operations and plains bison herds remove potential habitat for wood bison, and the presence of plains bison within the historical range of wood bison increases the probability that wood bison will come into contact with them. For these reasons, loss of genetic integrity through hybridization is a threat to wood bison and will remain so in the foreseeable future.

Summary of Factor E

Accidental mortality typically occurs randomly and cannot be predicted. We expect accidents to continue at the same rate and scale as they have in the past, into the future, but only expect this to effect individuals and not be significant enough to affect the species as a whole. Relative to genetic diversity, inbreeding in wood bison has not been documented, and management actions are in place to prevent further loss of genetic diversity. The status of genetic issues relating to hybridization could change relatively rapidly, especially if plains bison were to escape from captivity in close proximity to a wood bison herd. Currently, free-ranging wood bison and plains bison herds are widely separated from one another, but as herd size grows, the separation shrinks, increasing the odds that they may come into contact with one another. Furthermore, bison are difficult animals to contain, they can travel long distances, and the wood and plains bison can readily interbreed.

In summary, accidental mortality will continue to occur regularly, primarily through collisions with vehicles and drowning. In addition, climate change may create localized weather conditions such as above-average snowfall, long periods of sub-zero temperatures, or ground-fast ice formation that can lead to winter mortality of portions of herds. Given the number of herds and their wide distribution across the landscape, we conclude that accidental mortality and starvation are not threats to wood bison now or in the foreseeable future. It is recognized that genetic diversity in wood bison is relatively low, and that the herds must be managed to maintain genetic diversity. Loss of genetic diversity is a factor that may limit the ability of wood bison to adapt to changing conditions in the future, but the magnitude of that limitation, if it exists, is unknown. Lack of genetic diversity is potentially limiting over the long term depending on the magnitude of environmental change wood bison

may face. Because no effects of inbreeding have been documented and management actions have been shown to be effective, we conclude that loss of genetic diversity is not a threat to wood bison now or in the foreseeable future. Hybridization with plains bison is a threat that most likely will increase in the future. Because of consumer demand for bison meat we expect commercial bison production will continue to expand, removing suitable habitat for wood bison recovery herds, and increasing the probability that escaped plains bison will be free on the landscape. Hybridization is a threat to wood bison now and in the foreseeable future.

Finding

As required by the Act, we considered the five factors in assessing whether the wood bison is threatened or endangered throughout all or a significant portion of its range. We reviewed the petition, information available in our files, comments and information received after the publication of our 90-day finding (74 FR 5908), and other available published and unpublished information, and consulted with recognized experts. We have carefully assessed the best available scientific and commercial data regarding the past, present, and future threats faced by wood bison. This status review found that threats to wood bison are still present in factors A, C, D, and E. Habitat loss has occurred from agricultural development, and we expect losses will continue in concert with human growth and expansion of agriculture, including commercial bison production. The presence of bovine brucellosis and bovine tuberculosis constrains herd growth as managers attempt to maintain physical separation between diseased and disease-free wood bison and cattle herds, the diseased herds are occupying habitat that could be restored with disease-free herds, and disease in the largest potential donor population (WBNP herd) prevents those animals from being used in reintroduction projects. Plains bison are commercially produced in historical wood bison habitat. These operations remove potential habitat from wood bison recovery efforts and the escape of plains bison poses a threat to wood bison because of hybridization and the loss of genetic integrity. Finally, we found that regulatory mechanisms are inadequate to prevent disease transmission within Canada, and to prevent hybridization.

In addition to the five factor analysis, we also considered the progress towards meeting the recovery goals outlined in the Canadian recovery plan to

determine if it is appropriate to reclassify the wood bison under the Act. We took into consideration the conservation actions that have occurred, are ongoing, and are planned. Since listing, the subspecies' status has improved as a result of the following:

- Enactment and enforcement of national and international laws and treaties have minimized the impacts of hunting and trade.
- Reintroduction of disease-free herds has increased the number of free-ranging herds from 1 population of 300 in 1978 to 7 populations totaling 4,414 bison in 2008.
- Diseased and disease-free, free-ranging populations are stable or increasing.

In sum, the continued reintroduction of disease-free herds, the ongoing development and updating of management plans, the active management of herds, the ongoing research, and the protections provided by laws and protected lands provide compelling evidence that recovery actions have been successful at reducing the threats posed to the species.

