

Wood Bison Restoration in Alaska:

A Review of Environmental and Regulatory Issues and Proposed Decisions for Project Implementation



Painting by Randall Compton

**Alaska Department of Fish and Game
Division of Wildlife Conservation**



April 2007

ACKNOWLEDGMENTS

This report and environmental review of wood bison restoration in Alaska was made possible by generous contributions from Safari Club International Foundation and the Pope & Young Club. Additional support for printing and distribution of the report was provided through the State Wildlife Grant program.

ADF&G would like to hear your views on the wood bison restoration project

The purpose of this report is to provide the public and decision makers with comprehensive information on wood bison restoration, to fully identify and discuss the issues related to wood bison restoration in Alaska, and provide an opportunity for additional public review and comment. Public comment on this report will be used to help make decisions on whether ADF&G will proceed with wood bison restoration in Alaska and, if the project proceeds, will play a significant role in determining where initial wood bison restoration efforts will be focused.

Comments should be received by *June 30, 2007* at:

Wood Bison Environmental Review Comments
ADF&G, Division of Wildlife Conservation
1300 College Road
Fairbanks, AK 99701-1599

Comments can also be sent by fax to
(907) 452-6410 or email at
woodbison@fishgame.state.ak.us

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:

- ♦ ADF&G ADA Coordinator, PO Box 115526, Juneau, AK 99811-5526.

The department's ADA Coordinator can be reached via phone at the following numbers: (VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648, (Juneau TDD) 907-465-3646, or (FAX) 907-465-6078.

- ♦ US Fish and Wildlife Service, 4040 N Fairfax Drive, Suite 300 Webb, Arlington, VA 22203, or;
- ♦ Office of Equal Opportunity, US Department of the Interior, Washington DC 20240

For information on alternative formats and questions on this publication, please contact the following:

- ♦ Publications Specialist, ADF&G/Division of Wildlife Conservation, PO Box 115526, Juneau, AK 99811-5526 or call 907-465-4176.

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF WILDLIFE CONSERVATION

SARAH PALIN, GOVERNOR

1300 College Road
Fairbanks, AK 99701-1599
PHONE: (907) 459-7213
FAX: (907) 452-6410

April 17, 2007

Dear Alaska Wildlife Enthusiast:

On behalf of the Alaska Department of Fish and Game, Division of Wildlife Conservation (ADF&G/DWC), I am happy to announce completion of the report “Wood Bison Restoration in Alaska: A Review of Environmental and Regulatory Issues and Proposed Decisions for Project Implementation” (Environmental Review). This Environmental Review represents a significant milestone in the department’s efforts to evaluate wood bison restoration in Alaska. Public comment on this report will have a major influence in determining whether the department continues to pursue wood bison restoration in Alaska and, if so, where we attempt to restore this historically important species.

Up to this point the proposal to restore wood bison has received support from a wide variety of organizations and individuals interested in Alaska wildlife management and wood bison conservation. In spring 2005 the department established a Wood Bison Restoration Advisory Group that included representatives of several state Fish and Game advisory committees, Native organizations, conservation groups, including both environmental and sportsman’s organizations, and animal welfare interests. After thoroughly reviewing and discussing available information on wood bison, the group unanimously recommended that the department continue to pursue wood bison restoration. The members of this advisory group showed a willingness to set aside differences of opinion on some issues and work together to achieve the common objective of returning wood bison to the wild in Alaska. Continuing this spirit of cooperation will be a key factor in the success of any restoration efforts that are pursued in the future.

Based on public input and thorough biological evaluation, ADF&G believes that wood bison restoration in Alaska represents an outstanding wildlife conservation opportunity and that wood bison restoration will ultimately provide benefits for local and nonlocal hunters and wildlife viewing enthusiasts. It is clear that wood bison are compatible with other wildlife species in the state and can play an important role in restoring and maintaining natural processes. The wood bison restoration project also has significance beyond Alaska. Wood bison restoration in Alaska would help to achieve several goals in Canada’s Wood Bison Recovery Plan and will contribute to international efforts to restore the ecological role of bison throughout North America.

There are some remaining challenges described in the Environmental Review that must be addressed in a cooperative manner in order for the project to move forward. While the department has been preparing this Environmental Review we have also been pursuing several other actions that are necessary to restore wood bison in Alaska. If these actions resolve some regulatory and permitting issues in time, and sufficient public support is evident, we hope to import wood bison stock from Canada in winter 2007–08, and complete preparations to release wood bison into the wild by spring 2010 or 2011.

At present it appears that the issues related to importing bison can be resolved in the coming months, and that there is substantial public interest in working to prepare cooperative management plans to guide wood bison reintroduction and management in specific areas. Continued public support and advocacy from diverse wildlife users will be essential in achieving the wildlife conservation objective of restoring wood bison in Alaska and creating opportunities for diverse users to share in the benefits.

ADF&G is pleased to provide the public with an additional opportunity to comment on this proposal to restore a historically important species to Alaska. We look forward to receiving additional public comments on wood bison restoration. If the public continues to support the project, we are eager to work with various wildlife users, landowners, local governments and managing agencies to evaluate and plan for wood bison restoration in specific locations in Alaska.

Sincerely,

A handwritten signature in black ink, appearing to read "David D. James". The signature is fluid and cursive, with the first name "David" and last name "James" clearly distinguishable.

David D. James
Regional Supervisor
Division of Wildlife Conservation

Wood Bison Restoration in Alaska:

A Review of Environmental and Regulatory Issues and Proposed Decisions for Project Implementation



Photo by Cormack Gates

Wood bison bull in the Mackenzie Bison Sanctuary, Northwest Territory, Canada

This report was prepared by Bob Stephenson and Randy R. Rogers, Alaska Department of Fish and Game, with assistance from Andrea Hunter, Hunter Environmental Associates, Inc.

EXECUTIVE SUMMARY

The Alaska Department of Fish and Game (ADF&G or “department”) is evaluating the possibility of restoring wood bison (*Bison bison athabasca*) in Alaska because of the potential for substantial benefits to wood bison conservation and to people. At the same time we recognize that restoring an animal that has not been present for at least 100 years requires careful consideration and extensive public involvement and support. During the nearly 15 years the wood bison restoration project has been considered, it has consistently received broad support by people and organizations with diverse interests in Alaska’s wildlife. In June 2005 the ADF&G Wood Bison Restoration Advisory Group (WBRAG) recommended that the department continue to pursue wood bison restoration and initiate site-specific planning efforts. After additional public review and comment on this report, ADF&G will decide whether to proceed with further consideration of wood bison restoration in specific areas.

This Environmental Review (ER) evaluates the potential to restore wood bison at three sites, as well as considering a “No Action” alternative. The results of the review indicate that wood bison restoration can be accomplished with minimal or no negative environmental impacts, and would enhance the diversity of Alaska’s wildlife resources and provide significant benefits to people. Wood bison restoration in Alaska would make a significant contribution to international efforts to conserve wood bison and would represent a major step in meeting several key conservation goals outlined in Canada’s Wood Bison Recovery Plan.

The three sites for wood bison restoration considered in the ER are the Yukon Flats, Minto Flats and the lower Innoko–Yukon River area. Because of logistic and cost considerations, wood bison restoration in each area would initially involve releasing bison on private lands near a local community, with the understanding that bison would be likely to range onto other lands as the population grew. Bison would be expected to eventually occur on state and/or federal public lands.

ADF&G concludes that all three sites are suitable for wood bison restoration and that the environmental effects of restoration at the three sites are similar. However, the three alternatives differ in terms of habitat potential, long-term conservation benefits, current levels of public awareness, and potential obstacles related to federal policies. The Yukon Flats site has the best habitat potential and ranks most favorably overall. The U.S. Fish and Wildlife Service (FWS) has indicated they prefer that ADF&G initiate wood bison restoration on lands outside of the Yukon Flats National Wildlife Refuge. However, they do not object to the proposal to restore wood bison onto private lands on the Yukon Flats.

ADF&G proposes to proceed with efforts to restore wood bison in Alaska and continue to consider all three of the potential restoration sites identified in the ER. ADF&G proposes to initiate site-specific planning efforts for both the Yukon Flats and Minto Flats locations while also increasing efforts to discuss wood bison restoration with residents of the lower Innoko–Yukon River area and evaluate local support for bison restoration in this area. Attempting to restore wood bison almost simultaneously on both Yukon Flats and Minto Flats is the approach that has the potential to provide the most benefits for various wildlife user groups in the shortest period of time. Because wood bison restoration on the Yukon Flats has been considered for many years, as well as other factors discussed in the ER, ADF&G recommends that the Yukon Flats location be the first priority in terms of initiating a site-specific planning process. Implementing

wood bison restoration at more than one of the potential sites would result in more positive effects in terms of wood bison conservation, biological diversity, and socioeconomic benefits.

Most of the permitting requirements for the project can be met without much difficulty. However, several significant legal and policy issues must be adequately addressed before wood bison restoration can proceed. Even if ADF&G reaches a final decision to proceed with wood bison restoration in Alaska, there is no guarantee of success at any of the sites being considered.

Because wood bison restoration appears to be an outstanding opportunity for wildlife conservation in Alaska and, up to this point has received substantial public support, ADF&G proposes to continue the effort to achieve the following goal:

“Restore wood bison populations to portions of their former habitat in Alaska so they are again an integral part of Alaska’s wildlife, providing Alaskans and others the opportunity to enjoy, and benefit from, this ecologically important northern animal.”

In all potential scenarios involving proceeding with the wood bison restoration program, ADF&G is committed to:

- ◆ Following the disease testing and health certification requirements established by the Alaska State Veterinarian and U.S. Department of Agriculture.
- ◆ Conducting site-specific planning efforts to provide additional opportunity for public review and comment and close involvement of local residents and other wildlife users.
- ◆ Conducting a cost-effective and affordable biological monitoring program to monitor the wood bison population and potential effects on other wildlife and the environment.
- ◆ Continuing to work with FWS and others to address issues related to the U.S. Endangered Species Act in a manner that ensures that wood bison restoration in Alaska does not limit opportunities for future uses and enjoyment of wood bison, or other resource development activities.
- ◆ Working to ensure that diverse wildlife users have an opportunity to share in the benefits of wood bison restoration.

The purpose of this report is to provide the public and decision makers with comprehensive information on wood bison restoration, to fully identify and discuss the issues related to wood bison restoration in Alaska and provide an opportunity for additional public review and comment. Public comment on this report will be used to help make decisions on whether ADF&G will proceed with wood bison restoration in Alaska and, if the project proceeds, will play a significant role in determining where initial wood bison restoration efforts will be focused.

ADF&G would like to hear your views on the wood bison restoration project

Comments should be received by June 30, 2007 at:

Wood Bison Environmental Review Comments
ADF&G, Division of Wildlife Conservation
1300 College Road
Fairbanks, AK 99701-1599

Comments can also be sent by fax to

(907) 452-6410 or email at

woodbison@fishgame.state.ak.us

CONTENTS

EXECUTIVE SUMMARY	I
PROPOSED VISION FOR THE FUTURE OF WOOD BISON IN ALASKA	1
SECTION 1: INTRODUCTION	1
PURPOSES, GOALS AND OBJECTIVES	2
ORGANIZATION OF THE REPORT	3
SECTION 2: BACKGROUND	4
HISTORY AND STATUS OF WOOD BISON IN NORTH AMERICA	4
WOOD BISON HABITAT REQUIREMENTS AND HABITAT ASSESSMENT	6
OVERVIEW OF PROJECT HISTORY AND PUBLIC CONSULTATION	9
WILDLIFE TRANSPLANT POLICY REVIEW	10
GENERAL LOGISTIC APPROACH TO WOOD BISON RESTORATION	10
PROJECTED POPULATION GROWTH AND MONITORING	11
LONG-TERM ENVIRONMENTAL RESEARCH AND MONITORING	12
CONSERVATION GUIDELINES	13
SECTION 3: MAJOR ISSUES INVOLVED IN WOOD BISON RESTORATION	13
U.S. DEPARTMENT OF AGRICULTURE IMPORT REGULATIONS	13
DISEASE TESTING AND HEALTH CERTIFICATION	14
CONCERNS RELATED TO THE U.S. ENDANGERED SPECIES ACT	15
FUTURE HARVEST ALLOCATION	16
FUNDING	17
SECTION 4: SUMMARY OF PREVIOUS PUBLIC INVOLVEMENT	18
EARLY PUBLIC CONSULTATION EFFORTS ON THE YUKON FLATS	19
WOOD BISON RESTORATION ADVISORY GROUP	19
PRIMARY RECOMMENDATIONS OF THE WBAG	20
PUBLIC COMMENTS RECEIVED FROM THE SPRING 2005 WOOD BISON NEWS	22
ADVISORY COMMITTEE AND REGIONAL ADVISORY COUNCIL ACTIONS	24
SECTION 5: REVIEW OF POTENTIAL ENVIRONMENTAL AFFECTS	25
OVERVIEW OF ALTERNATIVES CONSIDERED	25
<i>Sites Not Being Further Considered at this Time</i>	26
DESCRIPTION OF NEEDED PHYSICAL DEVELOPMENTS	28
DESCRIPTION OF ALTERNATIVE SITES	29
<i>Alternative A – Yukon Flats</i>	29
<i>Alternative B – Minto Flats</i>	30
<i>Alternative C – Lower Innoko–Yukon River</i>	31
<i>Alternative D – No Action Alternative</i>	32
AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS	33
<i>Physical Factors</i>	33
<i>Biological and Ecological Factors</i>	38
<i>Land Use and Economic Factors</i>	45
SUMMARY OF CUMULATIVE IMPACTS	52
<i>Water Quality/Fisheries</i>	53
<i>Vegetation</i>	53
<i>Waterfowl/Wildlife</i>	53
<i>Recreation and Hunting and Trapping</i>	53
<i>Cultural Resources</i>	53
<i>Resource Development</i>	53

<i>Economics</i>	54
CONCLUSIONS ON POTENTIAL ENVIRONMENTAL EFFECTS	54
SECTION 6: ANALYSIS OF ENVIRONMENTAL REVIEW SCOPING LETTERS	56
SECTION 7: PERMITTING REQUIREMENTS AND ENVIRONMENTAL AND WILDLIFE LAW AND POLICY REVIEW	63
PERMITTING REQUIREMENTS	63
<i>CITES Export Permit</i>	63
<i>Endangered Species Import Permit</i>	64
<i>DWC Animal Welfare Policy/Assurance of Animal Care</i>	64
<i>State Historic Preservation Office Consultation</i>	64
<i>Alaska Division of Mining, Land and Water Land Use Permit</i>	64
<i>Alaska Department of Environmental Conservation Air Quality Permit</i>	64
<i>U.S. Army Corps of Engineers, Section 404 Wetlands Permit</i>	65
ENVIRONMENTAL AND WILDLIFE LAW AND POLICY REVIEW	65
<i>Endangered Species Act</i>	65
<i>National Environmental Policy Act</i>	68
<i>Alaska Lands Act and FWS Refuge Management Policies</i>	70
<i>BLM Land Use Planning Requirements</i>	75
<i>ADF&G Wildlife Transplant Policy</i>	75
<i>State Veterinarian and USDA, Animal Health Certification</i>	76
SECTION 8: CONCLUSIONS AND PROPOSED DECISIONS	78
CONCLUSIONS	78
<i>Alternative A – Yukon Flats</i>	79
<i>Alternative B – Minto Flats</i>	79
<i>Alternative C – Lower Innoko–Yukon River</i>	80
PROPOSED DECISION TO PROCEED WITH WOOD BISON RESTORATION IN ALASKA	81
LITERATURE CITED	85

FIGURES

FIGURE 1	Location of the three sites being considered for wood bison restoration in Alaska.....	2
FIGURE 2	Study areas for potential wood bison habitat in Interior Alaska	8
FIGURE 3	Diagram of the general layout of a temporary holding facility.....	29
FIGURE 4	Alternative A – Land-ownership patterns on the Yukon Flats and approximate area with high quality wood bison habitat.....	30
FIGURE 5	Alternative B – Land-ownership patterns in the Minto Flats area and approximate area with high quality wood bison habitat.....	31
FIGURE 6	Alternative C – Land-ownership patterns in the lower Innoko–Yukon River area and approximate area where studies have identified high quality wood bison habitat	32

TABLES

TABLE 1	Members of the Wood Bison Restoration Advisory Committee	19
TABLE 2	Comparison of potential wood bison restoration sites ^a	27
TABLE 3	Potential emission sources during construction of temporary bison holding facility ...	36
TABLE 4	Source thresholds for obtaining a minor permit.....	37
TABLE 5	Attainment status for pollutants with an established National Ambient Air Quality Standard within Alaska	37
TABLE 6	Estimated direct monetary effects from wood bison restoration.....	50
TABLE 7	Estimated implementation and management costs that could be incurred by the State of Alaska and project contributors	51
TABLE 8	Economic profile for villages at potential release sites on the Yukon Flats	51
TABLE 9	Economic profile for the village at the potential release site on Minto Flats.....	52
TABLE 10	Economic profile for villages at potential release sites in the lower Innoko/Yukon River area.....	52
TABLE 11	Summary of potential environmental effects of wood bison restoration for the four alternatives considered.....	55
TABLE 12	Approximate timeline for major activities required for wood bison restoration in Alaska	83

APPENDICES

APPENDIX A.	JOINT ADF&G AND FWS REVIEW OF WOOD BISON RESTORATION ON YUKON FLATS	91
APPENDIX B.	FWS DETERMINATION ON THE STATUS OF WOOD BISON IN ALASKA UNDER THE ENDANGERED SPECIES ACT.....	121
APPENDIX C.	RECORD OF PREVIOUS PUBLIC INVOLVEMENT.....	123
	C–1: DOCUMENTS OF SUPPORT FROM EARLY PUBLIC CONSULTATION ON THE YUKON FLATS..	123
	C–2: SUMMARY OF PUBLIC COMMENT FROM THE SPRING 2005 <i>WOOD BISON NEWS</i>	145
APPENDIX D.	LIST OF PRESENTATIONS AT THE WBRAG MEETINGS	151
APPENDIX E.	ENVIRONMENTAL REVIEW SCOPING COMMENTS	154
	E-1: LIST OF SCOPING LETTERS SENT AND RESPONSES RECEIVED	154
	E-2: EXAMPLE SCOPING LETTER	156
	E-3: COPIES OF SCOPING COMMENTS RECEIVED	157
APPENDIX F.	ADF&G/DWC WILDLIFE TRANSPLANT POLICY FINDINGS	186
	F-1: DIRECTOR’S FINDING ON THE STATUS OF WOOD BISON IN ALASKA	186
	F-2: FINDINGS OF THE WILDLIFE TRANSPLANT POLICY REVIEW COMMITTEE	188

FREQUENTLY USED ACRONYMS IN THIS DOCUMENT

Full name	Acronym
Alaska Board of Game	BOG
Alaska Department of Environmental Conservation	DEC
Alaska Department of Fish and Game	ADF&G
Division of Wildlife Conservation	DWC
Alaska Department of Natural Resources	DNR
Office of Habitat Management and Permitting	OHMP
Minto Flats State Game Refuge	MFSGR
Alaska Wildlife Conservation Center	AWCC
Bovine Spongiform Encephalopathy	BSE
Bureau of Land Management	BLM
Council of Athabascan Tribal Governments	CATG
Customary and Traditional	C&T
Elk Island National Park	EINP
Endangered Species Act	ESA
Environmental Assessment	EA
Environmental Review	ER or "report"
Federal Subsistence Board	FSB
Hunter Environmental Associates, Inc.	HEA
International Union for the Conservation of Nature	IUCN
National Ambient Air Quality Standards	NAAQS
National Environmental Policy Act	NEPA
U.S. Army Corps of Engineers	USACE
U.S. Department of Agriculture	USDA
U.S. Fish and Wildlife Service	FWS
Yukon Flats National Wildlife Refuge	YFNWR
Wildlife Transplant Policy	WTP
Wood Bison Restoration Advisory Group	WBAG
Wood Bison Recovery Team	WBRT

PROPOSED VISION FOR THE FUTURE OF WOOD BISON IN ALASKA

Wild, free-ranging wood bison again occupy suitable habitat and we continue to make significant contributions to international wood bison conservation. Wood bison are again an integral part of Alaska's natural wildlife diversity, can be enjoyed by Alaskans and visitors to the state, and also provide local and statewide economic benefits.

SECTION 1: INTRODUCTION

Wood bison (*Bison bison athabasca*) are a subspecies of North American bison that are larger than plains bison (*Bison bison bison*) and are well adapted to northern meadow and forest habitats. Wood bison were extirpated in Alaska during the last few hundred years, and by 1900 only a few hundred remained in Canada (Stephenson et al. 2001; Gardner and DeGange 2003). There are now about 4,000 wood bison in healthy, free-ranging herds in Canada. Canada's National Recovery Plan for the Wood Bison includes a recommendation to reestablish one or more populations in Alaska to help secure the future of the subspecies. Restoring wood bison to one or more parts of their original range in Alaska is a priority in wood bison conservation (Gates et al. 2001).

This Environmental Review (ER or "report") evaluates the possibility of restoring wood bison at one or more of three sites in Interior Alaska: 1) Yukon Flats, 2) Minto Flats, and 3) the lower Innoko–Yukon River area (Figure 1; also see Section 5, Figures 4, 5 and 6 for more detailed maps of each site). Three other potential sites, the Aniak River, Hogatza River and North Fork Kuskokwim River, were determined to be less suitable as initial locations for wood bison restoration and are not being further considered at this time. The ER also evaluates a "no action" alternative in which ADF&G's efforts to restore wood bison to Alaska would be discontinued.

The ER provides a thorough evaluation of the proposal to restore wood bison in Alaska. It includes a review of available information, identifies the major issues involved and reviews the public involvement that has occurred up to this point. The report describes ADF&G's proposed goals, objectives, and decisions about proceeding with wood bison restoration in Alaska. Following public review and comment on the ER, ADF&G will make a final decision on whether wood bison restoration in Alaska will continue to be pursued and, if so, how. The decisions made after public review and comment will complete the first phase of the wood bison restoration planning process.

If the project continues, a second phase of planning will be undertaken. "Phase II" site-specific planning would involve working with local residents, other wildlife users, other agencies, and landowners to develop recommendations on whether to proceed with restoring wood bison at a specific location. If the recommendation is to move forward, the next step would be to work to obtain the necessary permits and approvals and develop area-specific cooperative management and implementation plans. These plans would address wood bison restoration and future management in more detail.

Alaska's proposed wood bison restoration program would make a significant contribution to several key conservation goals and objectives outlined in Canada's Wood Bison Recovery Plan including: 1) fostering the restoration of wood bison in parts of their original range outside

Canada, 2) ensuring that the genetic integrity of wood bison is maintained without further loss as a consequence of human intervention, 3) reestablishing wood bison in areas where they will be subject to natural selection, and 4) restoring disease-free wood bison herds, thereby contributing to the aesthetic, cultural, economic, and social well-being of local communities and society in general.