The primary factor that led to the listing of the wood bison was the small number of free-ranging, disease-free animals on the landscape. However, the trend today is towards increasing numbers of disease-free herds and population sizes. We find that the threats identified under factors A, C, D, and E, when combined with the increase in number of herds and population sizes, ongoing active management, and protections provided by laws, are not of sufficient imminence, intensity, or magnitude to indicate that the wood bison is presently in danger of extinction and is, therefore, not endangered. However, threats to wood bison still exist and will continue into the foreseeable future. Consequently, we have determined that wood bison should be reclassified from endangered to threatened.

We next consider whether a distinct vertebrate population segment (DPS) exists or whether any significant portion of the wood bison range meets the definition of endangered.

Distinct Vertebrate Population Segment

Under the Service's "Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act" (61 FR 4722, February 7, 1996), three elements are considered in the decision concerning the establishment and classification of a possible DPS. These elements, which are applied similarly for additions to or removal from the Federal List of

Endangered and Threatened Wildlife, include:

- (1) The discreteness of a population in relation to the remainder of the species to which it belongs;
- (2) The significance of the population segment to the species to which it belongs; and
- (3) The population segment's conservation status in relation to the Act's standards for listing, delisting, or reclassification (*i.e.*, is the population segment endangered or threatened).

Discreteness

Under the DPS policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either one of the following conditions:

- (1) It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.
- (2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

Free-ranging wood bison herds do not cross international boundaries; no herds are discrete based on this criterion. There is marked geographic separation of the Aishihik and Chitek Lake herds from those centered more closely around WBNP, and there is no possibility of gene exchange between the Aishihik and Chitek Lake herds and those near WBNP. Because all extant wood bison herds originated from the same founders, there is no reason to maintain genetic distinctness among the herds. One of the recovery goals is to "ensure that the genetic integrity of wood bison is maintained." Because this goal can be accomplished through the movement of relatively few animals among the herds, it is reasonable to expect that this is a strategy that may be employed in the future to maintain genetic integrity. However, to our knowledge this strategy has not been used; therefore, because of marked geographical separation, the Aishihik and Chitek Lake herds are determined to be discrete.

Significance

Under our DPS Policy, in addition to our consideration that a population segment is discrete, we consider its biological and ecological significance to the taxon to which it belongs. This consideration may include, but is not limited to: (1) Evidence of the

persistence of the discrete population segment in an ecological setting that is unique or unusual for the taxon; (2) evidence that loss of the population segment would result in a significant gap in the range of the taxon; (3) evidence that the population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range; and (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics (61 FR 4721; February 7, 1996).

None of the wood bison herds occur in unique or unusual ecological settings; they are either in typical historical habitat or have been established in habitat that mimics historical habitat (Chitek Lake herd). Wood bison herds are currently in a growth phase and are beginning to fill in gaps in what was once a much more extensive range. There are already significant gaps in its distribution compared to the historical condition, and no one herd is more important than another in this regard. In the unlikely event of a herd being extirpated, it could be replaced through management actions that have been refined and implemented over the last 20 years. Six of the seven free-ranging, disease-free herds are within the historical range of the species. Only the Chitek Lake population is outside of what is considered the historical range. All of the herds, except the Mackenzie herd, were started with animals from Elk Island National Park, and both the Mackenzie and Elk Island National Park herds were initiated from animals from WBNP.

Because of the founder effect (a small number of founders which represented only a portion of the genetic variability available) and genetic drift, there are currently distinct, but low, genetic differences among the herds (Wilson and Strobeck 1999, p. 493). Wilson and Strobeck (1999, p. 494) note the power of the founder effect to lead to genetically distinct populations even when the populations were started at about the same time with animals taken from the same locale. The low level of genetic differences among the herds is an artifact of management actions and the differences do not represent significant, unique or special genetic traits. Therefore, although the Chitek and Aishihik herds are discrete, we find that they are not significant and no herds qualify as a DPS.

Significant Portion of the Range

Having determined that the wood bison does not meet the definition of an

endangered species throughout its range, we must next consider whether there is a significant portion of the range where the wood bison is in danger of extinction. A portion of a species' range is significant if it is part of the current range of the species and is important to the conservation of the species because it contributes meaningfully to the representation, resiliency, or redundancy of the species. The contribution must be at a level such that its loss would result in a decrease in the ability to conserve the species.