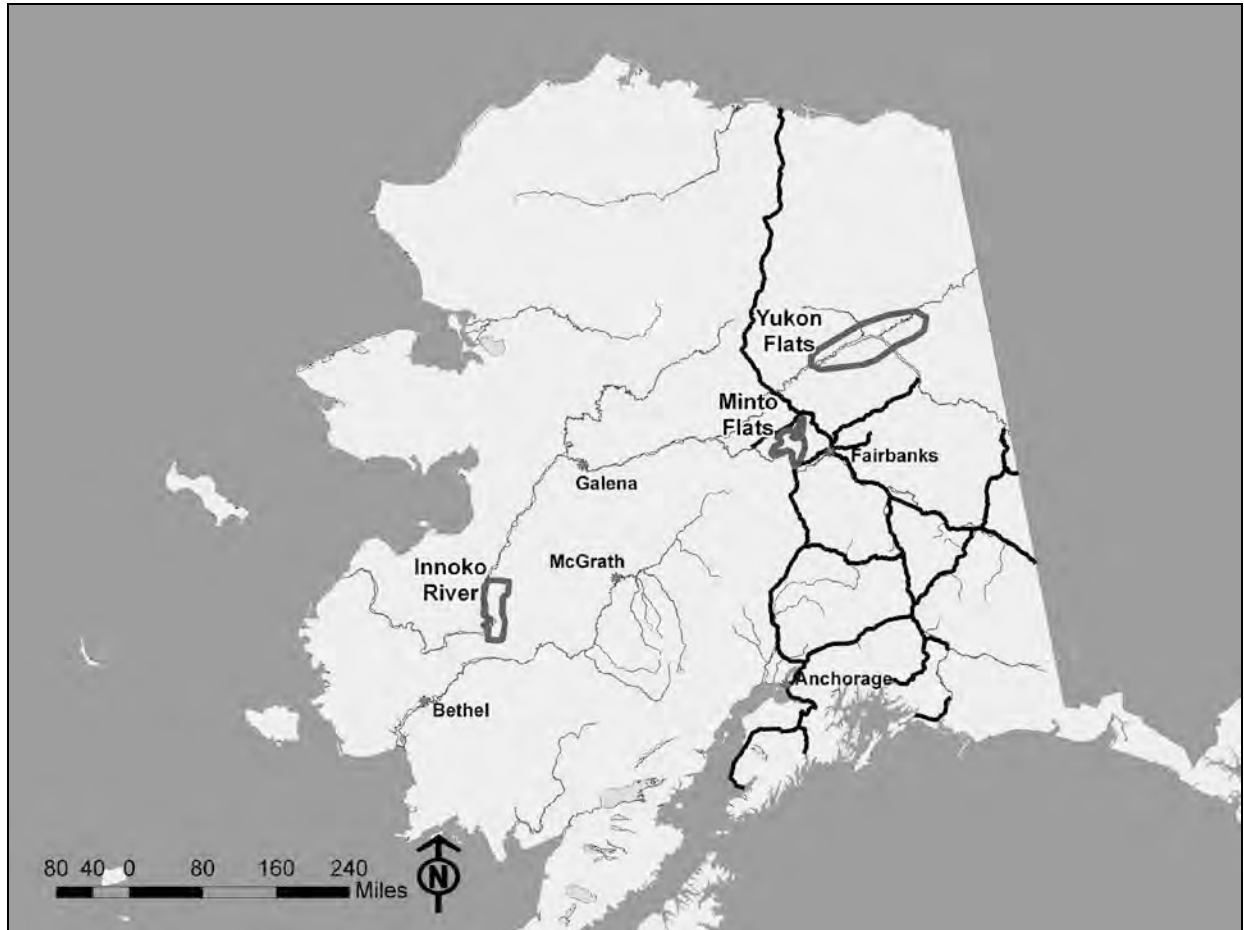


FIGURE 1 Location of the three sites being considered for wood bison restoration in Alaska

PURPOSES, GOALS AND OBJECTIVES

ADF&G is evaluating the possibility of restoring wood bison in Alaska because restoration of wood bison would: 1) be a major step forward in wood bison conservation and would improve the outlook for the long-term survival of the subspecies; 2) restore and enhance Alaska's natural wildlife diversity and natural processes; and 3) provide opportunities for education, hunting, and viewing and provide social, economic and cultural benefits to Alaskan's and others. In addition, restoration of wood bison in Alaska would:

- Enhance Alaska's wildlife resources by restoring a key indigenous grazing animal to our northern ecosystems.
- Restore them in suitable habitats within their known or likely original range.

- Provide a basis for sustainable development, including opportunities for local tourism or hunting and other guiding businesses.
- Restore a historic, cultural connection between bison and people in Alaska.
- Provide an opportunity to monitor the long-term ecological effects of a large grazing mammal as global climate change occurs, possibly shifting northern ecosystems towards grasslands.

The following proposed goal and objectives define the chronologic timeline that ADF&G will pursue to further evaluate and possibly move forward with wood bison restoration in Alaska. Due to regulatory issues beyond the direct control of ADF&G there is no certainty that these objectives can be met within the specified time frames, but they provide target dates that can be achieved if the necessary regulatory decisions are made and personnel and funding resources are available to allow the project to move forward. Additional detail on projected timelines to accomplish specific tasks is provided in Section 8, Table 12.

GOAL: Restore wood bison populations to portions of their former habitat in Alaska so that they are again an integral part of Alaska's wildlife, providing Alaskans and others the opportunity to enjoy, and benefit from, this ecologically important northern mammal.

- Objective 1:* Through public review and comment on this report, increase public awareness, evaluate public support and decide whether to proceed with wood bison restoration in Alaska by July 2007.
- Objective 2:* If the decision is made to proceed with wood bison restoration, complete cooperative implementation and management plans for wood bison restoration in one or more of the three identified potential release sites by March 2008.
- Objective 3:* Depending on progress on objectives 1 and 2, complete necessary testing for health certification, obtain permits and complete cooperative agreements so that wood bison can be moved to a temporary holding facility in Alaska in late 2007 or early 2008.
- Objective 4:* Release wood bison into the wild at one or more locations in Alaska by May 2010, or as soon as circumstances allow.

ORGANIZATION OF THE REPORT

Section 2 of this report provides background on the history and status of wood bison and describes wood bison habitat requirements and the habitat assessments that ADF&G has conducted to identify suitable locations for possible wood bison restoration. Section 2 also includes an overview of the history of the wood bison project, describes the findings made under the ADF&G/DWC Wildlife Transplant Policy, explains the general logistical approach to be used to restore wood bison, provides an overview of projected growth and monitoring of wood bison herds and other biological resources, and describes the conservation guidelines that are being applied. Section 3 identifies several major issues involved in wood bison restoration and how ADF&G intends to address them. Section 4 provides a detailed review of the public consultation on wood bison restoration that occurred through fall 2006. Section 5 includes a

review of the potential environmental effects of wood bison restoration at all three of the sites being considered. This section includes much of the information and analysis that is required for an Environmental Assessment (EA) that would meet the requirements of the National Environmental Policy Act (NEPA). It could be used as the basis for preparing an EA in the future if a federal action occurs that requires NEPA compliance. Section 6 provides an analysis and response to the scoping letters that were received from other agencies and landowners when the effort to prepare this ER was initiated. Section 7 provides a review of the permitting and legal requirements involved in wood bison restoration, including a review of NEPA; the Endangered Species Act (ESA); FWS refuge mandates and policies; and disease testing and health certification requirements. Finally, Section 8 outlines the conclusions of the environmental review and ADF&G's proposed decisions.

In addition to the information presented in the body of this report, there are several appendices that provide important information on wood bison restoration in Alaska. These include a joint review of issues involved in wood bison restoration completed by FWS and ADF&G (Appendix A), the FWS determination on the status of wood bison in Alaska under the Endangered Species Act (Appendix B), copies of letters of support from early public consultation on the Yukon Flats and the summary of public comments from April 2005 Wood Bison News (Appendix C). Appendix D is a list of the presentations at the Wood Bison Restoration Advisory Group (WBRAG) meetings identifying the extensive number of experts involved and the thorough review of information related to wood bison restoration which occurred at the meetings. Appendix E includes copies of scoping comments received early in the process of preparing this ER. Appendix F includes the findings that have been made during the review of the wood bison restoration project under the ADF&G/DWC Wildlife Transplant Policy.

SECTION 2: BACKGROUND

HISTORY AND STATUS OF WOOD BISON IN NORTH AMERICA

Radiocarbon dates and paleontological data show bison were present in Alaska for more than 400,000 years. Dated bison skeletal remains range from over 40,000 to 170 years old. Large-horned Pleistocene bison existed in North America until about 10,000 years ago, after which smaller horned bison evolved, ultimately leading to the existence of the two most recent North American subspecies, wood bison and plains bison. Skeletal remains and historical accounts show that wood bison persisted in a large part of their original range in Alaska and Canada during the last 10,000 years and were a component in the economies of Athabascan people in central and eastern Alaska during this period. Wood bison were the last subspecies of bison to live in Alaska, and were present for most of the last 5,000 to 10,000 years. Archaeological evidence and oral accounts from Native Alaskan elders indicate that wood bison were hunted until they disappeared from Alaska during the last few hundred years. Detailed historic accounts from Athabascan elders in Alaska describe how bison were hunted and used and indicate that they were an important source of food for Athabascan people before they declined to low levels within the last few hundred years. These accounts indicate that by 1800 only small numbers of bison persisted. The most recent records of wood bison occur in the early 1900s, and include sightings of small groups or single bison in northeastern Alaska. The most

likely reason for the extirpation of bison was the combined effects of hunting and changes in habitat distribution (Stephenson et al. 2001; Gardner and DeGange 2003).

Soper (1941) estimated that a total of 168,000 wood bison existed in North America in 1800. By the end of the 19th century, wood bison had nearly vanished as a result of unregulated hunting following the fur trade and westward expansion of European settlement (Gates et al. 1992). Conservation efforts subsequently improved their status in Canada. Currently, there are about 4,000 wood bison in six free-ranging, healthy populations and an additional 700 in captive herds in Canada.

Under the Canadian Species at Risk Act, which is similar to the U.S. ESA, wood bison are currently listed as a “threatened” species. The Committee on the Status of Endangered Wildlife in Canada downlisted wood bison from “endangered” to “threatened” status in 1988 because Canadian populations of wood bison were recovering. The U.S. Endangered Species list (which includes both foreign and domestic species) currently lists wood bison as endangered “in Canada.” The FWS is currently evaluating a proposal to revise the status of wood bison under the ESA to threatened “in Canada,” which is their current legal status under Canadian law.

In October 2004, in response to an inquiry from the Commissioner of the ADF&G, the Director of the FWS determined that, if wood bison are restored to Alaska, they would not need to be listed domestically under the ESA (Appendix B). Wood bison brought into Alaska would be treated as a foreign listed species for import permitting purposes. After arriving in Alaska, wood bison would have the same legal status as other resident wildlife, although depending on their status as a foreign listed species, FWS has indicated that there may be a need for some type of federal authorization to allow harvest if the species were still listed in Canada. If the species is downlisted to threatened status “in Canada” on the U.S. list of endangered species, an action likely to occur before the harvest of wood bison in Alaska is feasible, it would be easier to obtain any needed federal approval for harvest or exportation of trophies. Even if wood bison in Canada are not downlisted on the ESA, FWS indicates that provisions can be made to allow harvests that are necessary for herd management. Sections 3 and 7 provide more information on ESA considerations.

The proposed restoration program would increase the worldwide population of wild wood bison substantially. Wood bison restoration in Alaska is widely regarded as an important initiative in wildlife conservation and ecosystem restoration. It is consistent with accepted conservation principles and Alaska's constitutional mandate to maintain and enhance the states' natural resources. It would be a major step forward in bison conservation, and is a significant opportunity for international cooperation in improving the status of a historically important native species. In August 2006 the Director of DWC found “that wood bison are an extirpated indigenous species and are native to Alaska. Once restored to Alaska wood bison will again be an integral part of Alaska's natural wildlife diversity and will be managed by ADF&G like other resident species of wildlife.” (See discussion of the ADF&G Wildlife Transplant Policy below).

Alaska currently supports four plains bison populations, with the largest being the Delta and Farewell herds. The original herd in Delta Junction was established in 1928 with stock obtained from the National Bison Range in Montana. Three other herds were subsequently established with stock from the Delta herd. Because the founding stock for these herds was obtained from

the National Bison Range before there was some introgression of cattle genes into bison at the National Bison Range, the Alaska herds (particularly the isolated Farewell herd) may be among the relatively small number of herds that include genetically pure plains bison. Therefore, Alaska's plains bison may be important in terms of conserving the genetic integrity of plains bison over the long term. The areas being considered for wood bison restoration are 100 miles or more from existing plains bison herds and it is important that these subspecies be maintained separately so that hybridization is prevented. Restoring wood bison in Alaska will not detract from the management of Alaska's plains bison herds. If however, in the future, wood bison were to become more widespread in Interior Alaska, it might be desirable to replace plains bison herds with wood bison, the subspecies endemic to Alaska. Replacing plains bison herds with wood bison could only be considered in areas where livestock and captive plains bison are not present (e.g., this would not be a viable consideration for the Delta bison herd) and is beyond the scope of the present environmental review.

WOOD BISON HABITAT REQUIREMENTS AND HABITAT ASSESSMENT

Potential areas in Alaska for wood bison restoration must offer suitable habitat characteristics and quantity and quality of forage species, while not having conflicting land use practices. Also, as recommended by Canada's Wood Bison Recovery Team (WBRT), restoring wood bison must not negatively impact Alaska's ecosystems by harming indigenous species, damaging habitat, or introducing diseases or parasites. To provide benefits to wood bison conservation, new herds must be established in areas where they will not interbreed with plains bison or cattle. It is also critical that new wood bison herds not have contact with domestic livestock that might be a source of diseases or parasites. The WBRT recommended the following criteria for suitable habitat: 1) the area should be able to support a minimum population of at least 400 bison (Minimum Viable Population or "MVP"), 2) restoration sites should be located in areas where wood bison will not mix with plains bison, and 3) restoration sites should not have conflicting land uses such as agriculture (Gates et al. 2001).

Wood bison populations remain within a fairly stable home range, the size of which depends on habitat availability and numbers, and tends to increase as population density increases. In general, the range of a population will tend to expand when density reaches about 1–1.6 bison/square mile. For example, a population of 500 bison could be expected to remain within an area of about 300 to 500 square miles. During most of the year, wood bison occur in small groups ranging from 1–60 animals. The larger groups include primarily cows, calves, and juveniles. Wood bison move frequently, generally remaining in a meadow for less than one day, moving before forage is depleted, and using only the top part of plants. More detailed information on wood bison ecology and behavior can be found in Section 5, the references cited, and Appendix A.

Wood bison are primarily grazers and select for sedges and grasses (Reynolds et al. 1978). Compared to other ungulates, bison are less selective in using available forage. However, although bison are forage generalists, certain sedge and grass species are preferred. Reynolds et al. (1978), Larter and Gates (1990), and Fortin et al. (2003) found that slough sedge (*Carex atherodes*) is the most important forage species for wood bison in areas where it is available, especially during winter. To meet nutritional needs, wood bison use a variety of habitats

throughout the year but generally show an affinity for wet and mesic sedge/grass meadows (Berger et al. 1995; Larter and Gates 1991).

Soil conditions and snow cover can affect bison movements and foraging behavior. Snow depth and hardness can reduce range use (Van Camp 1975; Reynolds and Peden 1987). Bison exert a relatively high weight load on track (Telfer and Kelsall 1979), have relatively short legs and do not dig craters, but use their head to push away snow to access forage. It appears that deep snow or a snow pack with hard layers will limit bison feeding sites and access to forage. Boggy or muddy conditions also affect bison movements, and bison prefer relatively dry meadows during the spring and summer.

Van Camp (1975) found that snow depths up to 30 inches (76 cm) and 24 inches (61 cm) do not restrict foraging behavior of adult and calf bison, respectively. Bison can tolerate deeper snow without affecting mortality or productivity as long as wind or icing does not increase snow density. Plains bison have been observed foraging in snow about 4 feet deep without hard layers in Yellowstone National Park (Meagher 1973). Snow hardness was found to be the principal characteristic of snow cover influencing bison use of feeding sites. Reynolds and Peden (1987) found that bison selected for areas with soft snow for winter feeding habitat and avoided large windswept meadows. Based on habitat used by most free-ranging wood bison herds in Canada, optimum wood bison range would include extensive sedge/grass meadow systems with an abundance of slough sedge. However, the thriving wood bison herd in Yukon, Canada demonstrates that wood bison can prosper on lower quality ranges as long as snow depth is limited, making suitable sedge and grass species accessible.

A wood bison habitat inventory was conducted on the Yukon Flats in the early 1990s (Berger et al. 1995). This study focused on a 410 square mile area south of the Yukon River and a 633 square mile area east of Fort Yukon and south of the Black and Porcupine Rivers, but included aerial and ground reconnaissance surveys in three additional areas north and northwest of Fort Yukon and north of the Black River. The study concluded that the two intensively studied areas (1,043 square miles) could support at least 2,000 bison. Additional aerial and ground reconnaissance surveys were conducted in areas north and south of the Yukon River near Beaver in 1998. These surveys indicated that meadow plant communities were similar to those studied earlier, and that a substantial amount of habitat exists outside the areas studied by Berger et al. (1995). Land-sat and color IR aerial photographs were used to identify the extent of meadow habitat in all of the areas mentioned above. This information was used in combination to estimate the overall extent of high quality wood bison habitat on the Yukon Flats, which includes an area of about 3,800 square miles. Aerial observations indicate some additional bison habitat exists outside this area. Additional details regarding the Yukon Flats habitat studies are presented in Appendix A.

In 2003, ADF&G initiated a broader wood bison habitat assessment effort with the objective of identifying suitable areas within Interior Alaska that could sustain a population of 400 or more wood bison. This study used the criteria recommended by the WBRT as well as abundance indices for suitable forage to evaluate potential wood bison release sites (Gardner 2007).

The "Habitat Assessment of Potential Wood Bison Relocation Sites in Alaska" (Gardner 2007) examined the Minto Flats, North Fork of the Kuskokwim River, the Aniak River, the lower

Innoko–Yukon area and an area on the Hogatza River (Figure 2). The North Fork Kuskokwim was found to include only marginal habitat and is too close to the existing Farewell plains bison herd. The Aniak area offers adequate forage but is too limited in size to support a herd of 400 wood bison. In the Hogatza area deep snow conditions are common and would be restrictive to winter foraging. For these reasons, the North Fork Kuskokwim, Hogatza River, and the area near Aniak are not being further considered at this time (see Section 5 for further detail).

The habitat assessment identified the Minto Flats and lower Yukon–Innoko River areas as suitable sites for wood bison restoration. As noted above, Berger et al. (1995) concluded that extensive high quality habitat exists on the Yukon Flats and that the two areas, totaling 1,043 square miles, could support at least 2,000 wood bison. Gardner concluded that, based on the size of the area and available forage quality and quantity, Minto Flats could support a herd of about 500 wood bison, and that the herd should be limited to this size, at least initially, to reduce the likelihood that the population would expand into areas along the southeastern edge of the Minto Flats where there is some agricultural development. Gardner also concluded that extensive habitat with an abundance of suitable forage occurs in the lower Innoko–Yukon River area, which could easily support a herd of 400 or more wood bison. He recommends further study of snow depth and spring flooding before considering a population goal of more than 500 wood bison in this area.

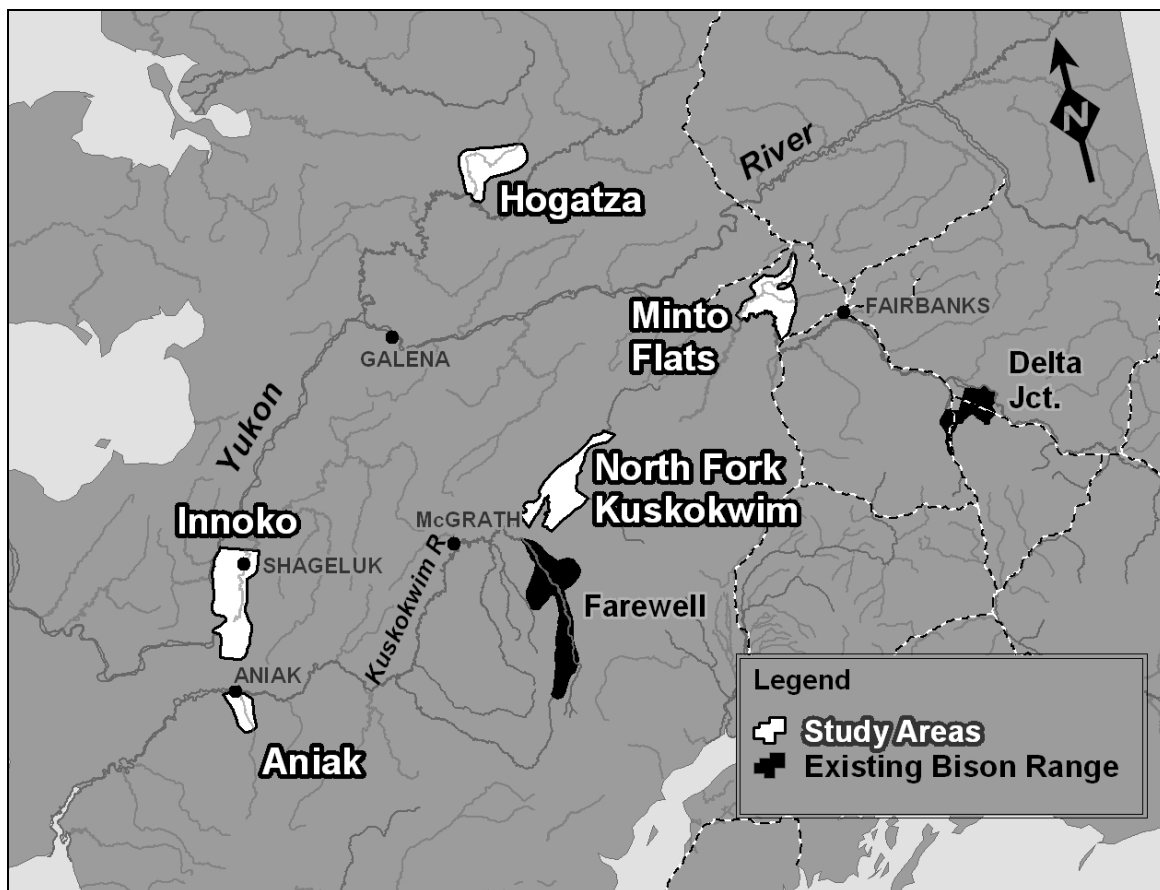


FIGURE 2 Study areas for potential wood bison habitat in Interior Alaska

OVERVIEW OF PROJECT HISTORY AND PUBLIC CONSULTATION

Restoring wood bison to the Yukon Flats has been a focus of cooperative efforts among ADF&G, Canada, local landowners and other conservation interests since 1991. Early on the Yukon Flats National Wildlife Refuge (YFNWR) was an active participant in meetings held in Yukon Flats villages to discuss wood bison restoration. There is an extensive record of support for the project among tribal councils on the Yukon Flats dating back to this time (Appendix C-1). As a result of the numerous public meetings, discussions and presentations in local communities on the Yukon Flats beginning in the early 1990s the level of public awareness about wood bison restoration is greater than in the other areas now being considered. The Council of Athabascan Tribal Governments (CATG), a consortium of the 10 tribal governments within the Yukon Flats, has identified wood bison restoration as a priority for their natural resource management program.

In 1997 the FWS determined they could not support the project due to concerns that wood bison restoration would not be compatible with the purposes of the YFNWR (see further discussion in Section 7). FWS opposition to wood bison restoration on Yukon Flats delayed progress on the project for several years. However, residents of Yukon Flats and other organizations with an interest in Alaska wildlife management continued to advocate for wood bison restoration. In 2000, ADF&G staff reevaluated the proposal and determined that wood bison restoration is an outstanding wildlife conservation opportunity for Alaska that should be fully examined in an open, public decision-making process. Due in part to uncertainty about whether FWS would support a restoration effort on the Yukon Flats, ADF&G undertook a renewed evaluation of potential wood bison habitat in other parts of Interior Alaska.

In spring 2005, DWC initiated further public planning and consultation efforts to evaluate wood bison restoration in Alaska. As the first step in additional planning, the department established a citizen's advisory group (Wood Bison Restoration Advisory Group [WBAG]) representing stakeholders in Alaska wildlife and land management to review information on the proposal to restore wood bison, discuss the relevant issues, and provide recommendations to the department on wood bison restoration. WBAG's recommendations were to move forward with wood bison restoration in Alaska and continue to pursue restoration at all three potential release sites, with the understanding that further planning and public involvement would be required before final decisions are made. The group also developed a list of 20 guidelines for wood bison restoration. The complete recommendations of the WBAG are provided in Section 4.

In May 2005, ADF&G distributed a newsletter that summarized the results of the first WBAG meeting and provided an opportunity for written public comment on the proposal to restore wood bison. Although the newsletter was not widely circulated the comments received strongly favored wood bison restoration.

In winter 2005–06, ADF&G staff attended local Fish and Game advisory committees meetings in the Minto and lower Innoko–Yukon River areas to provide information about the wood bison project and seek input from the committees. The Minto–Nenana, Tanana–Manley–Rampart and Grayling–Anvik–Shageluk–Holy Cross advisory committees each endorsed wood bison restoration and continued planning to consider such an initiative in their respective areas. Discussion of wood bison restoration with advisory committees continued during fall 2006 with further support expressed. The Eastern Interior and Western Interior federal subsistence advisory

councils have also voiced support for wood bison restoration. Section 4 and Appendix C provide a more detailed review of public involvement and comment.

As noted in the Executive Summary, most recently the FWS has indicated they prefer that ADF&G initiate the wood bison restoration on lands outside of the Yukon Flats National Wildlife Refuge. However, they do not object to the proposal to restore wood bison onto private lands in the Yukon Flats.

WILDLIFE TRANSPLANT POLICY REVIEW

The ADF&G/DWC Wildlife Transplant Policy (WTP) was established in July 1995 and was designed to contribute to the:

1. Conservation of Alaska's native wildlife and their habitats;
2. Restoration and maintenance of wildlife diversity;
3. Protection of the state's rich natural heritage; and
4. Enhancement of wildlife values for the benefit of the people.

The purposes of the WTP are to identify concerns that must be appraised and establish a protocol for systematically evaluating those concerns to ensure that the public benefits from transplants substantially outweigh ecological and socioeconomic risks.

In August 2006 the department initiated an evaluation of the proposal to restore wood bison according to the process required in the WTP. The DWC Director approved a WTP Scoping Report and issued a finding "that wood bison are an extirpated indigenous species and are native to Alaska. Once restored to Alaska wood bison will again be an integral part of Alaska's natural wildlife diversity and will be managed by ADF&G like other resident species of wildlife." The Director also instructed staff to establish a WTP Review Committee for the project. The primary duty of the review committee, as defined in the WTP, was "to determine whether wood bison restoration is likely to effect a significant reduction in the range, distribution, habitat, or pre-existing human use of other species."

In January 2007 the WTP Review Committee concluded that wood bison restoration is not likely to effect a significant reduction in the range, distribution, habitat, or preexisting human use of other species. Public comment on the findings of the WTP Review Committee is being sought as part of the review of this ER. The Director's finding on the status of wood bison in Alaska and the Findings of the Wood Bison Restoration Wildlife Transplant Policy Review Committee are included in Appendix F.

GENERAL LOGISTIC APPROACH TO WOOD BISON RESTORATION

A number of steps would be involved in restoring wood bison populations at remote sites in their former habitat. There are two approaches that could be used to create a source of suitable stock for Alaska's restoration effort.

One approach is to import young bison from captive herds in Canada. Once necessary import permits are obtained and after health certification, the animals would be transported by truck to a

holding facility at the Alaska Wildlife Conservation Center (AWCC) near Portage, Alaska. AWCC presently manages a herd of 22 wood bison that include 13 wood bison provided by the FWS, and their progeny. Additional calves will be born in spring 2007. The AWCC facility includes several enclosures encompassing over 100 acres that are available for wood bison, as well as a handling facility that can be used for veterinary work and other purposes. ADF&G is in the process of completing a Memorandum of Understanding with AWCC that will guide husbandry practices for wood bison that are temporarily held at the facility, and provide for their eventual use for restoration efforts in the wild. The temporary use of additional Chugach National Forest land adjacent to AWCC to help support wood bison is also being pursued.

Bison would likely be held at AWCC for approximately one to two years for additional disease testing and observation. This will allow ample time to make preparations for their release at one or more of the potential restoration sites. At the appropriate time bison would be transported by truck or in large horse trailers to Anchorage or Fairbanks. Wood bison could be transported to the Minto Flats site by truck. For the Yukon Flats or lower Innoko–Yukon sites, they would be loaded on a C-130 or other large aircraft and flown to an airstrip near a local community where they would be transferred to a small temporary holding corral in late winter, where they would be held for several weeks before being released.

If it is not possible to bring additional wood bison stock from Canada into Alaska, it may be necessary to use the existing stock at AWCC and allow additional time for them to increase in numbers. This approach would also involve efforts to obtain surplus semen and/or embryos from captive wood bison in Canada and implant them in bison in Alaska to provide increased genetic diversity quickly at a relatively low cost. Artificial insemination and embryo transplants are commonly used in cattle and other species, and have been successfully used with plains bison. ADF&G is exploring this approach with the Wood Bison Reproductive Research Group in Canada, which is refining the techniques necessary to apply this reproductive technology in northern bison. ADF&G and cooperators will attempt to incorporate as much genetic diversity as possible in stock used in restoration efforts.

Because of logistic and cost considerations, wood bison restoration would initially involve releasing bison on private lands near a local community, with the understanding that bison would range onto other lands as the population grew. Bison would eventually occupy state, federal, and private lands. A temporary holding facility consisting of up to 5–10 fenced acres, a small camp and a supply of hay would be established at a release site near a local community. The final step in the reintroduction would involve transporting 40–50 or more wood bison to this site in late winter, where they would be held and allowed to acclimate in their new location before being released several weeks later, in early spring. Section 5 includes an additional description of the physical infrastructure that would be required.

PROJECTED POPULATION GROWTH AND MONITORING

Based on experience with reintroduced populations elsewhere, wood bison would be expected to increase at a rate of 15%–25% annually after becoming established (Gates and Larter 1990; ADF&G, unpublished data). With an average annual growth rate of 20%, an initial precalving population of 50 bison would increase to 500 in approximately 13 years. If the population were augmented with an additional 50 bison in the year following the initial release, it would take

about 10 years to reach 500. Variation in the rate of growth could lengthen or reduce the period necessary to reach the population objective. For example, if the average growth rate were 25%, a herd of 50 would increase to 500 in only 11 years. Biological data necessary for long-term management of a herd of bison would be obtained from an annual spring census, fall composition counts, and monitoring of herd movements. Bison populations are relatively easy to monitor because of their visibility, gregarious nature, and fidelity to seasonal ranges (ADF&G 1994).

A population of about 500 wood bison would be expected to remain within an area of about 500 square miles, based on wood bison population ecology in Mackenzie Bison Sanctuary, (Gates and Larter 1990). However, the total area occupied could be smaller if habitat for wood bison is more abundant than in the Mackenzie Bison Sanctuary, as it appears to be in the three areas being considered in Alaska (Berger et al. 1995; Gardner 2007). It seems likely that in these settings populations of about 500 bison would occur largely within an area of 300–500 square miles, as is the case for the Delta and Farewell plains bison herds. This area is equivalent in size to 8–14 townships.

In terms of the Yukon Flats and Innoko areas this suggests that, given the patterns of landownership in these areas a population established on private land near local communities would probably occur at least periodically in small numbers on federal public lands within a few years or less, and possibly within months after their release. As numbers increased the number of bison on both private and public lands would increase, but it is not possible to predict their exact distribution over time. This is partly because of the large amount of suitable habitat in these areas and the difficulty in anticipating the precise seasonal use patterns that would develop over the long term. Potential release sites in the Yukon Flats and lower Innoko areas would probably be located about 3–12 miles from federal public land, depending on the community involved and landownership patterns. The Minto Flats area includes primarily Alaska Native corporation lands and state lands, including the Minto Flats State Game Refuge (MFSGR). Land in the lower Innoko–Yukon area is primarily owned by Alaska Native corporations and the Bureau of Land Management (BLM). (See Figures 4, 5 and 6 in Section 5 for detailed maps showing landownership patterns at each site).

LONG-TERM ENVIRONMENTAL RESEARCH AND MONITORING

Based on the information reviewed in Section 5 and Appendix A, as well as reviews by the department (ADF&G 1994) and the Alaska Chapter of *The Wildlife Society* (Griffith et al. 1998), and information presented to the WRAG (Appendix D), wood bison are unlikely to have significant effects on other wildlife or the environment at the population densities that would be expected to occur. Griffith et al. (1998) recommended post-release studies to document the effect on waterfowl habitat and production. In his presentation to the WRAG, Dr. Mark Lindberg, an Associate Professor of Biology and Wildlife at the University of Alaska Fairbanks who specializes in waterfowl research, concluded that bison would have little or no effect on waterfowl populations, that any negative effects would be localized, and that beneficial effects might include an increase in the quality and quantity of meadows. He also reviewed studies showing that changes in water levels and predation cause large annual variation in waterfowl production in Interior Alaska, which would make it difficult to detect any minor effects of wood bison. Dr. Lindberg emphasized the need for control sites (no bison present) and treatment sites

(with bison present) to examine the effects of bison on waterfowl and suggests that a “Before-After-Control-Impact/Interrupted Times Series” approach might be the best study design for monitoring long-term relationships between bison and waterfowl. He recommends that efforts to establish baseline nesting density should include other waterbird and landbird species that are in national decline such as red necked and horned grebes, lesser yellowlegs, solitary sandpiper, and rusty blackbird. In addition to waterfowl studies, long-term monitoring to study the effects of grazing on plant and animal communities using exclosures will also be considered. ADF&G will work with other scientists to develop research and monitoring plans appropriate for each site.

CONSERVATION GUIDELINES

Wood bison restoration efforts will be pursued based on accepted biological principles and will incorporate guidelines and recommendations found in ADF&G’s Wildlife Transplant Policy, the International Union for the Conservation of Nature (IUCN)/Species Survival Commission guidelines for the Translocation of Living Organisms and also the IUCN Guidelines for the Reintroduction of Native Species. In addition, the IUCN Bison Specialist Group for North America is completing a North American Bison Conservation Status and Action Plan. This document will include recommendations on conservation and management of biodiversity, genetics, populations, habitat and other aspects of bison restoration and management. ADF&G is participating in the completion of this plan, and has considered and incorporated many of the key recommendations into plans for developing Alaska’s wood bison restoration program. These include the desirability of managing for relatively large populations wherever possible to help conserve genetic diversity.

SECTION 3: MAJOR ISSUES INVOLVED IN WOOD BISON RESTORATION

As wood bison restoration in Alaska has been evaluated, several major issues have been identified that, if not satisfactorily addressed, could result in a lengthy delay or inability to proceed with wood bison restoration. This section provides an overview of these issues and generally how ADF&G intends to address them. ADF&G believes these issues can be resolved; however, it is important for the public and decision-makers to be aware of them and the potential ramifications to the effort to restore wood bison in Alaska. If wood bison restoration proceeds to site-specific planning, all of the applicable issues will be reexamined in greater detail in the context of each particular situation.

U.S. DEPARTMENT OF AGRICULTURE IMPORT REGULATIONS

U.S. Department of Agriculture (USDA) regulations (9 C.F.R. §93.401) currently ban the import of bovines (cattle and bison) into the U.S. from Canada for breeding purposes due to concerns about mad cow disease (bovine spongiform encephalopathy or BSE). However, the USDA recently proposed a new regulation which, with some modification, would allow the import of bison and other animals from Canada for breeding and other purposes. USDA will prepare a final regulation after a comment period ending in March 2007. The USDA is authorized to make exceptions to the current regulations when such action will not endanger the livestock or poultry of the United States, and it may be possible to obtain an exemption to allow import from Canada for the purpose of restoring wood bison in Alaska if the regulations are not changed. Until the present situation changes or an exemption is obtained, wood bison stock cannot be brought into

Alaska from Canada. There is no identified threat of BSE from wood bison, but they were included in the import ban, which applies to all bovines. If the import obstacle persists, it is possible that the genetic diversity of wood bison stock currently at the AWCC can be supplemented through artificial insemination and/or embryo transfer, as described previously.

ADF&G intends to work with the USDA to modify bovine import regulations to allow the import of wood bison into Alaska for breeding purposes to support the wood bison restoration program. Section 6 includes a summary of a letter received from the USDA that addresses this issue and Section 7 includes a more detailed discussion of USDA regulations.

DISEASE TESTING AND HEALTH CERTIFICATION

Wood bison brought into Alaska have to be free of a number of serious diseases and must be certified as healthy by the Alaska State Veterinarian before they can be imported into the state. Preliminary testing of wood bison at Elk Island National Park, Alberta (EINP) using an experimental technique showed the possible presence of Johne's disease, or a related mycobacterium, and one case of Johne's disease was recently confirmed. Although Johne's disease already exists in areas where livestock occurs in Alaska (R. Gerlach, Alaska State Veterinarian, unpublished data), it would be unwise to release bison in the wild that were known to be infected with Johne's disease. The EINP herd has a long history of being free of other diseases of concern.

In cooperation with the Yukon Government, ADF&G recently completed disease testing procedures for the wood bison herd at LaPrairie Bison Ranch near Whitehorse. The results indicate the herd is free of Johne's and other diseases that would preclude importing stock from this herd. There are currently 22 wood bison at the AWCC near Anchorage. These animals are descended from the Yukon wood bison herd, which was established with stock obtained from EINP in the 1980s. Future testing will determine whether the health status of these animals will allow them to contribute to restoration efforts. As described above, ADF&G is also exploring the possibility of using artificial insemination techniques, perhaps in combination with importing more animals, to increase the genetic diversity of wood bison stock. While the outlook for obtaining a suitable source of stock is good, it is still true that if potential stock cannot be demonstrated to the satisfaction of the Alaska State Veterinarian and ADF&G to be disease-free, there may be no source of animals that can be used for wood bison restoration in Alaska. There appears to be little chance that wood bison would acquire any serious disease from other indigenous wildlife in Alaska (ADF&G 1994; Gardner and DeGange 2003).

ADF&G staff, including the DWC Wildlife Veterinarian, will work with the State Veterinarian to refine disease testing procedures and complete all animal health certification requirements necessary to import suitable stock from Canada and to ensure that wood bison brought into Alaska and released into the wild will not adversely affect other wildlife or domestic animals. If wood bison were released into the wild and later found to have a disease that could adversely affect other wildlife, ADF&G would consider culling individual diseased animals or even removing an entire herd. See Section 7 for further detail on diseases of concern and how they will be addressed.

CONCERNS RELATED TO THE U.S. ENDANGERED SPECIES ACT

As previously noted, FWS has made a policy determination that wood bison brought into Alaska would not need to be listed under the ESA (Appendix B). This policy determination means that wood bison would not have any special legal status that could affect other land use activities. ADF&G does not envision a need to designate special habitat or other protected areas in connection with wood bison conservation and management. However, the public can petition to list a species under the ESA and there are continuing concerns that if wood bison were listed in the future it could constrain other natural resource development projects. In particular, Doyon, Ltd., the Native regional corporation in Interior Alaska, has an interest in developing oil and/or gas on the Yukon Flats and Minto Flats areas and is concerned about the possibility that wood bison would somehow become listed under the ESA. Based on discussions with FWS and an analysis of the listing criteria that would have to be met, ADF&G believes that it is extremely unlikely that wood bison in Alaska would be listed under the ESA in the future. However, if a petition for listing, revised policy interpretations or legal action resulted in listing, or other complications involving the ESA occurred, public support for the wood bison restoration could be reduced.

Restoring wood bison to Alaska would help to secure the future of the species and, as such, is consistent with the intent of the ESA. As recognized in discussions with FWS, under the circumstances there would be no additional conservation benefit from listing Alaskan populations of wood bison under the ESA. Such an action would create obstacles to wood bison restoration, and increase costs substantially, while at the same time raising concerns about the effects of listing on resource development and other land uses. While the ESA has been an effective tool in assisting the recovery of wildlife under certain circumstances, it was not designed for a situation like that presented by wood bison restoration.

ADF&G has carefully studied the provisions of the ESA and worked with FWS to arrive at a policy interpretation that will allow wood bison restoration in Alaska to occur without unnecessary regulatory complications. If a petition were filed to list wood bison, it is likely the petition would be denied or be given such a low priority that no listing action would occur. When the circumstances surrounding reestablishing one or more wood bison herds is evaluated according to the five factors that must be considered in listing species under the ESA, it appears that a decision to list would not be supported. Section 7 provides a more detailed discussion of the ESA, the five factors that must be considered in listing a species as threatened or endangered, and the options that have been considered by ADF&G to minimize the possibility of listing and adverse impacts to other resource development projects.

ADF&G intends to continue discussions with FWS, Doyon, Ltd., and others in an effort to provide all possible reassurance that wood bison restoration will not impact other resource development activities due to provisions of the ESA. Conceptually, ADF&G would support congressional action to exempt wood bison populations in Alaska from the ESA if there is sufficient public support, and it can be accomplished in a way that is not perceived as undermining provisions of the ESA or its application in cases where it is an appropriate tool to help conserve plants or animals. At the same time, ADF&G believes the FWS decision that wood bison brought into Alaska do not need to be listed under the ESA is well founded. The

department does not consider congressional action to be a requirement for moving forward with wood bison restoration in Alaska.

FUTURE HARVEST ALLOCATION

ADF&G believes that wood bison restoration will eventually provide opportunities for diverse wildlife uses including viewing, general recreation, and subsistence and other hunting. Once wood bison are restored to the wild it would likely be 10 years or more before harvest could be allowed, depending on the number of animals initially released and other factors.

Discussions with groups interested in wood bison restoration, public comments received in response to the ADF&G newsletter *Wood Bison News*, and public testimony at the WBRAG meetings all demonstrated a high level of interest in how future harvests might be managed. Local residents, landowners and hunters want to derive benefits from wood bison, while others want to have the opportunity to travel to these areas to view and hunt wood bison. Some people feel that subsistence use of wood bison should be given priority, while others have suggested that wood bison be treated as a trophy hunting species with equal opportunity for all Alaska residents and nonresidents. There are concerns on both sides about how state and federal determinations on customary and traditional (C&T) subsistence use of wood bison might be made and how they might affect the allocation of future harvest opportunities. Depending on these C&T determinations, harvest allocation options may be different on lands where subsistence is managed by the state or federal governments. As a result, some people have advocated making wood bison restoration on state managed lands a priority (e.g., Minto Flats), while others may see restoration on or near federal lands as preferable (e.g., Yukon Flats). In view of the historical information detailing the human use of wood bison prior to their extirpation, it is possible that the Federal Subsistence Board (FSB) and/or the Alaska Board of Game (BOG) would find that there has been C&T subsistence use of wood bison.

It is also important to consider that it will likely be necessary to have cooperative agreements to use private lands for construction of temporary holding facilities to implement wood bison restoration. Part of the incentive for landowners to cooperate in wood bison restoration is the possibility of future harvest opportunity. The existing plains bison herd at Delta provides an example of how harvest is allocated with the use of drawing permits available to all Alaska residents and nonresidents. In the spring 2005 drawing, less than 1% of the applicants received permits. Farmers in the Delta area who often have bison grazing in their fields have expressed frustration because they have a very small chance of getting a permit to harvest an animal. Landowners and other local residents would likely have a low success rate in obtaining permits to harvest wood bison if harvest were managed by a drawing permit system alone, because the number of permit applications from nonlocal hunters would probably be very large.

The history of muskox management on the Seward Peninsula provides an example of another species of wildlife that was extirpated from Alaska and restored. There have been some difficult and controversial decisions about managing harvest of Seward Peninsula muskox. However, over time harvest opportunities have progressed from federal subsistence permits only, to a combination of federal permits and state Tier II permits to, more recently, harvest opportunities gradually being broadened through registration and drawing permit systems. Nonetheless, frustration over the slow progress in opening up general hunting opportunities for Seward

Peninsula muskox likely led to a statewide regulation proposal that was adopted by the Alaska BOG in January 2006. The policy for hunting seasons and bag limits for new species of game established by this action provides:

“The Board of Game will not adopt regulations to establish a hunting season and bag limit under this chapter for a new species of game that is introduced in a region of the state, where the species of game does not already naturally exist, until the board determines that there is a harvestable surplus of the species of game that is large enough to provide a general hunt for eligible residents and nonresidents” (5 AAC 85.005).

The regulation was probably intended to prevent wood bison harvest from being limited only to subsistence uses for an extended period. It is not clear if this regulation is meant to preclude the option of managing harvest through registration and drawing permits. If the regulation were strictly interpreted to mean that harvest must be managed by general harvest tickets for residents and nonresidents there would have to be either a very large population of wood bison to support that level of harvest opportunity or severe restrictions on access or harvest methods and means to avoid exceeding sustained yield and maintain hunt quality.

It is important that various groups and individuals that have an interest in use and enjoyment of wood bison in the future reach at least a conceptual agreement on sharing in the benefits of bison restoration. If agreement cannot be reached it could result in controversy and loss of public and political support, which might prevent the project from moving forward.