We evaluated the wood bison's range in the context of whether any potential threats are concentrated in a significant portion of the range such that if there were concentrated impacts, those wood bison populations might be in danger of extinction.

The herds in and around WBNP, which represent approximately half of the free-ranging wood bison, have tested positive for bovine brucellosis and/or tuberculosis. Approximately 30 percent of the wood bison in this area test positive for brucellosis, 21 to 49 percent test positive for tuberculosis, with a combined prevalence of 42 percent (Tessaro *et al.* 1990, p. 174; Gates *et al.* 2010, p. 35). It could be argued that the threat of disease to these populations is concentrated. However, as discussed above, these diseases are chronic and cause slow debilitation, not acute mortality of large numbers of animals at one time. The population at WBNP has persisted with these diseases since the 1920s, and population numbers have been stable at 4,000 to 5,000 since 2002 (Table 1).

Research into solutions on how to manage the diseased herds in and around WBNP continues. In 2005, a technical workshop was convened to determine in part if it was technically possible to remove disease from the wood bison herds in and around WBNP (Shury *et al.* 2006). Technical success was defined as reestablishing a disease-free bison population at a similar level to the current population without any loss in genetic diversity. The team determined that:

1. Eradication of bovine tuberculosis and brucellosis through lethal removal and reintroduction is technically feasible, and under controlled conditions there would be a very high probability of eradicating both diseases.

2. The eradication of these diseases would be a long-term project, taking 15–20 years.

3. The cost was estimated to be between 62 and 78 million dollars over 20 years with the greatest costs being incurred during the first 4 years (Shury *et al.* 2005, pp. 1–2).

Although the diseases affect the fitness of the herds and cause occasional mortalities, they will not cause herd extirpation. We are not aware of any other threat within this area that would act synergistically with disease and heighten our level of concern for these herds. Consequently, although we recognize that it is desirable to eradicate these diseases, we conclude that the threat they present is not of a magnitude that leads us to delineate the herds in and around WBNP as being more in danger of extinction than the other herds, and, as being a significant portion of the wood bison range.

In summary, the primary threats to the wood bison are relatively uniform throughout the species' range. We have determined that none of the existing or potential threats currently place wood bison in danger of extinction throughout all or a significant portion of its range.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, requirements for Federal protection, and prohibitions against certain practices. Recognition through listing results in public awareness, and encourages and results in conservation actions by Federal governments, private agencies and groups, and individuals.

Section 7(a) of the Act, as amended, and as implemented by regulations at 50 CFR part 402, requires Federal agencies to evaluate their actions within the United States or on the high seas with respect to any species that is proposed or listed as endangered or threatened, and with respect to its critical habitat, if any is being designated. However, given that there are no wild populations of wood bison in the United States, critical habitat is not being designated for this species under section 4 of the Act.

Section 8(a) of the Act authorizes limited financial assistance for the development and management of programs that the Secretary of the Interior determines to be necessary or useful for the conservation of endangered and threatened species in foreign countries. Sections 8(b) and 8(c) of the Act authorize the Secretary to encourage conservation programs for foreign endangered species and to provide assistance for such programs in the form of personnel and the training of personnel.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered and threatened wildlife. As such, these prohibitions would be applicable to the wood bison.

These prohibitions, under 50 CFR 17.21 (17.31 for threatened wildlife species), make it illegal for any person subject to the jurisdiction of the United States to “take” (take includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt any of these) within the United States or upon the high seas, import or export, deliver, receive, carry, transport, or ship in interstate or foreign commerce in the course of a commercial activity, or to sell or offer for sale in interstate or foreign commerce, any endangered wildlife species. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken in violation of the Act. Certain exceptions apply to agents of the Service and State conservation agencies.

We may issue permits to carry out otherwise prohibited activities involving endangered and threatened wildlife species under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22 for endangered species, and at § 17.32 for threatened species. With regard to endangered wildlife, a permit must be issued for the following purposes: For scientific purposes, to enhance the propagation or survival of the species, and for incidental take in connection with otherwise lawful activities. For threatened species, a permit may be issued for the same activities, as well as zoological exhibition, education, and special purposes consistent with the Act.