ADF&G believes the experience gained in managing harvest of muskox can be used to develop harvest management systems that would provide both subsistence and general harvest opportunities for wood bison. One option might be to not initiate any harvest until a herd reaches sufficient size to provide for both some subsistence and nonsubsistence hunting. If wood bison restoration proceeds to the site-specific planning phase, it is ADF&G's intent to seek consensus among all user interests on the principles that will guide future harvest allocation. This would include recommendations on how future harvest would be managed under state and federal subsistence laws. Critical components of harvest management plans include 1) agreeing on a commitment to manage for herd growth to reach a population level that can provide diverse hunting opportunities, 2) determining the number of wood bison that are reasonably necessary to provide subsistence opportunity, and 3) defining the population level where nonsubsistence harvests will occur. Proposed harvest allocation plans and principles would need to be developed during management planning efforts and included in each cooperative wood bison management plan. These would be brought to the appropriate state Fish and Game advisory committees and federal subsistence councils for review and comment. Once approved by these entities the plans would be presented to the BOG and FSB for their review and formal endorsement. This approach will provide the greatest possible level of certainty that the benefits of wood bison restoration will be shared by various wildlife consumptive users. Additional discussion of harvest is included in Section 5 under “Hunting” and “Subsistence.”

FUNDING

The wood bison restoration program has been developed by a variety of DWC staff, including the former Fort Yukon Area Biologist, research biologists, wildlife planners, and several others

who have worked on the project as an adjunct to their routine duties, and often with limited funding. DWC budgets have been especially limited in the last few years, and although some additional funding has recently been provided to DWC, it is largely tied to Intensive Management programs designed to increase existing ungulate populations for human consumptive use. It would be advantageous if ADF&G could dedicate a greater amount of staff time to wood bison restoration, and provide a higher level of funding for project development. It is possible that wood bison restoration may have to be delayed or discontinued if sufficient staff and funding are not available.

Implementing wood bison restoration will require substantial funding over a period of years, and there appears to be a variety of promising funding opportunities, including sources other than the State of Alaska. For example, Safari Club International Foundation, and the Pope & Young Club contributed funding for this environmental review. These and other private organizations have expressed interest in supporting wood bison restoration and are assisting in the development of the holding facility at AWCC. Capital Improvement Project funding from the Alaska Legislature may also be a possibility. Other potential future sources of funding for wood bison restoration include various foundations such as those listed above, other national and international conservation organizations, outdoor equipment manufacturers or other private corporations, federal Pitman–Robertson and State Wildlife Grant funds, and Native American or Alaska Native organizations and governments. The AWCC is actively involved in informing the public about wood bison restoration and has also expressed interest in helping to raise funds for the project. While many funding possibilities exist, coordinating fundraising and preparing proposals also require considerable staff time.

SECTION 4: SUMMARY OF PREVIOUS PUBLIC INVOLVEMENT

This section of the report provides a summary of public involvement and comment on the wood bison restoration project between 1991 and fall 2006. Public comment received on the proposal to restore wood bison to Alaska demonstrates a high level of support for the project. Appendix C includes the statements of support for wood bison restoration that arose during early public consultation on the Yukon Flats and a summary of the public comment received in response to the spring 2005 *Wood Bison News*.

Early public consultation focused on communities on the Yukon Flats where wood bison restoration was first proposed. The WBRAG was created in spring 2005 to provide a public forum to review information on wood bison restoration in Alaska and seek recommendations from an advisory group that included representatives of some of the major organizations with an interest in wood bison restoration and public land management in Alaska. When DWC expanded consideration of wood bison restoration to Minto Flats and the lower Innoko–Yukon River, efforts to consult with local residents and Fish and Game advisory committees that represent those areas were initiated. The last part of this section describes actions taken by state Fish and Game advisory committees and federal regional subsistence advisory councils. The review of scoping letters that were received from landowners and governmental agencies as part of this ER is provided in Section 6.

EARLY PUBLIC CONSULTATION EFFORTS ON THE YUKON FLATS

Several village councils, including Birch Creek, Beaver, Fort Yukon, Circle, and Chalkyitsik, passed resolutions supporting wood bison restoration on the Yukon Flats. In 1997 the Beaver Village Council approved a resolution authorizing the Tribal Council and staff to cooperate in an effort to reintroduce wood bison on or near Beaver tribal lands. Later, First Chief Bobby Winer wrote to other Yukon Flats tribal councils and other organizations requesting support for the concept of wood bison reintroduction. Appendix C includes copies of several of the early resolutions and correspondence supporting wood bison restoration on the Yukon Flats. Interest and support for wood bison restoration remains strong in this area, as evidenced by the scoping letter received from CATG (Appendix E). It should also be noted that Stevens Village, located at the western edge of Yukon Flats has an active interest in wood bison restoration. Because they have pursued wood bison restoration somewhat independently, ADF&G does not have resolutions of support or other documentation from Stevens Village. Representatives of the Stevens Village Tribal Council and village corporation participated in the WBRAG meetings.

WOOD BISON RESTORATION ADVISORY GROUP

The WBRAG included participation from the local, statewide and national groups interested in wood bison restoration. Representatives for the WBRAG were sought from a number of local Fish and Game advisory committees in the locations of the potential restoration sites, outdoor and conservation organizations, and others who might have an interest in the project. The members of the WBRAG and the organizations they represent are listed in Table 1.

TABLE 1 Members of the Wood Bison Restoration Advisory Committee

Name	Organization	Location
Bruce Thomas (Alternate: Ben Stevens)	CATG Natural Resources Department	Fort Yukon
Paul Edwin	Chalkyitsik Village Council	Chalkyitsik
Nancy Fresco	Northern Alaska Environmental Center	Fairbanks
Bob Byrne	Safari Club International	Washington, D.C.
Nicole Whittington-Evans	The Wilderness Society	Anchorage
Arnold Hamilton	Grayling–Anvik–Shageluk–Holy Cross Advisory Committee	Shageluk
Ron Silas	Minto–Nenana Advisory Committee, Minto Village Council	Minto
Oliver Burris	Fairbanks Advisory Committee and the Alaska Outdoors Council	Fairbanks
Ronnie Rosenberg	Represents animal welfare interests (no formal organization)	Fairbanks

Two, 2-day public meetings of the WBRAG were conducted in April and June 2005. The meetings provided a public forum for an exhaustive review of information provided by numerous

experts on wood bison and associated wildlife and land management issues. The presenters included ADF&G, FWS, and BLM staff; Native organizations including CATG, Doyon, and Stevens Village; eight faculty members with expertise in various fields from the University of Alaska Fairbanks; the Alaska State Veterinarian; and a biologist from the Yukon Department of Environment with firsthand experience in wood bison restoration and management. Appendix D provides a list of the presentations at the WBRAG meetings and a list of experts involved. All of the information produced during the WBRAG meetings is included in notebooks provided to members of the WBRAG and is available for review at the Fairbanks ADF&G office.

The following are the primary recommendations and additional measures agreed upon by the WBRAG at their June 2005 meeting. These recommendations were based on the understanding that, if ADF&G proceeds with wood bison restoration, there will be additional site-specific planning and opportunity for public comment. Several topics identified in the guiding principles are discussed more fully in the section pertaining to the environmental review of wood bison restoration in Alaska. As reflected in item #15 below, the WBRAG agreed on the need to develop harvest management guidelines during site-specific planning efforts consistent with the goal of providing for subsistence and non-subsistence opportunities to harvest wood bison. Allocation was not a major focus of the WBRAG's discussions. At the conclusion of the second meeting one member of the group stated:

"I am not going to argue over harvest allocation that won't occur for at least 10 years. Let's work together to get wood bison into the state and then work to resolve those questions when the time comes."

PRIMARY RECOMMENDATIONS OF THE WBRAG

1. WBRAG supports restoration of wood bison to Alaska, and recommends ADF&G move forward without delay.
2. WBRAG recommends that ADF&G should continue to pursue wood bison restoration at all three of the primary potential release sites (Yukon Flats, Minto Flats and the lower Yukon-Innoko area).

As wood bison restoration efforts move forward, ADF&G should remain flexible and take advantage of opportunities to proceed with wood bison restoration at each site as they arise. Independent of whichever site is implemented first, knowledge gained from restoring wood bison at the first site should be used to benefit restoration planning and monitoring at the other potential release sites. There should be no fixed time required to wait for the results of studies at one site before proceeding with wood bison releases at the other sites.

Additional measures recommended by the WBRAG to guide ADF&G's wood bison restoration efforts include:

1. Restoring wood bison in Alaska is a significant step towards conservation and preservation of the subspecies on an international scale. Keep the focus of the project on restoration of wood bison as a component of international wood bison recovery efforts

and work to raise awareness of the state, continental, and international importance of the project. The story of restoring a species extirpated from Alaska should be told.

2. ADF&G's efforts should remain focused on restoring wild, free-ranging wood bison herd(s) in Alaska. Wood bison physically contained (like at a game ranch) are not an option for wild wood bison recovery efforts.
3. Wood bison stock brought to Alaska for restoration must be shown to be disease-free. Testing protocols should be developed for: a) wood bison stock in Canada being considered for release in Alaska, b) testing that may be necessary during temporary holding, and; c) follow-up testing that may be necessary following release into the wild.
4. Predation by wolves (*Canis lupus*) and bears has not been shown to significantly affect wood bison populations in Canada. In keeping with the ADF&G Division of Wildlife Conservation, Wildlife Transplant Policy, extraordinary management actions such as predator control should not be considered as part of a wood bison restoration program.
5. Protocols for monitoring wood bison and possible effects on other species should be developed. Pre- and post-release research studies should be outlined. Research and monitoring efforts should address the points identified in the Alaska Chapter of *The Wildlife Society's* Technical Peer Review of Reintroducing Wood Bison to the Upper Yukon Valley.
6. International standards of humane care should be followed in transport, temporary holding and release of wood bison to the wild. Wood bison should be contained for the shortest possible time period prior to release.
7. The first release to be completed must be conducted in a way to create a positive public image for wood bison restoration because it will reflect on future releases in terms of ecological concerns, public participation, animal welfare, etc.
8. The breeding/release and management program should be designed to maintain genetic diversity. Subjecting wood bison populations to natural selection via predation and other natural forces is important to international bison conservation goals and maintaining genetic strength and diversity.
9. Protocols should be developed outlining what to do if wood bison move onto lands where they are not intended or wanted or if biological problems are identified. Thresholds for what would constitute an adverse impact should be identified. Environmental change is not necessarily environmental damage. Options to address problems should include limiting or reducing herd size or possible removal of wood bison in a specific location, if necessary.
10. The possible impacts of wood bison on "noncharismatic" species in ecosystems should be considered. Existing research should be reviewed.
11. Wood bison may not stay only where released. Possible expansion or changes in their range must be considered in planning.

12. Landowners' concerns must be addressed and considered in decision-making.
13. Involve local people and others in wood bison monitoring efforts, management, etc.
14. The overall health of the ecosystem should be monitored during a restoration program.
15. During site-specific planning processes ADF&G needs to spell out how subsistence and other uses will be managed. Consider subsistence values especially on Native corporation lands. Subsistence should have priority, as herd grows, then provide other opportunities.
16. ADF&G should work with others to develop a wood bison holding/breeding facility in Alaska and place wood bison there as soon as they are available. This would create a "clean reservoir" of wood bison in Alaska.
17. ADF&G should seek import permits and international agreements necessary before the first release site is chosen to bring wood bison to the holding/breeding facility.
18. ADF&G should pursue nontraditional (nongovernment) funding for this project.
19. ADF&G should develop an education program on wood bison to be used in local schools and other locations.
20. ADF&G should consider other large-scale natural resource plans and mesh wood bison planning with them. ADF&G should inform other agencies developing land use plans about possible wood bison restoration so it can be accommodated in those planning processes.

PUBLIC COMMENTS RECEIVED FROM THE SPRING 2005 WOOD BISON NEWS

The department received 20 written comments, emails and Public Comment Response Forms that were included in the spring 2005 *Wood Bison News*. These comments were all provided to members of the WBAG prior to the group developing their recommendations and guiding principles. The responses to the questions in the comment form and the individual comments on each question are provided in Appendix C-2.

The responses to the first question on the comment form, "Do you support the Alaska Department of Fish and Game continuing to pursue wood bison restoration in Alaska?" were: Yes (13), No (3), and Maybe (1). Of the three comments who opposed continuing to pursue wood bison restoration, one came from a youth in Beaver who was concerned about wood bison transmitting disease to moose; one came from a resident of Arctic Village who was concerned that wood bison would disrupt the ecosystem and affect caribou and moose; and one came from a Fairbanks resident who felt that wood bison are not a native species, that good hunting opportunities are already available, and that any risk of disease transmittal to native species is too great a risk.

Of those who favored continuing to pursue wood bison in Alaska, some of the comments provided were as follows:

- I feel wood bison are natural and much better suited for Alaskan conditions. I think they could provide an expanded resource for multiple uses: recreation, viewing, consumption, hunting, etc.
- What a great conservation project to reintroduce these animals.
- They were indigenous to Alaska before being overharvested to elimination. The modern (future) generations should be able to enjoy the viewing, harvesting and managing of the wood bison, as it was a natural part of the landscape in recent history.
- I think it is a good deal transplanting wood bison where planned. Another resource of subsistence food since the moose population is going down.
- Restoration of wood bison would be a positive contribution to Alaskan ecosystems, to people's opportunities for uses and appreciation of Alaska's outdoors, and a significant conservation accomplishment by helping to perpetuate a species population that was formerly viable in Alaska, but was probably diminished through human activity. A real parallel with muskox.

The "maybe" response included the following comment:

- Maybe, it depends on many things but the first is "what's [it] going to cost and can you afford it"? With the current financial situation we need to know a projected cost and source of funding. If we are to sacrifice other ADF&G programs to make this restoration happen, will we the public get a chance to evaluate these options?

The second question on the comment form asked which of the three suitable habitat areas should be considered first. Most of the respondents favored either the Minto Flats or Yukon Flats sites, however relatively few people in the lower Innoko–Yukon River area were informed about the project or received the newsletter.

Comments in favor of the Minto Flats site included:

- I guess personally I would like to see bison (wood) started at Minto Flats because the greatest number of residents would be able to see them the easiest.
- Minto Flats because they would be on state land. I think this project should stay as far as possible from the feds. Feds would just gum it up.
- Minto Flats: This is the obvious first choice. It's closer to Fairbanks, which makes it less expensive and easier to monitor the condition of the herd. But perhaps more importantly this area is comprised of mostly state land with the least amount of private land. We don't need to expend huge sums of public money establishing a herd of bison on private land.

Comments in favor of the Yukon Flats site included:

- Yukon Flats seems to be the best habitat for wood bison combined with the fact of its most recent extinction in that area. However, I believe they would do well in many places in Alaska.
- Yukon Flats has endless prime wood bison habitat. Native elders remember wood bison stories passed on by their parents. We should restore wood bison for the Native community.

Several respondents supported more than one site with comments such as:

- 1st: Yukon Flats, 2nd: Minto Flats. Just don't ever let them be classified for "traditional" subsistence use. Traditional "subsistence" hunters wiped them out in the first place! Make them accessible for viewing and hunting to everyone, with no special opportunities for any group of the population.
- Transplant them to Minto, then Yukon Flats, then to Innoko. Three Alaskan "herds" would help their survival. Minto is the most accessible area for seeing, and hopefully, eventually hunting them.

A respondent who opposed the project stated:

- All three sites are unsuitable. The potential effects of wood bison on Alaskan ecology are unknown and potentially mildly damaging to our local ecosystem and the native species that depend on it. I believe in the precautionary principle which to my mind is similar to a doctor's Hippocratic oath – First do no harm! If you don't know what the effects will be you cannot assume they will only be positive.

Overall, public comment was supportive of wood bison restoration. At the same time, comments showed concern about possible ecological effects of wood bison restoration and how all segments of the public would share in the benefits of wood bison restoration. The reader is encouraged to review all the comments included in Appendix C-2.

ADVISORY COMMITTEE AND REGIONAL ADVISORY COUNCIL ACTIONS

The Yukon Flats Advisory Committee (AC) has discussed wood bison restoration on Yukon Flats on several occasions over the last 15 years and has supported the proposal. Similarly, the Fairbanks AC has discussed wood bison restoration and has supported the project. In 1997 the federal Eastern Interior Regional Advisory Council voted to support the concept of wood bison reintroduction on Yukon Flats (Appendix C-1). In October 2005 the federal Western Interior Regional Advisory Council received a report from ADF&G staff on the wood bison restoration program. Council members expressed support for the proposal but also wanted to be sure there would not be any threats to the health of other wildlife species. ADF&G staff provided presentations on the wood bison project to the Minto–Nenana AC (November 15, 2005), the Grayling–Anvik–Shageluk–Holy Cross AC (February 1, 2006), and the Tanana–Rampart–

Manley AC (February 10, 2006). All of these state Fish and Game advisory committees unanimously endorsed wood bison restoration in their areas.

In October 2006 the Fairbanks AC wrote to the Director of DWC supporting efforts to create a huntable population of wood bison but also expressing concerns about placing wood bison where they would occur on federal lands and might be subject to the federal subsistence priority. The committee encouraged focusing restoration efforts on state land in the Minto Flats area. In fall 2006 the Minto–Nenana Advisory reaffirmed its support for wood bison restoration on Minto Flats and the Tanana–Manley–Rampart AC selected a member to participate in site-specific planning. In November 2006 the Yukon Flats AC was updated on the wood bison project but took no action. ADF&G hopes to obtain additional advisory committee and regional council review and comment on the wood bison restoration proposal during the public review of this report.

SECTION 5: REVIEW OF POTENTIAL ENVIRONMENTAL AFFECTS

In April 2005 ADF&G initiated an environmental review of the wood bison project to provide information that will help the public evaluate the restoration proposal. ADF&G contracted Hunter Environmental Associates, Inc. (HEA) to assist in this effort, and particularly to help identify various federal and state permitting requirements and prepare information that may be needed for NEPA compliance in the future. This section of the report provides a detailed evaluation of the potential environmental effects of wood bison restoration in the three potential release areas.

In summer 2005, ADF&G and HEA sent letters to agencies, landowners and others requesting scoping comments for this report. This consultation effort focused primarily on public agencies with potential permitting requirements and landowners adjacent to local communities where a temporary holding facility might be constructed in connection with potential restoration efforts. We asked for assistance in identifying issues that need to be addressed in connection with the three potential restoration sites being considered, and specifically those associated with constructing a temporary holding facility in remote areas. Section 6 provides an analysis of the scoping comments received and ADF&G's responses to the comments. Information on agency permitting requirements comes from the scoping letters and ADF&G's ongoing communication with other agencies and is summarized in Section 7. Appendix E includes the distribution list for the letters requesting scoping comments, an example scoping letter and the comments received.

OVERVIEW OF ALTERNATIVES CONSIDERED

To supplement the habitat assessment already completed for Yukon Flats, ADF&G staff conducted an evaluation of potential wood bison habitat in Interior Alaska during 2002–2005. Using available habitat information, ADF&G identified three potential sites for wood bison restoration (Figure 1) and rejected three locations, at least as initial restoration sites (Gardner 2007). The three potential restoration sites being further evaluated include the Yukon Flats, Minto Flats, and the lower Innoko–Yukon River area. Wood bison could also be restored at one, two, or all three of the sites being considered. The following four alternatives for wood bison restoration are analyzed in this section (see the local area landownership maps in Figures 4, 5, and 6).

Alternative A: 'Yukon Flats' would involve restoration within an area of approximately 3,800 square miles consisting of 63% refuge, 32% private, and 4% state-owned land.

Alternative B: 'Minto Flats' would involve restoration on about 800 square miles consisting of 85% state and 14% private-owned land.

Alternative C: 'Lower Innoko–Yukon River area' would involve restoration within an area of about 1,348 square miles consisting of 51% private, 48% BLM, and 1% state-owned land.

Alternative D: 'No Action' would involve no wood bison restoration activities.

Sites Not Being Further Considered at this Time

Hogatza River. The Hogatza River is a tributary of the Koyukuk River and is located to the west of the community of Hughes (Figure 2). The area includes about 600 square miles and would provide high quality summer habitat, but winter habitat is limited. This area usually receives heavy snowfall that could make it difficult to sustain a bison herd. Bison might survive in this area, but it is a less than ideal location.

North Fork Kuskokwim River. The area evaluated is northeast of McGrath (Figure 2). This area includes about 400 square miles of potential habitat, part of which is quite wet. The area may not be sufficient to sustain a bison herd over the long term, and is in close proximity to the range of the Farewell plains bison herd. Creating a situation in which the two species are likely to mix would conflict with bison conservation guidelines (Gates et al. 2001).

Aniak River. The Aniak River was identified as a potential site through conversations with local residents and biologists. ADF&G surveyed the Swift Creek and Aniak River drainages from their confluence with the Kuskokwim River (Figure 2). The sedge/grass meadow system extended approximately a half mile on either side of drainages from the mouth of each drain to about 15 miles upstream before transitioning to upland tundra. The area contained multiple large and small sedge meadows scattered throughout the floodplain woodlands. The meadows were small compared to those in the Innoko area and their characteristics were different. The tundra habitats contained few bison forage species. The general assessment is the area offers suitable forage but is too limited in size to support a herd of 400 wood bison.

The proposed restoration effort would entail reestablishing populations of wood bison using stock obtained from Canada. Over the long term, population levels could range from 500 to 2,000 or more depending on the area involved along with cooperatively developed management objectives. The area eventually inhabited by bison populations would also vary from a low of approximately 800 square miles on the Minto Flats to 3,800 square miles or more on the Yukon Flats (Table 2). The total area potentially involved at all three sites could include approximately 6,000 square miles or more. The actual size of the area occupied at each site would depend on bison population size as well as local habitat characteristics.

TABLE 2 Comparison of potential wood bison restoration sites^a

Area	Size (mi ²)	% Meadow habitat (mi ²)	% Bison forage (mi ²)	Potential habitat carrying capacity	Land status	Habitat characteristics	Other considerations
Yukon Flats	3,800	6.6–10.1% (250–385)	62.2% (156–239)	>2,000	63% refuge 32% private 4% state	Excellent habitat-estimated to be able to support at least 2,000 bison	Local support; initial release on private lands but bison expected to also occur on federal refuge lands as herd size increases; low density moose; important. waterfowl production area.
Minto	812	25.8% (210)	46.7% (98)	500 or slightly more	85% state 14% private	Small area in southeastern portion may not be accessible during spring/summer. Carrying capacity limited to about 500.	State game refuge; combination of state and private lands; public support not well established; high density moose; important waterfowl production area.
Innoko	1,348	7.6% (103.1)	48.7% (50.2)	>500	51% private 48% BLM 1% state	Spring flooding (during some years 70%+ of available land can be flooded); deep snow at times. Carrying capacity estimated to be in excess of 500.	Combination of federal, state, and private lands; public support not well established; moderate density moose; important waterfowl production area.

^a The minimum viable population size for bison is estimated to be at least 400 animals. Areas that could not easily support populations at or above this level are not being considered. Where possible, larger populations are preferable in terms of long-term maintenance of genetic diversity.

This section evaluates several environmental and socioeconomic issues. These include the relationship between wood bison restoration and a variety of physical factors (i.e., water, soil, and air quality), biological and ecological factors (fisheries, vegetation, wildlife), and cultural and socioeconomic factors (hunting, recreation, and resource development).

DESCRIPTION OF NEEDED PHYSICAL DEVELOPMENTS

The letters sent out by HEA that requested scoping comments for this ER included a description of the likely physical developments that would be needed for temporary wood bison holding facilities in remote locations. These descriptions were used by landowners and agencies identify their requirements. The same general description is provided below.

A temporary corral would be constructed at a release site by late fall so posts could be set prior to freeze-up. Fencing would be attached to trees as much as possible and 4–8 inch diameter posts would be set 3 feet into the ground every 20 feet in open areas, to enclose an area of up to 5–10 acres (Figure 3). No cement or fill material would be required. The fence would be removed by early summer the following year (after approximately 10 months), unless there is an opportunity to bring in additional founding stock in subsequent years. It is unlikely that any particular enclosure would remain in place for more than 2–3 years. Supplemental food (primarily hay) for the bison will be stored at the release site as long as bison are held there. In order to minimize the risk of introducing noxious weeds, only certified weed-free Alaska-grown hay, would be used. A temporary bison food-storage enclosure measuring 25 ft × 25 ft would be constructed in a way that would preclude access by other wildlife. This would not require breaking the ground surface, since the structure would be supported above the ground with a base consisting of cement blocks spaced evenly to support a floating floor. The cement blocks would be the only contact with the ground. The structure would be removed by early summer (after a total of about 6 months), unless there were plans to release additional bison in subsequent years.

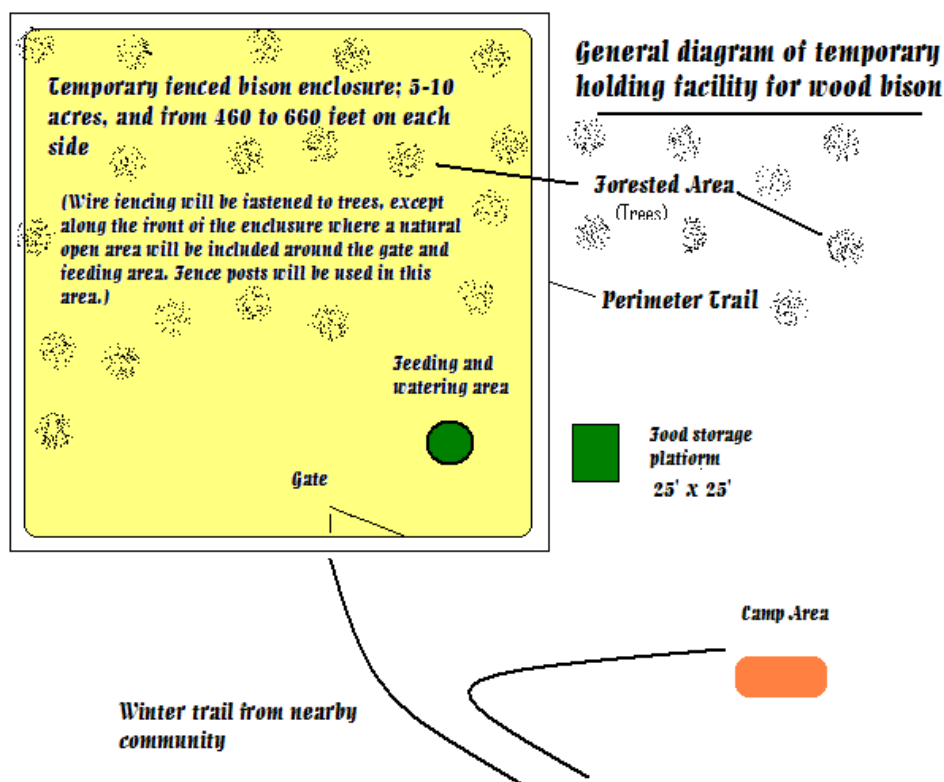


FIGURE 3 Diagram of the general layout of a temporary holding facility

A temporary holding facility would be constructed near one or more of the following communities:

- 1) Yukon Flats: Beaver, Birch Creek, or Chalkyitsik
- 2) Minto Flats: Minto
- 3) Lower Innoko–Yukon River area: Shageluk or Holy Cross

The exact location of a temporary holding facility is flexible and will be partly determined by cultural resources, wetlands, and other permitting considerations. Except for limited foot paths, there will be no need for new trail construction to access the temporary holding fence/food storage facility at any of the potential restoration sites. Most access will occur during the winter months when the ground is frozen and will rely on existing vehicle trails. If some clearing is required to construct the fence or food storage facility, it would be done using hand axes and chain saws.

DESCRIPTION OF ALTERNATIVE SITES

Alternative A – Yukon Flats

This alternative would involve restoration in an area that includes about 3,800 square miles of high quality wood bison habitat, consisting of 63% YFNWR lands, 32% private and 4%

state-owned land (Table 2, Figure 4). The Yukon Flats could support a relatively large bison population.

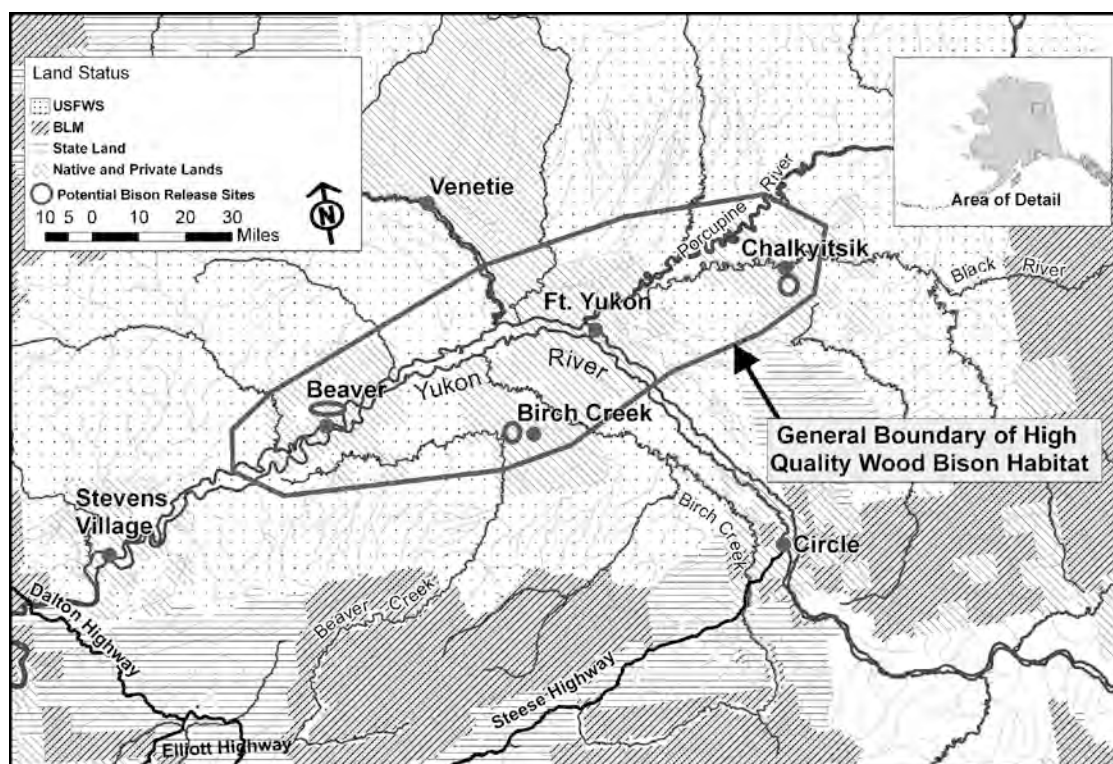


FIGURE 4 Alternative A – Landownership patterns on the Yukon Flats and approximate area with high quality wood bison habitat

Alternative B – Minto Flats

This alternative would involve restoration in an area including about 800 square miles of bison habitat, consisting of 85% state land in the MFSGR, 14% privately-owned land and a small component of BLM land (Table 2, Figure 5). BLM lands in the Minto area have been selected under the Alaska Native Claims Settlement Act and are scheduled to be conveyed in the next year. Minto Flats is less remote than Yukon Flats or the lower Innoko–Yukon River with road access to the area available from the Elliot Highway and Minto Road.

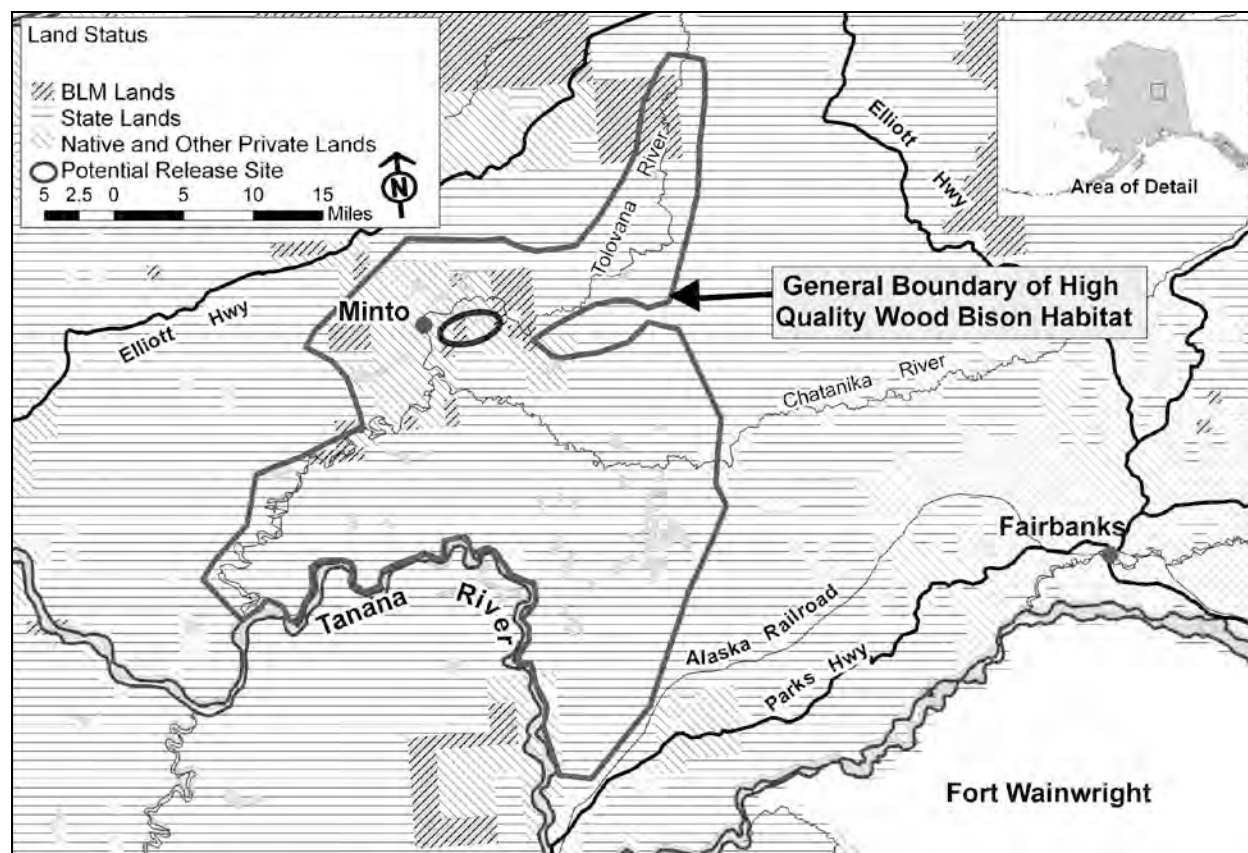


FIGURE 5 Alternative B – Land-ownership patterns in the Minto Flats area and approximate area with high quality wood bison habitat

Alternative C – Lower Innoko–Yukon River

This alternative would involve restoration in an area including at least 1,348 square miles of bison habitat, consisting of 51% private, 48% BLM, and 1% state-owned land (Table 2, Figure 6). The lower Innoko–Yukon River area includes a large amount of habitat that likely extends beyond what has been inventoried up to this point, and could support a relatively large bison population.

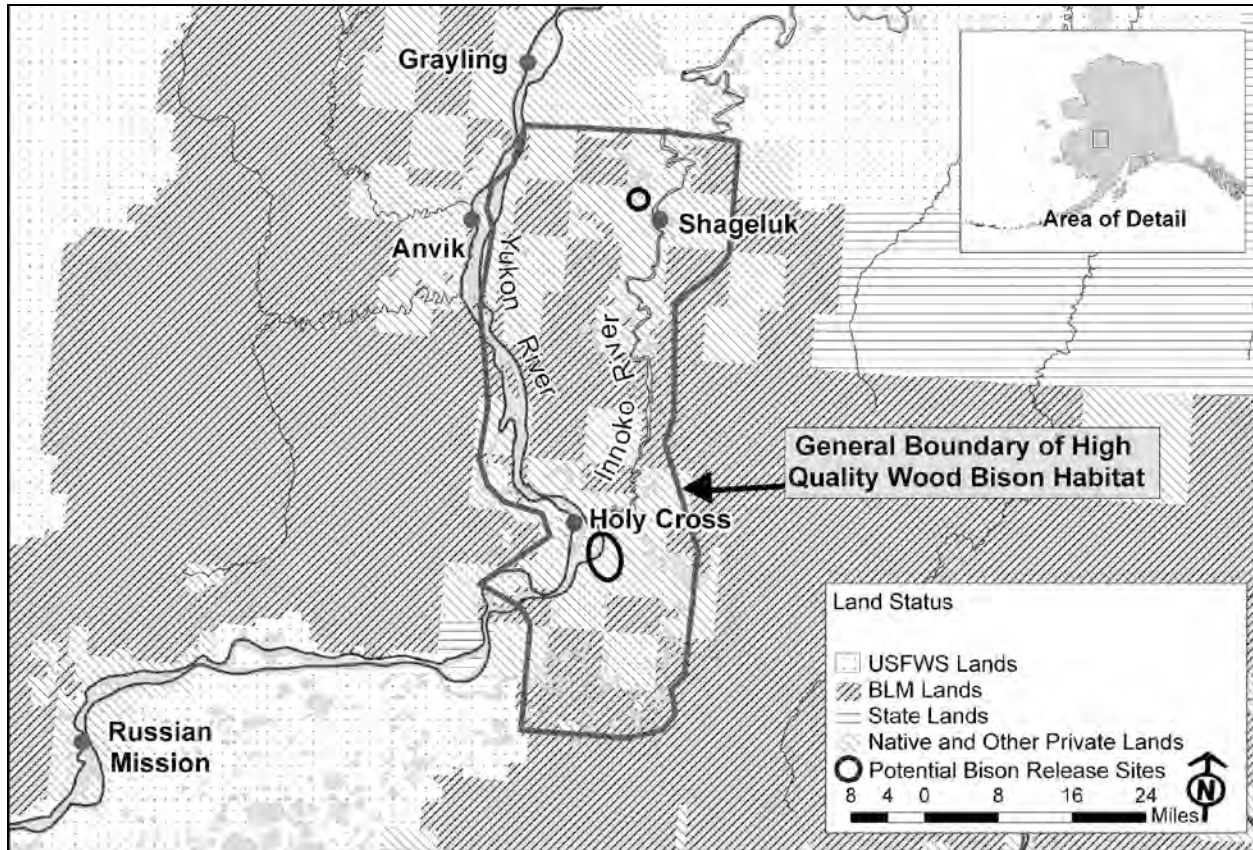


FIGURE 6 Alternative C – Land-ownership patterns in the lower Innoko–Yukon River area and approximate area where studies have identified high quality wood bison habitat

Alternative D – No Action Alternative

The no action alternative would mean that ADF&G would discontinue the wood bison restoration program. Wood bison would not be restored at any location in Alaska, and this would result in a number of lost opportunities. Alaska would forego the opportunity to contribute to wood bison conservation and enhance biodiversity, renewable resources, hunting, educational programs, and tourism. Loss of the uses and activities associated with wood bison restoration would result in a loss of economic opportunity for Alaska, and particularly for rural communities in potential wood bison restoration areas.

Under the no action alternative, ADF&G would not be required to use resources to address several key issues involved in wood bison restoration. Public information, education and planning efforts related to wood bison restoration would be discontinued. There would be no risk of disease transmission to other wildlife or domestic animals as a result of wood bison restoration. Concerns about the possible listing of wood bison in Alaska under the ESA and potential adverse effects to other resource developments activities would not have to be addressed. ADF&G funds for wood bison restoration could be allocated to other programs; however, the opportunity to obtain private and other funding for this wildlife conservation initiative would be lost.

This alternative would mean that an ecologically important native herbivore that could contribute to restoring and maintaining boreal ecosystems would remain absent from the state. Alaska would lose an opportunity to monitor long-term ecological effects of a large grazing mammal as global climate change occurs, possible shifting northern ecosystems towards grasslands. This might lessen Alaska's ability to sustain large mammal populations if global climate change occurs, as is predicted by many scientists. The continued absence of this native herbivore would result in reduced biological diversity, the absence of some basic ecological processes, and the loss of an opportunity to restore and enhance Alaska's renewable resources and increase the basis for sustainable economies. Except for the loss of economic opportunity, described below, the effects associated with this alternative are difficult to quantify. However, they include a variety of negative effects in terms of ecology, culture and aesthetics, and lost opportunities to make a major contribution to international wood bison recovery and wildlife conservation in general. Wood bison conservation efforts would be limited to Canada, where there are some constraints relating to loss of habitat in some areas, potential transmission of cattle diseases to healthy herds and the potential for hybridization with plains bison.

AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

Physical Factors

Water Quality. This section addresses potential effects of wood bison on surface water quality. Wetland permitting requirements are addressed in Section 7.

Alternative A – Yukon Flats — The effects bison might have on water quality can be evaluated based on evidence from other areas where bison inhabit wetlands. A diversity of river systems, dry, mesic and wet meadows, and lakes and ponds, some of which are eutrophic, characterize the Yukon Flats. Concern has been expressed that bison activity could cause hypereutrophy or increased water turbidity. As described below in the section on fisheries, extremely high population densities of bison could have indirect effects on aquatic systems. Although grazing by high densities of cattle has been shown to have detrimental effects on streamside vegetation, erosion, and aquatic systems (Belsky et al. 1999; Steinman et al. 2003), these effects are not known to occur at the relatively low densities that characterize northern free-ranging bison populations. Plains bison in the Delta area have caused localized effects in some high-use riparian areas and caused some stream sedimentation (J. Durst, DNR, personal communication, 2006). This is less likely to occur in the Yukon Flats or other areas being considered for wood bison restoration, where sources of water are abundant and widespread and the animals would be unlikely to concentrate near individual water sources or use them frequently.

The effects of cattle have been most apparent in relatively arid areas in the western U.S. and Canada, where ponds, lakes, and rivers are limited in number and the use of aquatic systems and riparian areas by ungulates and other animals is concentrated in relatively small areas. In contrast, the areas being considered for wood bison restoration are characterized by an abundance and diversity of lakes and rivers, which would tend to disperse use by bison and other wildlife. For example, King (1962) estimated there were about 30,000, mostly shallow, lakes on the Yukon Flats. This number may have declined because of a general drying trend. In 2002 FWS estimated there were 20,000 water bodies, based on an analysis using LANDSAT imagery and GIS. The widespread availability of water sources combined with the relatively low densities of grazing ungulates would minimize the potential for effects on water quality. As described

below in the sections regarding the effects of wood bison on vegetation and waterfowl, there are differences in the grazing behavior of bison and cattle, and northern ecosystems were shaped, in part, by the influence of large herbivores.

Relevant information is provided by studies in Elk Island National Park, Alberta, where high densities of bison and other ungulates inhabit an area with hundreds of lakes and ponds that are naturally eutrophic or hypereutrophic. Park biologists have seen no indication that bison have increased the level of eutrophy, noting that lakes outside the park are identical in terms of their trophic status, and that eutrophication is a natural characteristic of lakes in the region. In addition, water quality in this park has been monitored for several years with no indication that fecal coliform levels are higher than normal, even in wetlands adjacent to bison holding facilities (G. Sargent, former Park Superintendent, personal communication).

It is unlikely that wood bison would have detrimental effects on water quality on the Yukon Flats. The influence of bison would certainly be overshadowed by the effects of drought, flooding, siltation, and beaver and waterfowl activity on the dynamic wetlands on the Yukon Flats. The available information suggests that the effects of wood bison on water quality will be minor or nonexistent.

Information on water quality on the Yukon Flats is available, and can serve as a basis for comparison with future water quality data. Water quality data is available from 129 lakes in 7 plots distributed across the Yukon Flats that were sampled in the mid 1980s. The areas sampled represent much of the potential wood bison habitat in the area. Most lakes were either eutrophic or hypereutrophic (Heglund and Jones 2003). Three of these areas were sampled again in 2001 and some additional water quality data were obtained in 1989–1990. FWS initiated a water quality monitoring program on Beaver Creek in 2006. This involves monitoring water quality near the confluence with Victoria Creek and at two sites downstream on Beaver Creek (M. Bertram, FWS, personal communication).

Alternative B – Minto Flats — The discussion of effects on water quality on the Yukon Flats generally applies to the Minto Flats as well. Minto Flats is categorized as an “open” wetland system. The watershed includes numerous semi-permanent wetlands and eutrophic lakes and is drained by the Chatanika, Tolovana, and Tatalina Rivers and Goldstream Creek. The area undergoes large fluctuations in water depth within and between seasons (Rowinski 1958; Petrula 1994; Walker 2004). The effects of wood bison on water quality would be minor or nonexistent, especially in view of the frequent flow of water through the area’s water bodies.

Alternative C – Lower Innoko–Yukon River — As is the case on the Yukon Flats and Minto Flats, the effects of wood bison on water quality in the lower Innoko–Yukon River area would be minor or nonexistent. The lower Innoko valley is characterized by numerous lakes and semi-permanent wetlands and is drained by the Yukon and Innoko Rivers. Like the Minto Flats, the lower Innoko–Yukon River area is primarily an “open” wetland system, and most water bodies are subject to changes in water levels and chemistry as a result of spring flooding in the Innoko and Yukon Rivers. Spring flooding occurs annually, and is most extensive in the lower Innoko drainage because of topography and its relatively low elevation. The periodic influx of large amounts of flood water would negate any long-term effects of bison.

Soil Quality. The following information applies to all potential restoration sites. Wood bison should have localized beneficial effects on soil quality by increasing soil fertility and plant productivity in grazing and resting areas. Studies of the effects of grazing by plains bison show that bison affect nutrient cycling processes and patterns of nutrient availability. They increase nitrogen availability and influence the amount and quality of plant litter returned to soils (Knapp et al. 1999). No significant adverse effects on soil quality are anticipated due to wood bison restoration.