Effects of This Proposed Rule

If made final, this rule would revise 50 CFR 17.11(h) to reclassify the wood bison from endangered to threatened. The prohibitions and conservation measures provided by the Act, particularly through sections 4(d) and 9 would still apply to this species. Because there are no wild populations of wood bison in the United States, no critical habitat was designated, and consequently none will be affected. We are also correcting the 1980 listing to include Alaska in the historical range based on the best available scientific information (Skinner and Kaisen 1947, p. 158; Stephenson *et al.* 2001, p. 140; Rasic and Matheus 2007, p. 385). In addition, because the 1980 CFR indicated that the listed entity for wood bison was a DPS, we are correcting that mistake. Despite the 1980 designation, it is clear that the wood bison is listed at the subspecies level. The CFR through 1980 indicated the Service's intent of the original listing; because we have conducted no rulemaking since that time, we are making the correction here to change the scope of the listed entity.

The entire “population” of wood bison in Canada is the full extent of the subspecies’ current range and no individuals occur in the wild outside this population.

Peer Review

Under our peer review policy (59 FR 34270; July 1, 1994), we will solicit the expert opinions of three appropriate and independent specialists regarding pertinent scientific or commercial data and assumptions relating to the taxonomy, population models, and supportive biological and ecological information on this proposed rule. The purpose of such review is to ensure that we base listing decisions on scientifically sound data, assumptions, and analysis. To that end, we will send copies of this proposed rule to these peer reviewers immediately following publication in the **Federal Register**.

Required Determinations

National Environmental Policy Act

We have determined that we do not need to prepare an Environmental

Assessment or Environmental Impact Statement, as defined under the authority of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

A complete list of the references cited may be obtained from the Alaska Regional Office (**see FOR FURTHER INFORMATION CONTACT**).

Author

The primary author of this rule is Marilyn Myers, Ph.D., Ecological Services, Alaska Regional Office, 1011 E. Tudor Road, Anchorage, Alaska, 99503, (907) 786-3559.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and

recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

We propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

Part 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407; 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500; unless otherwise noted.

2. Amend § 17.11(h) by revising the entry “Bison, wood” under MAMMALS in the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *
(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
MAMMALS
*	*	*	*	*	*	*	*
Bison, wood	<i>Bison bison athabascaae</i>	Canada, Alaska	Entire	T	3	NA	NA
*	*	*	*	*	*	*	*

Dated: January 28, 2011.
Larry Williams,
Acting Director, Fish and Wildlife Service.
 [FR Doc. 2011-2529 Filed 2-7-11; 8:45 am]
BILLING CODE 4310-55-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 223

RIN 0648-XZ59

Endangered and Threatened Species; Extension of Public Comment Period on Proposed Threatened Status for Subspecies of the Ringed Seal

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; extension of public comment period.

SUMMARY: We, NMFS, are extending the date by which public comments are due concerning the proposed rule to list the Arctic (*Phoca hispida hispida*), Okhotsk (*Phoca hispida ochotensis*), Baltic (*Phoca hispida botnica*), and Ladoga (*Phoca hispida ladogensis*) subspecies of the ringed seal as threatened under the Endangered Species Act of 1973, as amended (ESA). On December 10, 2010, we published a proposed rule to list these subspecies as threatened. As part of that proposal, we announced a public comment period to end on February 8, 2011. Today we extend the public comment period to March 25, 2011.

DATES: The deadline for receipt of comments on the proposed rule published on December 10, 2010 (75 FR 77476), is extended from February 8, 2011, to March 25, 2011.

ADDRESSES: Send comments to Kaja Brix, Assistant Regional Administrator, Protected Resources Division, Alaska Region, NMFS, Attn: Ellen Sebastian. You may submit comments, identified

by RIN 0648-XZ59, by any one of the following methods:

- **Electronic Submissions:** Submit all electronic public comments via the Federal eRulemaking Portal <http://www.regulations.gov>.
- **Mail:** P.O. Box 21668, Juneau, AK 99802.
- **Fax:** (907) 586-7557.
- **Hand delivery to the Federal Building:** 709 West 9th Street, Room 420A, Juneau, AK.

All comments received are a part of the public record. No comments will be posted to <http://www.regulations.gov> for public viewing until after the comment period has closed. Comments will generally be posted without change. All Personal Identifying Information (for example, name, address, etc.) voluntarily submitted by the commenter may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information.

We will accept anonymous comments (enter N/A in the required fields, if you