Floodplain and Potential Affect on Local Communities. Compliance with Executive Order 11988, 1977, Floodplain Management, amended by Executive Order 12148, July 20, 1979; 44 FR 43239, 3 CFR, 1979 Comp., p.412, is required as part of the NEPA process. This order states that structures cannot impede or channelize water flow.

Complete avoidance of the floodplain for temporary holding facilities is not possible in some areas. However, a temporary holding facility will not impede or channelize flow on floodplains given its temporary nature and use primarily during the winter months. Attempts will be made to place the temporary holding facility in an upland area where surface water flooding/flow impediment would not be an issue (based on elevation and flood data for the adjacent community) if a project were expected to extend into the spring months. It should be noted that wood bison would be released from the facility in early spring just prior to ice break-up, and would be able to avoid flood waters after their release. Human activity at a holding facility would also end prior to break-up.

The flood data below represents the highest known flood elevations that have been recorded. The data also shows the number of recorded floods and in-town flood heights, giving an indication of flooding frequency near each community. The flood potential in surrounding areas could be different from the villages themselves. However, these data are the recorded flood information points closest to potential temporary bison holding facility locations. The following information was obtained from the U.S. Army Corps of Engineers (USACE) website for flood records.

Alternative A – Yukon Flats — There is a general downward trend in the incidence of flooding on the upper Yukon River, and a temporary holding facility would be located a considerable distance from a community. There is limited potential that a fenced enclosure could somehow redirect flood waters and cause impacts on structures in nearby communities.

Beaver: Beaver village tends to be prone to floods from the Yukon River, with a recommended building elevation of 365.5. Floods were recorded in 1948, 1958, and 1992. A holding facility would be located some distance from the village, and therefore would not influence the effects of flooding in the community.

Birch Creek: The village of Birch Creek tends to have little potential for flooding from Birch Creek, but flooding was recorded in 1967 and 1992. Both floods reached about the same elevation. Greater flood volumes will raise the river only slightly because of the broad floodplain of the river. All floods are open water floods; ice jams do not occur. Because a temporary holding facility would be located a mile or more from the community and downstream, the community is unlikely to be affected by flooding.

Chalkyitsik: Chalkyitsik is a highly flood prone area because of snowmelt/ice jams. Floods occurred almost every year from the 1920s through the 1940s and were documented in 1937, 1947, 1948, 1967, and 1997. The 1937 flood was the most serious. However, a handling facility constructed in connection with wood bison restoration would probably be located about 2 miles south of the community at an elevation that is several feet higher than in the community. There is little chance that floodwaters could affect a temporary facility, or that it would affect the nature of flooding in the community.

Alternative B – Minto Flats — Minto Village is located on a bluff above the Tolovana River and has no history of flooding. Lowland areas east and south of the village can, however, experience flooding. The temporary holding facilities would be situated on higher ground to avoid potential flooding, and be located a mile or more from Minto Village.

Alternative C – Lower Innoko–Yukon River —

Shageluk: Shageluk Village was flooded from the Innoko River prior to 1967 when the community moved to its present location. Most of the new community is 20 feet or more above the river. There is no known flooding at the present town site. The service road from the current town site 3 miles north to the airstrip has been inundated with floodwaters, cutting access to the airport. A holding facility would be located a mile or more from the community and therefore would have no effect on structures within the community.

Holy Cross: Only one Yukon River flood has been recorded at Holy Cross. A holding facility would be located east of the community, on the east side of the Yukon River, where flooding may be more likely than in the community. There would be no effects on community structures as a result of potential flooding of temporary holding facilities.

Air Quality. The air quality division of the Alaska Department of Environmental Conservation (DEC) was contacted concerning air quality regulations and whether the project would require permitting through the Air Quality Control Regulations, 18 AAC 50, based on the information provided below (Table 3).

TABLE 3 Potential emission sources during construction of temporary bison holding facility

Emission sources	3-Hour period	24-Hour period	9-Month period
Gas-powered auger	1 hour	2 hours	504 hours
Pick-up trucks	1 hour	3 hours	756 hours
Snowmachines	1 hour	3 hours	756 hours
ATVs	1 hour	3 hours	756 hours
Generator (1 kW)	1 hour	3 hours	756 hours

Air pollution sources are regulated under 18 AAC 50 and 40 CFR Part 71, based on their “potential to emit,” which means the maximum capacity of a stationary source to emit a pollutant given its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on the hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally

enforceable. Potential-to-emit estimates are based on 8,760 hours/year of operation and the information provided by the source.

Using the following formula, the NO_x emissions for the generator described in Table 3 totaled 0.0182 tons per year, which is well below the 100 tons/year threshold.

$$\frac{\text{ENGINE hp} \times .031 \text{ lb NO}_x/\text{hp-hr} \times 8760 \text{ hr/yr}}{2000 \text{ lb/ton}} = \text{X tons of NO}_x/\text{yr}$$

The minor permits program (18 AAC 50.502) requires air quality permitting prior to construction if the potential to emit is greater than the maximum allowable tons/year for each pollutant source (Table 4).

TABLE 4 Source thresholds for obtaining a minor permit

Pollutant Source	Maximum tons/year
PM 10 (Particulate matter)	15 tons/year
NO _x (Nitrous monoxide or dioxide)	40 tons/year
SO ₂ (Sulfur dioxide)	40 tons/year
Lead	0.6 tons/year
CO (Carbon monoxide)	100 tons/year

The NO_x potential to emit for the 1 kW generator does not require a minor permit under 18 AAC 50.502. The other emission sources mentioned in Table 2 are deemed non-road engines. The actual and potential emissions of non-road engines and equipment are not included when determining the classification of a stationary source or modification under AS 46.14.130. However, non-road engines are not exempt from compliance with other applicable air pollution control requirements, such as visible emission standard cited in 18 AAC 50.055.

National Ambient Air Quality Standards (NAAQS) were developed as part of the Clean Air Act. The NAAQS are health-based standards, and were established by the Environmental Protection Agency to protect human health and the environment. Major source thresholds will vary depending upon the local attainment status for a pollutant with an established NAAQS (Table 5).

TABLE 5 Attainment status for pollutants with an established National Ambient Air Quality Standard within Alaska

	Fairbanks	Juneau	Anchorage	Unalaska	St. Paul	Random
Nonattainment	CO	PM-10	CO	SO ₂	SO ₂	PM-10
Special protection areas	n/a	n/a	n/a	SO ₂	SO ₂	n/a

n/a = not applicable.

Other areas of the state are in attainment. There are small pockets assessed for PM-10 around the state, but none of the areas we evaluated are in those pockets. There would be minor impacts to air quality as the result of wood bison restoration.

Biological and Ecological Factors

Fisheries. The following evaluation of the potential effects of wood bison on fisheries applies to all three potential wood bison restoration sites. The fish fauna of the Yukon River drainage is described in detail by Mecklenburg et al. 2002. Except for a few isolated lakes in the Tanana River system, all populations are wild; there is presently no enhancement of fish populations in the remainder of the drainage. Five species of Pacific salmon including chinook salmon, coho salmon, chum salmon, sockeye salmon, and pink salmon migrate annually into the Yukon River and its tributaries. Migratory and resident whitefish species include inconnu (sheefish), broad whitefish, humpback whitefish, least cisco, Bering cisco, and round whitefish.

Resident species that are widely distributed in lakes and streams of the Yukon drainage include Arctic grayling, northern pike, Dolly Varden, burbot, long-nosed sucker, and Alaska blackfish. Lake trout are present in many higher elevation lakes. Rainbow trout do not occur naturally in drainages north of the Gulkana and Kuskokwim Rivers. A summary of Yukon area sport fisheries can be found in Burr 2004; commercial and subsistence use is described in Vania et al. 2002.

Because bison are predicted to have minor effects on water quality, and minor or beneficial effects on vegetation (Smith 1990), there is little likelihood that they would have any detrimental effect on fisheries. Like other large mammals in the area, wood bison would periodically cross streams and rivers, and would probably spend brief periods foraging or drinking at the edges of lakes and ponds. Their effects on fisheries in these areas would be minor or nonexistent. Any minor effects could be mitigated by limiting population size at a level where effects would be nonexistent. There do not appear to be any studies of the effects of bison in general, or wood bison in particular, on fisheries. Wood bison would have little direct effect on fish themselves, but could have indirect effects on fish populations by affecting aquatic systems. Although grazing by extremely high densities of cattle has been shown to have detrimental effects on streamside vegetation, erosion, and aquatic systems, these effects do not seem to occur at relatively low densities that characterize northern free-ranging bison populations.

Negative and other effects of grazing by cattle on wetland invertebrates, riparian vegetation and watershed function have been documented at stocking rates equivalent to a few hundred or more cattle per square mile (Belsky et al. 1999; Steinman et al. 2003). These densities are much higher than those that would occur as a result of wood bison restoration in Alaska, which would approximate 0.5–1 bison/square mile of total habitat and a maximum of 10–12 bison/square mile of meadow habitat. Based on range use patterns of wood bison populations in Canada, densities there approximate 5–7 bison/square mile of meadow habitat (Gardner and DeGange 2003). It is also known that the effects of intensive grazing on aquatic systems can be mitigated by limiting cattle density, and by using rest-rotation grazing and other management practices (Fitch and Adams 1998). As described below in the sections regarding the effects of wood bison on vegetation and waterfowl, there are differences in the grazing behavior of bison and cattle, and northern ecosystems were shaped, in part, through the influence of large herbivores. As noted above, the abundance of water sources in the three areas being considered for wood bison restoration would avoid the effects observed in arid habitats, where use by large numbers of ungulates is concentrated near limited sources of water.

Vegetation. The following evaluation of the potential effects of wood bison on vegetation applies to all three areas being considered for wood bison restoration. A review of the literature on the effects of grazing by bison indicates that they would have a beneficial effect on plant communities on the Yukon Flats. The effects of bison and other large herbivores on vegetation, and their relationships with plant communities, have been evaluated in a number of studies including Reynolds et al. (1978), Reynolds and Hawley (1987), Larter and Gates (1990), Larter and Gates (1991) Smith (1990), Berger (1996), Frank et al. (1998), and Knapp et al. (1999), and were reviewed by ADF&G (1994) and more recently by ADF&G and FWS (Gardner and DeGange 2003). The joint review of this and other biological issues (Gardner and DeGange 2003) is included in Appendix A, and includes additional analysis and references related to the effects of bison on the environment.

Grasslands and wild ungulates have coexisted for millions of years, indicating the long-term sustainability of grazing ecosystems. Typically, these grazers are continually on the move and grazing at any one site may be intense but never lasts long. Key factors are the large spatial and temporal variation in mineral-rich forage, the ability of defoliated grass and sedges to regrow after grazing, and the migratory nature of bison and other grazers. In the absence of grazing, nutrient cycling is reduced. Wood bison are adapted to boreal regions and have a highly efficient digestive system and an ability to forage on a variety of common grasses and sedges found in meadows and early successional habitats.

Reestablishing wood bison in certain areas would restore natural processes including more rapid nutrient cycling and the effects of grazing on meadow plant communities. Studies of grazing ecology show that ungulates can effect plant species composition, richness, diversity, productivity, and physiognomy of plant communities, and that effects are related to grazing intensity, frequency, and season. In general, ungrazed areas tend to have low species richness and diversity, overgrazed areas are species-poor and provide little forage value, while moderate grazing results in increased species diversity, richness, and quality. Grazing by bison reduces dead biomass, and moderate grazing can increase productivity in many graminoid species, in part due to the reduced accumulation of dead material. Grazing has been shown to enhance forage quality, and to cause changes in plant composition by reducing preferred grass species and leguminous plants in favor of less palatable sedges and forbs.

Bluffs along the upper Yukon River 100–175 miles southeast of Fort Yukon support some of the few remaining steppe plant communities in Alaska. Four species (*Cryptantha shackletteana*, *Oraba murrayi*, *Eriogonum flavum*, *Podistera yukonensis*) were once on the Category II Candidate Species List in Alaska, meaning they might qualify for protection under the Endangered Species Act. However, this list was abolished in the mid 1990s, and these species do not have status under the ESA (S. Detwiler, FWS, personal communication). In addition, a new species of gentian was recently identified on bluffs along the Porcupine River, about 40 miles east of the nearest meadow habitat. Bison are not known to forage on any of these plant genera or species. It should also be noted that steppe plant communities coexisted with bison and other large grazers for millennia (Guthrie 1990). About 75 miles of primarily upland terrain lies between the eastern edge of wood bison habitat and the closest known steppe community at Woodchopper Bluff. In view of the lack of suitable bison range in these areas, and the limited and predictable movements of existing bison herds in Alaska and Canada, it is unlikely that wood bison would venture this far from suitable habitat.

An additional concern about impacts to vegetation communities is the possibility of introducing exotic species of weeds into remote areas by feeding wood bison hay grown in other parts of Alaska. This concern can be mitigated by feeding wood bison only certified weed-free hay prior to and after their being moved to temporary containment facilities at remote locations.

Wildlife.

Waterfowl — The following evaluation of the potential effects of wood bison on waterfowl applies to all three areas being considered for wood bison restoration. Waterfowl species in Interior Alaska include mallards, pintails, canvasbacks, wigeon, shoveler, scaup, gadwall, green-winged teal, blue-winged teal, redhead, ring-necked duck, goldeneye, bufflehead, oldsquaw, scoter, ruddy duck, and mergansers, as well as Canada geese, white-fronted geese, loons, and trumpeter swans. The Yukon Flats is one of the most productive waterfowl breeding areas in North America producing approximately 1.6 million ducks, geese, and swans annually (U.S. Fish and Wildlife Service 1987). The Minto Flats area is a high quality waterfowl nesting and staging area and a variety of waterfowl species occur in the lower Innoko/Yukon River area.

Water levels and predation are major factors determining waterfowl nesting success in Interior Alaska. Spring floods often occur in the lower Innoko drainage because of its relatively low elevation compared to the Yukon River. Floods can have a large effect on waterfowl production in these areas by reducing the amount of available nesting habitat. The effects of flooding on waterfowl nest success can be substantial in a given year. Flooding reduces available habitat and can destroy nests that are already initiated. The effects of flooding, however, are limited to geographic areas with open lake systems (lakes connected by surface water) and these open systems, although very important to waterfowl production, are relatively rare compared to closed lakes. For example, the open lake portion of Minto Flats is highly productive for waterfowl and can be subject to flooding, but this type of system is less common in the Interior than closed lake systems (e.g., much of the Yukon Flats).

The possible effects of bison on waterfowl were mentioned as a concern by FWS and Griffith et al. (1998) because of the importance of the Yukon Flats for waterfowl. Although there have been no studies specifically addressing the effects of bison on waterfowl in the northern boreal forest, there is a substantial number of relevant studies and empirical data available from other areas. Rather than being concentrated in a few areas, waterfowl nesting activity is widely distributed on the Yukon Flats and the other two areas under consideration, a situation that limits the potential effects of bison to a small number of waterfowl nests at any given time. The incubation period for most species of ducks is about one month or less (Bellrose 1980), and occurs during a period when wood bison generally avoid wet meadows (Larter and Gates 1991). There is no indication of adverse effects of wood bison on waterfowl populations in Elk Island National Park, Alberta, or in the Mackenzie Bison Sanctuary or Mills Lake area in the Northwest Territories (ADF&G 1994).

The potential effects of wood bison and other large ungulates on waterfowl in Interior Alaska were reviewed by ADF&G (1994) and again in the joint ADF&G and FWS review of wood bison restoration conducted in 2003 by Gardner and DeGange (Appendix A). Based on 1) a review of major studies on the effects of grazing ungulates (primarily bison or cattle) on waterfowl nesting success, nesting vegetation, and nutrient cycling; 2) consultation with wildlife

biologists familiar with the ecology of waterfowl and bison where these animals presently coexist; and 3) the density and patterns of habitat use that would likely characterize a wood bison herd on the Yukon Flats, Gardner and DeGange concluded that a medium density wood bison population is unlikely to have negative effects on waterfowl.

Mark Lindberg, an Associate Professor of Wildlife Biology at the University of Alaska Fairbanks who specializes in waterfowl biology, provided comments to the WRAG on the potential for wood bison restoration causing impacts to waterfowl. Dr. Lindberg indicated that although wood bison might have some direct effects on nest survival through trampling or disturbance, these would probably be localized and minimal and would not have any negative effects on overall population levels (Lindberg 2005). He suggested that long-term, indirect negative effects could include the creation of travel corridors that could be used by predators and a reduction in the height of nesting cover by intensive grazing. However, grazing by bison could have a long-term beneficial effect by maintaining and increasing the extent and quality of meadow habitat adjacent to water bodies, which is important nesting habitat for waterfowl. Bison could cause positive changes in meadow plant communities by helping reverse encroachment by trees and shrubs and increasing nitrogen input and nutrient cycling in general. Nitrogen input aids plant productivity and growth. Lindberg cited studies showing that small mammal population cycles and their effects on predator numbers have a strong influence on waterfowl nesting success, as do annual fluctuations in water levels. High water levels reduce the amount of nesting habitat available. Nest survival rates on the Minto Flats ranged from near zero to about 60% based on surveys in 7 years between 1989 and 2003, demonstrating that substantial variability in nesting success occurs under current conditions. Dr. Lindberg concluded that bison would have little or no effect on waterfowl populations, that any negative effects would be localized, and that beneficial effects might include an increase in the quality and quantity of meadows.

The available information indicates that wood bison would have minor or beneficial effects on waterfowl at any of the wood bison restoration sites being considered. If minor negative effects were to occur in any of the three areas under consideration, they could be mitigated by limiting bison population size and density at levels that will not have detrimental effects on waterfowl.

Moose — The following conclusions pertain to all three alternative wood bison restoration sites. The potential effects of wood bison on moose populations have been reviewed by ADF&G (1994) and Gardner and DeGange (2003; Appendix A). The major difference in the general ecology of moose in these areas is that they support a wide range of moose densities. Moose population density on the Yukon Flats is relatively low at about 1 moose/3–4 square miles (Stephenson 2002). Moose are relatively abundant in the Minto Flats area, with a population density of about 2–4 moose/square mile. The lower Innoko–Yukon River area also supports a relatively healthy moose population of about 1 moose/square mile. The potential effects of bison on moose numbers via effects on predator numbers are discussed in a separate section below.

There is generally little competition for food between moose and bison. Wood bison are primarily grazers, consuming mainly sedges and grasses, while moose are primarily browsers, relying on willow, birch, and aspen. Most dietary overlap between moose and bison occurs during late spring/early summer when forage quality and quantity is highest and competition between species would be lowest. Blyth and Hudson (1987) found little overlap in the food of

bison and moose despite relatively high overlap in habitat use in Elk Island National Park. The available information indicates that wood bison might have minor impacts on moose forage availability, and that this would be more likely where moose densities are extremely high. There is evidence that bison and moose can coexist at high densities. Examples include the Delta and Farewell areas in Alaska and Elk Island National Park in Alberta, where moose populations in excess of 1 moose/square mile have coexisted with bison populations for decades (Blyth and Hudson 1987; DuBois and Stephenson 1998; Whitman and Stephenson 1998). Wood bison could also have beneficial effects on moose populations by providing an alternative big game resource that could result in reduced harvest pressure on moose. In Yukon, Canada, most wood bison harvest takes place in winter and provides a source of meat that reduces demand for harvest of moose at a time when cow moose are often taken (Jung 2005). Harvesting fewer cow moose can help maintain the reproductive potential of the population.

Plains Bison — ADF&G agrees with the recommendations of other bison conservation authorities, which emphasize the importance of maintaining separation between free-ranging wood bison and plains bison populations. The areas being considered for wood bison restoration are at least 100 miles from the Farewell or Delta Junction plains bison populations. There is a small, privately-owned herd of plains bison in an enclosure in the lower Cosna River area, about 45 miles west of the western edge of the bison habitat on the Minto Flats. There is little naturally occurring bison habitat in this area, and it is unlikely that wood bison would occur in this area or interbreed with these captive animals. Geographical separation as well as management that will limit wood bison population size will prevent mixing of the two bison subspecies in all areas.

Caribou and Dall Sheep — Wood bison should have no effect on caribou and Dall sheep populations in the upper Yukon basin. There is little history of caribou using the Yukon Flats, and there appears to be little chance that bison could have adverse effects on this species. In addition, bison and caribou have different dietary preferences, with caribou using a broad range of plants including forbs, twigs and leaves of shrubs, lichens, fungi, sedges and grasses (Miller 1982; Fischer and Gates 2005), while bison have a strong preference for graminoid plants during most of the year. Bison and caribou seem to be behaviorally compatible, and can be found in the same geographic areas (Fischer and Gates 2005), although their ranges often do not overlap. Although the White Mountains, Fortymile, Porcupine, and Western Arctic herds have occasionally used the uplands surrounding the flats at some time in the last century, caribou are rarely found closer than about 50 miles from the area where potential wood bison habitat occurs. If caribou were to occasionally winter on the Yukon Flats in the future, the small overlap in food habits and behavioral compatibility between caribou and bison suggest that bison would not interfere with caribou use of the area.

Dall sheep occur south of the Yukon Flats in the White Mountains, with the nearest sheep populations being located about 20 miles from the major wood bison habitat. Bison would be unlikely to occur in this area unless the population was allowed to increase to an extremely high level that would cause some bison to disperse from low elevation meadow systems. Even if that were to occur, it is known that bison and Dall sheep exist in close proximity in some areas, including the Farewell area in Alaska and in the southern Yukon, without negative effects (T. Boudreau and M. Oakley, personal communication).

Dall sheep and caribou do not normally occur in the Minto Flats or the lower Innoko–Yukon River areas.

Predator–Prey Interactions — The relationship between wood bison and predators has been reviewed by Oosenbrug and Carbyn (1985), Van Camp and Calef (1987), Carbyn and Trottier (1988), Larter et al. (1994), and Gardner and DeGange (2003). The latter review is included in Appendix A and includes a detailed analysis of the relationship between wood bison and predators.

Predation on bison by black (*Ursus americanus*) or brown bears (*Ursus arctos*) has rarely been documented and does not appear to be a significant source of mortality for any bison herd, regardless of size (C. Gates, personal communication). The existence of wood bison on the Yukon Flats, Minto Flats, or lower Innoko–Yukon River area is unlikely to cause significant changes in bear or wolf numbers or predation rates on moose, and will have a minor effect on these species.

Disease-free wood bison have not been found to be the preferred prey for wolves, but wolves can be an important predator on bison, especially on calves (Oosenbrug and Carbyn 1985; Van Camp and Calef 1987; Carbyn and Trottier 1988; Larter et al. 1994). The conditions that would hypothetically be necessary to cause changes in wolf prey selection and increased predation on moose (Larter et al. 1994) do not seem to occur during the first 15–20 years after wood bison are established in an area. There are no studies that demonstrate that wolf numbers or wolf predation on moose increased following the reestablishment of bison in northern habitats (N. Larter, personal communication, 2006). Wolf predation on wood bison still has not been detected 15 years after their release in the Nisling River valley (B. Hayes, M. Oakley, Yukon Department of Environment, personal communication) and was not detected during the first 19 years in the Mackenzie Bison Sanctuary (Gates and Larter 1990). Both herds increased by at least 15% annually during these periods, suggesting low levels of predation. Few wolf kills have been documented in the 40-year history of the Farewell herd, which has numbered 300–400 bison since 1992 (Whitman and Stephenson 1998; Boudreau 2002). These studies indicate there is little interaction between wolves and bison when bison numbers are below 500 (Gates et al. 2001; Boudreau 2002; DuBois 2002) and are not limited by habitat (Gates and Larter 1990). Gates et al. (2001) concluded that the potential for indirect effects of bison on moose or other ungulates can be mitigated by limiting bison population size.

Furbearers — The Yukon Flats, Minto Flats, and lower Innoko–Yukon River area support populations of lynx, marten, wolverine, red fox, beaver, muskrats, mink and river otter. Bison appear to coexist with a variety of furbearers without detrimental effects. Where bison are abundant, the remains of bison killed by predators or dying of other causes are a source of food for small predators and scavengers such as wolverines, foxes, and ermine. There is no reason to anticipate detrimental effects on furbearers, which could benefit from increases in biological diversity and productivity. The existence of wood bison should have no, or beneficial, effects on furbearer populations.

Small Mammals and Birds — The following discussion applies to all three sites where wood bison restoration is being considered. A wide variety of small mammals and birds occur on the Yukon Flats, Minto Flats, and lower Innoko–Yukon River areas. Small mammals include red-

backed, tundra, taiga (yellow-cheeked) and meadow voles, meadow jumping mice, brown lemmings, porcupines, snowshoe hares, arctic ground squirrels, red squirrels and shrews (MacDonald and Cook 2002). Small birds present are typical of Interior Alaska and include various thrushes, warblers, sparrows, swallows, chickadees, juncos, grosbeaks, ravens, and gulls. The projected effects of wood bison on upland birds are generally similar to those indicated for waterfowl. Based on studies of the relationship between grazing and upland bird species diversity and richness elsewhere in North America, it appears that wood bison would have a neutral or beneficial effect on upland birds. Kantrud and Kologiski (1982) studied the effects of grazing on upland birds in a 600,000 km² area on the Great Plains, and reviewed 241 related articles in the scientific literature. Their study showed that light to moderate grazing resulted in increased species richness for 19 upland species studied. Other studies show various effects ranging from no change or increases in bird density with increased grazing intensity, to declines in density and richness with heavy grazing. The favorable status of the 227 bird species recorded in Elk Island National Park despite the high densities of bison and other ungulates also indicates that healthy upland bird populations exist in the presence of even relatively high densities of bison (Blyth and Hudson 1987; Blyth et al. 1993).

There are few studies focusing on the relationship between large ungulates and small mammals such as microtines, ground squirrels, beavers, and snowshoe hares. However, these species occur in Elk Island National Park, Wood Buffalo National Park, and the Mackenzie Bison Sanctuary at levels of abundance typical of northern environments. It is difficult to foresee a mechanism by which bison would adversely affect small mammal populations, and an increase in habitat diversity and productivity could benefit small mammals such as microtine rodents. The effects of wood bison on small birds and mammals should be minor and could be somewhat beneficial.

Raptors — Although the effect of grazing on ground-nesting raptors such as short-eared owls and northern harriers in boreal environments has apparently not been specifically evaluated, studies in other habitat indicate that grazing can have both positive and negative effects on these species, depending on intensity and timing. Intensive livestock grazing can have negative effects on nesting success and prey availability, while moderate and periodic grazing can be beneficial by maintaining open habitats and increasing populations of small mammal prey, and is used in some areas as a management tool (Kantrud and Kologiski 1982; Kochert et al. 1988; Dechant et al. 2003; Wiggins 2004; Slater and Rock 2005). Periodic grazing by relatively low density wood bison populations should have little negative effect on ground nesting raptors, and may be beneficial in the long term. Long-term monitoring of raptor populations could help assess whether wood bison would have any effect on these species.

Effects of Climate Change. This discussion applies to all three sites and to Interior Alaska in general. Bison are adapted to a wide range of climates, with their original distribution including much of North America and Eurasia and habitats ranging from the arid southwest to temperate woodlands, prairies, mountains and the boreal forest (Guthrie 1990; Stephenson et al. 2001). Some climate models indicate that Interior Alaska is experiencing a warming trend, which is expected to continue (Chapin et al. 2003). This trend may slow the growth and reduce the distribution of forests (particularly coniferous plants), increase the occurrence of wildland fires, and favor the expansion of grasslands. Various areas in Interior Alaska currently support substantial areas with high quality habitat for wood bison, but climate change may increase the

amount of available habitat over the long term. Studies show that parts of the Arctic are getting drier and/or warmer, and the area burned by forest fires is increasing (Chapin et al. 2003). These trends should have a beneficial effect on wood bison habitat by increasing the amount of forage available to grazing herbivores. Wood bison are well adapted to northern grassland environments and their restoration could help offset possible future declines in other northern mammals such as moose and caribou. Wood bison populations would help maintain grassland habitats, and maintain or enhance subsistence economies in the north (F. S. Chapin III, presentation to Wood Bison Restoration Advisory Committee, June 2005).

Land Use and Economic Factors

Recreational Use. The State of Alaska, Division of Parks and Outdoor Recreation indicates there do not appear to be any issues affecting the Alaska State Park system (Appendix E). As described above, common activities on existing bison ranges include hunting, trapping, woodcutting, berry picking, fishing, camping, hiking and other forms of recreation and resource use. Elk Island National Park, for example, is used by thousands of visitors each year who camp, hike, and picnic in an area where they routinely encounter bison and other ungulates (Blyth et al. 1993; W. Olson, personal communication). Bison generally avoid people, but should be treated with the same respect as other large animals. Wood bison restoration would not reduce opportunities for recreational use, and would enhance wildlife viewing opportunities and outdoor recreational opportunities in general.

Cultural Resources. As required in Section 106 of the National Historic Preservation Act, a letter was submitted to the State Historic Preservation Officer regarding the wood bison restoration and placement of temporary food storage and fence facilities near historic properties or archeological sites. All three alternative restoration sites were considered. The State Historic Preservation Officer concurred with the finding of “No Historic Properties Affected” for all three alternative restoration locations (Section 6 and 7; Appendix E).

Trapping. Recent experience with wood bison populations in the north shows they are compatible with the variety of activities that characterize human use of northern environments, including trapping. Wood bison are likely to have a small beneficial effect on furbearer populations and thus, on trapping, by increasing biological diversity and productivity. Bison could have a minor effect on trapping activity because, like moose, they may occasionally cross or travel on snowmachine trails during winter, temporarily resulting in a rough surface (ADF&G 1994), or get caught in snares set for furbearers. Except for minor effects on snowmachine trails and snares, wood bison would have little effect on trapping activity. The presence of bison could have minor beneficial effects on trapping by increasing biodiversity and furbearer populations.

Hunting. As described above in the section regarding effects on trapping activity, wood bison in Canada occur in areas that support a variety of other human uses including hunting for other big game animals, upland game, waterfowl and small mammals. Their presence would have little or no effect on hunting for other species, and in the long term will result in increased hunting opportunity.

At present, the Yukon Flats supports a harvest of approximately 200–300 moose annually, with the majority being taken by local residents. An estimated 75–150 black bears and 10–15 grizzly

bears are taken each year (ADF&G 2002). The successful reestablishment of a wood bison population would eventually allow for additional hunting activity. A population of 500 bison would probably support an annual harvest of 50–100 bison, while a population of 1,000 could support harvests of 100–200 bison each year.

Bison restoration would have a generally beneficial effect on hunting activities by restoring a big game species and providing additional hunting opportunity. Based on studies elsewhere that indicate that bison have no apparent affect on waterfowl production, we anticipate no negative effects on hunting success for resident waterfowl in any of the three areas being considered. Similarly, wood bison restoration should have no negative effects on hunting of other species and a beneficial effect on overall hunting opportunities in both the Minto Flats and lower Yukon/Innoko sites.

Subsistence. Wood bison occur in areas that support a variety of other human uses including hunting for other big game animals, upland game, waterfowl and small mammals and trapping. Their presence would have no effect on subsistence hunting for other species, and in the long term would result in increased hunting opportunities and harvest. In practical terms, bison restoration should have a beneficial effect on subsistence hunting in areas where it is implemented. In terms of helping meet subsistence needs, wood bison could make an especially important contribution on the Yukon Flats in view of the area's chronically low moose population and limited alternative resources.

Allocation of wood bison hunting opportunities is a major issue that is addressed in Section 3. The status of wood bison relative to state and federal subsistence laws would depend on future actions that might be taken by the BOG and/or the FSB. If one or both of these regulatory bodies made a positive determination regarding C&T subsistence use of wood bison, subsistence would be given priority for harvest of wood bison, according to each board's area of jurisdiction. A BOG positive C&T determination would apply to all Alaska residents and all landownerships. A positive C&T determination by the FSB would result in application of the federal subsistence priority for qualified rural residents on federal lands only.

If subsistence use is established through a positive C&T determination it is likely that subsistence hunters would account for a significant portion of the initial harvests. As a wood bison herd grew and a higher level of harvest could be provided, more opportunities for nonsubsistence uses would be available. If a large number of additional nonlocal subsistence or nonsubsistence hunters were attracted to areas where wood bison herds are restored in the future, this could cause some level of friction or conflict with local hunters. At least initially, the number of nonlocal hunters involved is likely to be fairly limited. For example, population and harvest modeling completed in connection with a preliminary cost–benefit analysis (Stephenson and Fix 2005) suggests that with a 14% harvest rate and a population of about 1,000 bison on the Yukon Flats harvests might (depending on state and federal C&T determinations) involve the participation of 130–180 local hunters and 130–175 nonlocal hunters in bison hunting activities each year. Hunting effort could be distributed over a relatively long period through the use of various permit systems, and would occur in an area of approximately 1,000 square miles or more. Minor conflicts between various user groups could be mitigated through a cooperative management planning process and the development of a harvest management system that would

distribute hunting pressure in time and space. Limiting harvest activities to certain times of year could help provide opportunities for wildlife viewers to more easily enjoy wood bison when hunting is not occurring.

Resource Development. Wood bison are compatible with a variety of resource development activities. The main concern about wood bison restoration affecting resource development is the possibility of restriction on land use due to a possible future listing of wood bison under the ESA. Section 3 addresses the ESA and Section 7 provides a more detailed discussion of the ESA in relation to potential effects on resource development projects.

Agriculture — The major human activities that result in conflicts with free-ranging bison are large scale agriculture and the existence of high-speed highways. There are no roads or large scale agricultural developments in the areas being considered for wood bison restoration in the Yukon Flats and Innoko areas. However, there is some agricultural development in the uplands near the southeastern edge of the Minto Flats, and bison could have a negative effect on domestic hay production or pastures in the future, probably after the population approached 500 animals and occupied its maximum range. One secondary road, the Minto–Manley Road lies north of the Minto Flats. The Parks Highway is located in the uplands east of Minto Flats and to the south of the main areas of bison habitat. The Alaska Railroad also traverses the area near the base of the hills on the southeastern edge of the Minto Flats. There could be some potential for future problems with train and/or vehicle collisions in this area, but these would be limited because these roads occur in areas with little or no bison habitat. A Minto Flats wood bison population would be limited to about 500 animals, which would reduce the likelihood that individual bison would spend significant amounts of time outside the low elevation areas, where habitat is abundant.

Oil and Gas and Mineral Development —

Alternative A – Yukon Flats: The major potential resource development in the Yukon Flats area involves a proposed land exchange between FWS and Doyon, Ltd., an Alaska Native Claims Settlement Act regional Native corporation, to facilitate oil development. This would involve FWS receiving approximately 150,000 acres of land currently owned by Doyon, Ltd. within the YFNRW boundary and in exchange giving Doyon title to refuge lands that may hold developable oil and gas resources. The lands obtained by Doyon would include 110,000 acres in the southcentral portion of the refuge around Beaver Creek, south of the village of Birch Creek (U.S. Department of Interior 2005).

The northern edge of the area that would be transferred to Doyon, Ltd. ownership lies about 13 miles south of Birch Creek, which is located near the southern edge of the area that includes high quality wood bison habitat. Directional drilling might also be used to access petroleum deposits along the northern and western edge of this area, and along the southern and eastern edge of Native owned lands south of the community of Birch Creek. The lands in this area that would potentially be affected by oil and gas development include little or no potential wood bison habitat, consisting primarily of forested uplands. The area would be connected to the trans-Alaska pipeline along the Elliot Highway by a pipeline, and possibly also a road constructed along one of two potential routes near the northern edge of the White Mountains, about 5–10 miles south of the any significant amount of bison habitat. A road in this area would

also have little or no direct effect on wood bison or their habitat, although it could increase access to the area if it were open for public use.

While the area south of Birch Creek is a major focus of the proposed Yukon Flats land exchange, it is possible that oil and gas development could occur beyond that area, possibly extending all the way north to the Yukon River and beyond. Because of the fact that wood bison are generally tolerant of various human activities, the effects of the proposed development on wood bison or their habitat would most likely be very limited. Similarly, the presence of wood bison should have little effect on development activities. Roads and pipelines may have to be designed to allow passage of wood bison and other wildlife, similar to what has occurred in connection with Alaska's North Slope oil developments.

At this stage in the exploration for oil and gas on the Yukon Flats it is not well known whether economically recoverable oil deposits exist or where they are located. Should extensive economically recoverable oil deposits be found in an extensive area on the Yukon Flats, it is possible that infrastructure and activity from oil and gas development could limit the range and movements of wood bison to some extent. Even in a scenario of major oil and gas development, wood bison could coexist with industry.

Alternative B – Minto Flats: The Nenana Basin gas exploration project is occurring primarily in the area west of the Nenana River and south of the Tanana River, with some initial seismic testing just north of the Tanana River near the southern edge of the Minto Flats State Game Refuge. Depending on the results of test wells that will be drilled south of the Tanana River, additional seismic testing and possibly gas wells could occur in the southeastern portion of the MFSGR in the future (Bailey 2005). The eastern part of the Minto Flats is relatively wet, and would probably be used by wood bison primarily during winter (Gardner 2007). Gas development would be regulated by the Alaska Department of Natural Resources (DNR).

There is little potential wood bison habitat south of the Tanana River, and development activities in this area would have little or no effect on bison. Development in the southeastern portion of the MFSGR could have a minor effect on wood bison by limiting access to winter habitat immediately adjacent to roads and gas wells. Similar to the Yukon Flats, the presence of wood bison on Minto Flats may require designing roads and pipelines to allow passage of wood bison and other wildlife, but this is unlikely to have a significant effect on oil development activities.

Alternative C – Lower Innoko–Yukon River Area: The Donlin Creek gold project is located 19 kilometers (12 miles) north of the Kuskokwim River and the community of Crooked Creek. The project would be accessed by road from Crooked Creek. The leased area includes 42 square miles of uplands located about 65 miles southeast of Shageluk, and 30–40 miles east of the expanse of potential wood bison habitat near the lower Innoko–Yukon River. The possibility of building a pipeline to transport liquefied propane from the Yukon River near Holy Cross to the mine site has been considered, but now appears to be unlikely. It is also possible that access roads could extend west and north of the mine in the future (M. McLean, DNR/Office of Habitat and Permitting, personal communication).

The proposed development of the Donlin Creek mine would not occur in or near the potential wood bison habitat in the lower Innoko–Yukon River area, and would have no foreseeable effect on bison. Similarly, bison would have no effect on the Donlin Creek gold project.

There is potential for additional mineral development in the Flat Mining District, north of Donlin Creek. If that were to occur there may be a need for a road to extend west to the Yukon River and that road might be located in possible wood bison habitat. It is unlikely that development in potential wood bison habitat would be extensive enough to adversely affect bison.

Economics. A preliminary economic cost–benefit analysis based on the Yukon Flats example was completed by Stephenson and Fix in 2005. This example can be generally extrapolated to all three potential wood bison restoration sites. Under one scenario (shown in Table 6), over a 25-year period wood bison restoration would bring an estimated \$10,283,500 in new money into the state. Additionally, it was estimated that \$3,533,500 would move within the state into the local region where restoration occurred (Table 6). This analysis was modeled primarily on the characteristics of a Yukon Flats restoration effort, and did not attempt to quantify indirect economic effects. It also did not attempt to estimate costs or benefits that would accompany long-term environmental research or monitoring. In the scenario illustrated below, it was assumed that an initial bison harvest occurred 13 years after release, and that over a 13-year period, 2,147 hunters harvested a total of 1,180 bison, with 484 being taken by local hunters, 445 by nonlocal residents and 251 by nonresident hunters.

In total, a project of this nature was estimated to generate about 12.5 to 13.8 million dollars in direct economic effects. The proposed action would require approximately \$2,117,000 for implementation and management costs (Table 7) over the same period. These costs would be offset by the estimated direct benefits over the 25-year period.

Construction of a temporary holding facility could temporarily increase employment levels in local villages. The facility would not affect community characteristics given its temporary nature. The proposed action would not affect public facilities, utilities, transportation systems, or services. Although not included in the analysis used in this example, local communities could derive additional economic benefits from contracting and forming local partnerships that would create opportunities for local participation in wood bison management and research.

TABLE 6 Estimated direct monetary effects from wood bison restoration

Activity	Calculation	Amount	Comments
<u>New money into Alaska:</u>			
Hide sales; assumes about half (500) are tanned or dried and sold and one-quarter are sold outside state; average price \$500	250×500	125,000	Sales of tanned or raw bison robes
Guiding and outfitting; 240 <u>nonresident</u> hunts @ \$15,000 each (guide fees plus local travel, equipment, expenses)	$240 \times 15,000$	3,600,000	
Nonresident tag fees	289×1000	289,000	
Nonresident drawing permit fees	$14,450 \times 10$	144,500	
Tourism; 50 ecotourists/year spending \$2,000 each	$50 \times 2,000 \times 25$	2,500,000	
Aerial sightseers, 400 nonresident/year @ 100	$400 \times 100 \times 25$	1,000,000	
Arts and crafts associated with wood bison; \$5,000/year out of state	$5,000 \times 25$	125,000	Sketches, paintings, beadwork, clothing and other items made from bison hide
Grants to Tribal Governments, Universities and agencies averaging 100,000/year	$100,000 \times 25$	2,500,000	For population, habitat, historical and environmental research, and cultural and educational activities (could offset other programs and not be additive)
Subtotal		10,283,500	
<u>New money into region or money moving within state:</u>			
Harvest of 1,180 bison over 25 years (beginning at low level in year 13; providing 590,000 lb of meat)	$1,180 \times 500 \times 6 \times 0.8$ minus \$1,180,000	1,652,000	Replacement value at \$6 per pound. Assumes that nonresident hunters would not realize a replacement benefit in terms of out-of-state food costs, but would donate meat to Alaskans; that 20% of the meat would have been obtained from other sources (replacement factor); and that the average cost of harvesting a bison is \$1,000
Access fees for nonlocal resident hunters using private land; (75% of 890 nonlocal hunters)	$667 \times \$500$	333,500	Includes both successful and unsuccessful hunters
Outfitting/transporting for nonlocal residents (i.e., air taxi, snowmachine and boat rental); 33% of 890 hunts = 295	$295 \times \$1,000$	295,000	Includes both successful and unsuccessful hunters
Lodging, food, fuel purchased in local communities; nonlocal resident hunters; (890 hunters spending an average of \$500 each)	890×500	445,000	Includes both successful and unsuccessful hunters
Hide sales; assumes about half are tanned or dried and sold and one-quarter are sold inside state	250×500	125,000	Sales of tanned or raw bison robes
Drawing permit fees; resident	$30,800 \times 10$	308,000	
Aerial sightseeing passengers, 100 residents/year @ 100	$100 \times 100 \times 25$	250,000	
Arts and crafts associated with wood bison; \$5,000/year in state	$5,000 \times 25$	125,000	Sketches, paintings, and beadwork, clothing and other items made from bison hide
Subtotal		3,533,500	
TOTAL		13,817,000	

TABLE 7 Estimated implementation and management costs that could be incurred by the State of Alaska and project contributors

Activity	Est. cost (\$)	Comments
Planning for Fort Yukon project and NEPA documents	55,000	Could be as high as \$100,000 depending on level of NEPA compliance needed
Implementation cost	162,000	Temporary holding facility, transporting bison, etc.
Personnel costs for implementation;	150,000	
Basic population monitoring – 30,000 annually (25 yr)	750,000	Postcalving and late winter surveys, periodic radiotracking
Personnel/Administrative 6 months salary, \$40,000/year	1,000,000	
Total	2,117,000	

Alternative A – Yukon Flats — Villages shown in Table 8 are potential locations for the initial temporary bison holding facility on the Yukon Flats. All villages shown in Table 8 have high poverty rates, ranging from 11.1 to 52.6%. The villages are predominantly Alaska Native but include a number of Caucasian residents. The average household income ranges from \$11,250 to \$28,750, with populations of between 28 and 84 individuals (Table 8). In view of the estimated direct economic effects associated with wood bison restoration, the average household income should increase and the percentage of individuals below the poverty level should decline.

TABLE 8 Economic profile for villages at potential release sites on the Yukon Flats

Village ^a	Population	% Individuals below poverty level	Race	Average household income (\$)	% Individuals not in labor force
Beaver	84	11.1	85.7% AK Native, 4.84% White	28,750	22.1
Birch Creek	28	37	100% AK Native	11,250	88.9
Chalkyitsik	83	52.6	97.6% AK Native, 2.4% White	16,250	63.8

^a Information obtained from U.S. Census Bureau, Census 2000.

Alternative B – Minto Flats — The village of Minto has a strong reliance on resources in the Minto Flats area, and is a potential location for a temporary bison holding facility that would be needed for a Minto Flats restoration project. Minto is a predominantly Alaska Native village, and has an average household income of \$21,250, with 26.4% of individuals below the poverty level (Table 9). The monetary effects expected for the Minto region would be similar to those estimated for the Yukon Flats, although they would likely be smaller because of the more limited amount of habitat and smaller bison population. As on the Yukon Flats, the average Minto

household income should increase and the percentage of individuals below the poverty level should decline as a result of a restoration effort.

TABLE 9 Economic profile for the village at the potential release site on Minto Flats

Village ^a	Population	% Individuals below poverty level	Race	Average household income (\$)	% Individuals not in labor force
Minto	258	26.4	91.9% AK Native, 7.8% White	21,250	60.3

^a Information obtained from U.S. Census Bureau, Census 2000.

Alternative C – Lower Innoko–Yukon Area — Two villages within the lower Innoko–Yukon River area are potential sites for a temporary bison holding facility. Shageluk and Holy Cross are predominantly Alaska Native villages, and have an average household income between \$21,875 and \$26,667, with between 16.2 and 45.6% of residents below the poverty level (Table 9). Because of the projected long-term monetary effects of wood bison restoration, the average household income in these communities should increase. As in other areas, the percentage of individuals below the poverty level should decline.

TABLE 10 Economic profile for villages at potential release sites in the lower Innoko–Yukon River area

Village ^a	Population	% Individuals below poverty level	Race	Average household income (\$)	% Individuals not in labor force
Shageluk	129	16.2	96.9% AK Native, 3.1% White	26,667	18.4
Holy Cross	227	45.6	96.5% AK Native, 3.5% White	21,875	52.7

^a Information obtained from U.S. Census Bureau, Census 2000.

SUMMARY OF CUMULATIVE IMPACTS

Because few, if any, adverse environmental impacts are expected at any of the individual sites, the anticipated level of cumulative effects, in particular those that might be regarded as negative, are very limited. The areas currently being considered for wood bison restoration include a small proportion of Interior Alaska (a total of a few thousand square miles), bison population sizes would be limited based on habitat and other considerations, and there would be ongoing population monitoring in place, along with mitigation measures if needed. Restoring wood bison populations in two or more areas would result in increased costs, as well as increased economic and ecological benefits. The cumulative effects can be summarized as follows:

Water Quality/Fisheries

As described above, wood bison are likely to have little effect on water quality or fisheries at any of the proposed sites, in part because of the large expanses of habitat available, low bison population densities, and the abundance of water sources. Potential effects would be extremely small and difficult to measure, and cumulative effects at two or more restoration sites would be minimal.

Vegetation

The beneficial effects of the resumption in use of meadow habitat by a grazing herbivore would be multiplied as a result of bison restoration in more than one area. The reduction in dead plant material and increased nutrient cycling would increase plant productivity and diversity over a larger area.

Waterfowl/Wildlife

The effects of wood bison restoration on waterfowl, furbearers, small birds and mammals, and on moose and other ungulates are predicted to range from nonexistent or minor to beneficial. No significant negative effects are expected, and there would likely be a mix of cumulative effects ranging from minor to beneficial.

Recreation and Hunting and Trapping

Opportunities for hunting, viewing, photography, tourism, culture and aesthetics would increase as a result of bison restoration at two or more locations. With increased opportunities for all users, there should be fewer conflicts over allocation of harvest, crowding or other social issues.

Cultural Resources

Because no impacts to historic properties are anticipated at any of the sites, there would be no cumulative impacts involved in restoring wood bison at two or three of the potential sites. In addition, further consultation with the State Historic Preservation Officer will occur prior to construction of any temporary facilities to ensure that cultural resources are not adversely affected.

Resource Development

Because wood bison are adaptable, their presence is not likely to cause significant effects on other resource development projects. This would not change significantly if wood bison were restored in one, two or all three potential sites. The main concern expressed about adverse impacts to other resource development is the possibility of wood bison populations in Alaska becoming listed under the ESA. While this appears to be unlikely, an action to list wood bison in Alaska under the ESA could result in cumulative impacts to resource development from all sites where wood bison are restored. Even if a listing of wood bison were to occur, there are provisions in the act and FWS regulations and policies that could be applied to allow for both wood bison restoration and other developments to proceed.

Economics

Restoring bison in two or more locations would require a greater level of funding for implementation and management by the State of Alaska and project contributors. The estimated direct beneficial monetary effects would also increase, and could be approximately two or three times the level estimated for the Yukon Flats. Given the generally similar nature of implementation activities at the three locations, project costs and monetary benefits would be generally comparable.

CONCLUSIONS ON POTENTIAL ENVIRONMENTAL EFFECTS

A qualitative summary of the potential physical, biological, land use and economic impacts associated with Alternatives A, B, C, and D is provided in Table 11, based on the evaluation and analysis presented above. The environmental effects of restoration at the three alternative sites are similar. The Yukon Flats is the most favorable site overall because of the extensive high-quality habitat that could support a large herd of wood bison that could make a greater contribution to maintaining the genetic diversity of the subspecies. The lower Innoko–Yukon River area ranks second because of its large amount of habitat, but there continues to be some concern about the effect of spring floods in the lower Innoko drainage. The Minto Flats area might rank slightly lower than Alternative A and C, but only because it includes a relatively small amount of habitat and the population would probably have to be limited to about 500 animals. Larger populations could be supported in the other two areas. Table 11 does not include an analysis of the effects of restoring wood bison at all three potential sites. However, this would result in the greatest positive effect in terms of wood bison conservation, biological diversity, and socioeconomic benefits.

The analysis concludes that wood bison restoration would have no significant impact on resources at any of the potential restoration sites. Effects on other species and the environment would be nonexistent, minor, or beneficial. Beneficial socioeconomic effects would result on local, regional, and statewide levels.

TABLE 11 Summary of potential environmental effects of wood bison restoration for the four alternatives considered

Category	Alternative A – Yukon Flats ^a	Alternative B – Minto Flats ^a	Alternative C – Lower Innoko–Yukon River ^a	Alternative D – No action alternative
Habitat quality and quantity	excellent	good quality-limited quantity	good	n/a
Potential contribution to bison conservation	high	limited	high	none
Local public support	high in the past	unknown/developing	unknown/developing	low
Effect on water quality	minor	minor	minor	none
Effect on soil quality	beneficial	beneficial	beneficial	lost potential benefits
Effect of climate on bison	beneficial	beneficial	beneficial	n/a
Effect of floods on facilities	none	none	none	n/a
Potential effect of floods on bison and habitat	low	low	short term local effect	n/a
Effect on trap lines	minor	minor	minor	n/a
Effect on hunting activities	beneficial	beneficial	beneficial	lost potential benefits
Effect on fisheries	minor	minor	minor	n/a
Effect on vegetation	beneficial	beneficial	beneficial	lost potential benefits
Effect on endangered species	none	none	none	n/a
Effect on waterfowl	minor	minor	minor	n/a
Effect on moose	minor	minor	minor	n/a
Effect on caribou or Dall sheep	none	none	none	n/a
Effect on furbearers:	none	none	none	no effect
Effect on small birds/mammals	beneficial	beneficial	beneficial	lost potential benefits
Effect on predator/prey interactions	minor	minor	minor	none
Effect on agriculture	none	minor	none	none
Effect on resource development	none	none	none	none
Effect on air quality	minor	minor	minor	none
Effect on subsistence	beneficial	beneficial	beneficial	lost potential benefits
Economic effects	beneficial	beneficial	beneficial	lost potential benefits

^a Where predicted effects could be either nonexistent or minor, they have been classified as minor in this summary.

SECTION 6: ANALYSIS OF ENVIRONMENTAL REVIEW SCOPING LETTERS

Beginning in July 2005, Hunter Environmental Associates, Inc. sent scoping letters to governmental agencies, village corporations and village councils in the three areas being considered for wood bison restoration. The letters requested consultation and input on the permitting requirements for reestablishing a wood bison herd and the temporary facilities that would be required. HEA conducted follow-up consultation with some governmental agencies to clarify the request in the scoping letter and agency permitting requirements and policies. There was no large scale effort to solicit scoping comments from the general public and organizations with an interest in wood bison restoration. Instead, in summer 2005 the WBAG meetings and *Wood Bison News* provided a forum for general public comment.

Representatives of some of the governmental agencies that participated in the WBAG meetings provided written comments similar to information presented during the meetings. Some village council representatives in the Minto Flats and lower Yukon–Innoko River areas, where less information and discussion about wood bison restoration has occurred, seem to have interpreted the scoping letters to imply that the project was going to proceed quickly without much consultation with local residents, causing some people to indicate initially that they did not support the project. Follow-up letters were sent to the Minto and Manley Village Councils. The project was later discussed at the Minto–Nenana, Manley–Tanana–Rampart, and Grayling–Anvik–Shageluk–Holy Cross Fish and Game advisory committee meetings and each committee voted to support the project. In contrast, no responses were received from individual village councils on the Yukon Flats, perhaps because they have expressed support for wood bison restoration numerous times over the last 15 years and may not have felt the need to add to their existing record of support. CATG provided a detailed letter that clearly articulates support for wood bison restoration on the Yukon Flats.

This analysis provides a summary of the substantive comments and/or concerns identified in the letters that were received and ADF&G’s responses to the issues raised. Appendix E includes a table showing the distribution of scoping letters, a sample of the HEA scoping letter and copies of all letters received. Section 7 of this report provides a description of all permitting requirements that have been identified through these scoping letters or elsewhere, as well as a more detailed analysis of some agency legal mandates and policy interpretations that may affect wood bison restoration.

ALASKA DEPARTMENT OF FISH AND GAME, DIVISION OF SPORT FISH

Division of Sport Fish is responsible for management of the MFSGR, in cooperation with DNR. The memorandum received from the Division of Sport Fish outlines the relevant goals and policies for the MFSGR. The MFSGR was established to ensure the protection and enhancement of habitat, conservation of fish and wildlife, and continuation of hunting, fishing, trapping, and other compatible uses. Management objectives provide for enhancement of hunting, fishing, and trapping opportunities when consistent with the conservation of fish and wildlife habitat and populations (ADF&G 1992). No permit from ADF&G is necessary if a temporary holding facility for wood bison is constructed outside of the MFSGR. A Land Use Permit will be required from DNR/Division of Mining, Land and Water, if a facility is constructed on state lands. Refuge policies require that “harmful” disturbance to fish and wildlife be minimized.

Permits for the project would include stipulations relating to monitoring and mitigating impacts. For example, MFSGR contains high quality waterfowl habitat and monitoring for potential impacts on waterfowl should be addressed. The memo concludes with the statement that “based on background research compiled by the Wood Bison Restoration Advisory Group the proposal appears to be compatible with the purposes for which the refuge was established.”

Response: DWC would work closely with the Division of Sport Fish and DNR, as well as Native landowners, to coordinate the development of a restoration effort in the Minto Flats area. Temporary facilities necessary to establish a herd would most likely be located on Hee-Yea-Lingde Corporation (Minto village corporation) lands. Whether required by permits or not, DWC will develop a monitoring and mitigation plan that would be based on advice from a variety of scientists and others with expertise in relevant fields. However, based on the knowledge of wood bison ecology and management, DWC foresees little potential for any harmful disturbance to fish and wildlife in the Minto Flats area, and agrees with the preliminary conclusion in the letter from Division of Sport Fish that wood bison restoration is compatible with refuge purposes.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION, ALASKA STATE VETERINARIANS OFFICE

The Office of the State Veterinarian has the responsibility to regulate the importation of animals into Alaska to prevent the introduction and spread of infectious and contagious diseases. Dr. Robert Gerlach provided information on diseases of concern at the April 2005 WBRAG meeting. In his letter he outlines the disease testing and health certification requirements in the Alaska Animal Health Regulations (18 AAC 36.005–36.930) and discusses the procedures necessary for restoring wood bison in the wild. He recommends that wood bison stock brought into Alaska be confined for an extended period to allow for repeated examination and diagnostic testing.

Response: ADF&G will continue to work closely with the state veterinarian to complete disease testing of wood bison stock in Canada and meet health certification requirements prior to import, and to conduct additional testing after the animals are in Alaska to ensure animal health prior to release into the wild. In addition, ADF&G is developing a cooperative agreement with AWCC to create a bison holding and handling facility that can be used to monitor wood bison health status prior to release. Section 7 provides additional details on disease testing and animal health certification procedures.

ALASKA DEPARTMENT OF NATURAL RESOURCES, OFFICE OF HABITAT MANAGEMENT AND PERMITTING

The Office of Habitat and Management Permitting (OHMP) has the specific statutory responsibility for protecting freshwater anadromous fish habitat (Anadromous Fish Act, [AS 41.14.870](#)) and providing free passage for anadromous and resident fish in freshwater bodies (Fish Way Act [AS 41.14.840](#)). In addition to permitting duties, OHMP coordinates with other agencies during plan reviews to provide expertise for protecting important fish and wildlife habitat throughout the state.

Their letter indicates “OHMP supports the proposed reintroduction and believes it will increase habitat and ecosystem diversity while providing enhanced socioeconomic benefits.” After reviewing the project description they indicated that all practicable measures to reduce wetland

and habitat impacts have been incorporated and no permit authorizations from OHMP are required.

Response: None required.

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF AGRICULTURE

The Division of Agriculture has no specific concerns or permitting jurisdiction over any of the proposed release sites for wood bison. However, the division would be concerned about bringing any animals into the state, for the purpose of creating a wild population, if they posed a threat to other wildlife and/or livestock on any of the alternative site locations. Their letter provides a reminder of the need to work with the Alaska State Veterinarian's Office.

Response: None required.

DEPARTMENT OF NATURAL RESOURCES, DIVISION OF PARKS AND OUTDOOR RECREATION

Since the proposed restoration sites do not involve any units of the state park system, DNR/Division of Parks and Outdoor Recreation chose not to be involved in this process.

Response: None required.

ALASKA DEPARTMENT OF NATURAL RESOURCES, OFFICE OF HISTORY AND ARCHEOLOGY

Under the National Historic Preservation Act the State Historic Preservation Officer is responsible for participating in the review of federal, state, and local undertakings that may affect historic properties (Section 106 review).

Two letters were received from the Office of History and Archeology. The final letter indicates that although there are no reported archeological sites or areas of medium to high archaeological potential in areas where remote temporary holding facilities might be located, it would be advisable to consult with this office once the exact location for a facility has been selected. The State Historic Preservation Officer concurs with ADF&G's preliminary finding of No Historic Properties Affected.

Response: ADF&G will, as requested, consult with the Office of History and Archeology before initiating construction of a temporary facility at any of the potential restoration areas in order to confirm that the project will not affect listed cultural sites.

ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

The Alaska Department of Transportation and Public Facilities had no objections to the proposal and stated that no permitting will be required provided there are no improvements made within a road right-of-way.

Response: None required.

U.S. ARMY CORPS OF ENGINEERS (USACE)

The USACE regulates dredge and fill activities that take place in wetlands under Section 404 of the Clean Water Act. A USACE permit is required for any activity resulting in the mechanized land clearing or placement of fill in wetland areas.

Initially the USACE indicated that the project description did not have locations specific enough for them to determine if the project involved wetlands under their jurisdiction. When more detail was provided by HEA the USACE concluded that the proposed project would not require a Department of the Army permit. The USACE requests that, if the DWC alters the method, scope or location of the proposed activity, they should be contacted again to make another jurisdictional determination.

Response: If changes are made in the location, design or construction of temporary facilities, DWC will ask for additional review by USACE and apply for the appropriate permits, if necessary.

U.S. DEPARTMENT OF AGRICULTURE

As part of the Animal and Plant Health Inspection Services mission of protecting American agriculture, the USDA is charged with regulating the import and export of animals, animal products and biologics.

The scoping comments received from USDA noted the final rule by the Animal and Plant Health Inspection Services, published January 4, 2005, entitled "Bovine Spongiform Encephalopathy; Minimal-Risk Regions and Importation of Commodities." The current rule does not allow importation of breeding bovines (cattle or bison), sheep, or goats from Canada (Appendix E). However, a revised regulation that, with some modification, would allow the import of wood bison was proposed by USDA in January 2007. In addition, the existing regulation allows the Animal and Plant Health Inspection Services to make exceptions.

Response: ADF&G is aware of the regulations described, and the fact that importing wood bison stock into Alaska from Canada for breeding purposes will require either a change in the current bovine import regulations or obtaining an exemption. ADF&G will follow developments related to the changes in import regulations proposed in 2007, request that the proposed regulation be modified to specifically allow the import of bovines from Canada to Alaska, and if a suitable new regulation is not adopted will consider applying for a permit to import wood bison. ADF&G is aware of other USDA import requirements that are not mentioned in the USDA letter. These requirements will be met by following the appropriate disease testing protocols prior to import, and by coordinating disease testing with the Canadian Food Inspection Agency and Environment Canada, Parks Canada Agency, or the appropriate provincial or territorial government. Except for the federal regulation relating to BSE, it appears that federal import health certification requirements are similar to, and will be met, by satisfying the requirements of the State of Alaska.

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

The letter from BLM outlines their policies and procedures related to the reintroduction of native species. The letter states "The State of Alaska, Department of Fish and Game has determined wood bison occurred historically in areas of Alaska which reintroduction has been proposed. BLM generally considers it the responsibility of the state wildlife management agency to determine most wildlife related actions such as species reintroductions."

While BLM generally regards wildlife management as primarily the responsibility of the state wildlife management agency, they are required to evaluate impacts on subsistence (Section 810

evaluation), and their policies require an amendment to their land use plan, if that plan does not address reestablishment of a population of wildlife within the planning area. The letter indicates that the only restoration site where a significant amount of BLM land occurs is the lower Innoko–Yukon River area. The current Management Framework Plan for that area does not address wood bison restoration; however, BLM is scheduled to begin preparing a Resource Management Plan for the area in 2008. BLM lands in the Minto area have been selected under the Alaska Native Claims Settlement Act and are scheduled to be conveyed in the next year. NEPA compliance would be required if holding facilities and supplemental feeding occurred on BLM lands, and BLM would be concerned about the possibility of introducing invasive plant species through supplemental feeding.

Response: ADF&G will work closely with BLM to coordinate any restoration activities in areas where wood bison might eventually occur on BLM lands, and provide information as needed to assist BLM in revising its management plans as necessary. Prior to release into the wild, wood bison stock would be fed certified weed-free hay to minimize the potential threat of introducing non-native plant species. Because of the pattern of landownership in the lower Innoko–Yukon River area and logistic considerations, a temporary holding facility on BLM lands would not be required. A release facility would be located on private lands near an airstrip at one of the local communities. As noted in the letter from BLM and in the section on NEPA regulations below, NEPA compliance would not be required. The information in this review could eventually be cited in BLM's revised 2008 Resource Management Plan for the lower Innoko–Yukon River area to help evaluate the possibility of bison eventually occurring on BLM lands.

U.S. FISH AND WILDLIFE SERVICE

The written response received from the former FWS Alaska Regional Director, states that “the Service would strongly prefer that the initial proposed wood bison introduction occur on the Minto or Innoko locations.” The letter also indicates that close monitoring of wood bison and other wildlife and habitats would provide important information that would help evaluate the appropriateness and desirability of reestablishing wood bison in other areas. Lastly, the letter states that the Alaska Region concurs with the view “that the listing of wood bison in Canada under the Endangered Species Act does not need to be modified to add an imported population of wood bison in Alaska as endangered or threatened. We intend to treat any wood bison imported into Alaska as a foreign listed species and have no intention of revising the list so that they are listed domestically.” More recently, the current Regional Director reaffirmed parts of the previous scoping letter and also further clarified the FWS position regarding wood bison restoration on the Yukon Flats. This letter states “While the Service prefers wood bison restoration in a sequential approach and learning from actions taken on Minto Flats before advancing to other areas, our concerns are *not* sufficient to object to your proposal to pursue reintroduction of wood bison onto *private lands* in the Yukon Flats...If you choose this approach, we will accept your offer to cooperatively develop management and development plans.” (Emphasis in original, see letter by FWS dated November 2, 2006 in Appendix E).

Although the matter was not included in their scoping comments, FWS has since noted that they will begin an update of the YFNWR Comprehensive Conservation Plan (CCP) in 2008. The topic of wood bison restoration on Yukon Flats will likely be discussed and further addressed in

that plan. The CCP for the Innoko NWR is currently being updated and wood bison restoration is being taken into consideration.

Response: If ADF&G proceeds with consideration of wood bison restoration on private lands on the Yukon Flats, we will continue to work with the FWS and public stakeholder groups with an interest in Alaska's wildlife and National Wildlife Refuge land management to evaluate wood bison restoration on the Yukon Flats. If a citizen's planning team recommends moving forward with wood bison restoration on private lands on the Yukon Flats, ADF&G will work with FWS to ensure the project is coordinated with refuge management activities. ADF&G will also participate in the process to update the YFNWR CCP and assist in providing information on wood bison restoration, as is currently being done with the update of the Innoko NWR CCP. More complete reviews of the issues that have been raised by FWS in the past and discussion of pertinent FWS legal mandates and policies is included in Section 7 of this report.

COUNCIL OF ATHABASCAN TRIBAL GOVERNMENTS

CATG is the regional, consortium government and nonprofit service provider representing tribes in the upper Yukon River area. Their letter articulates the support for wood bison restoration on Yukon Flats by CATG and their member tribes and notes their Board of Directors has designated the project as a high priority for their Natural Resources Department. They cite a variety of reasons for the project being a high priority including:

- ◆ A more reliable and diverse supply of subsistence foods for local communities.
- ◆ Wood bison have been of great spiritual, cultural and historical significance to the people of Yukon Flats.
- ◆ The project has international significance and would help to secure the long-term survival of wood bison.
- ◆ Restoration of wood bison would help to enhance the biological and habitat diversity within the Yukon Flats.
- ◆ Wood bison restoration would encourage development of local economies based upon renewable resources.
- ◆ The project allows for a unique and historical partnership among entities with different backgrounds and philosophies to work towards the common goal of wood bison restoration.

The letter goes on to state that local communities on the Yukon Flats are interested in working as partners to establish temporary holding facilities on their lands. They support the recommendations of the WBRAG to move forward expeditiously in developing wood bison restoration programs in all three areas. The letter indicates they would oppose any effort to remove or postpone consideration of the Yukon Flats site and "think it would be unfair considering the effort our elders, tribal governments and other residents have made to build the restoration effort, the fact that Yukon Flats has a much lower moose population than the other

areas, and also because the amount of high quality wood bison habitat is superior to the other areas.”

Response: ADF&G recognizes the long-standing interest and active participation of CATG in wood bison restoration on Yukon Flats. ADF&G intends to work closely with CATG, local tribal governments and others in any additional wood bison planning and implementation activities for the Yukon Flats.

DELOY GES, INC.

Deloy Ges, Inc. is the village corporation for Anvik in the lower Yukon–Innoko River area. Their letter states they support the reintroduction of wood bison into their area and have no issues at this time with wood bison grazing on their land.

Response: none required.

DELOYCHEET, INC.

Deloycheet, Inc. is the village corporation for Holy Cross on the lower Yukon–Innoko River area. An email received from Deloycheet representatives indicates they are interested in the wood bison reintroduction project and that more information and continued dialog would benefit their corporation and people in the region.

Response: Deloycheet and all the village corporations in areas proposed for wood bison restoration will be provided copies of this ER. If the project proceeds to site-specific planning in their area there will be several additional opportunities for dialog. If their lands were proposed as a location for construction of a temporary holding facility for wood bison, ADF&G would seek to develop a cooperative agreement with Deloycheet.

HOLY CROSS TRIBAL COUNCIL

A letter was received from the Holy Cross Tribal Administrator expressing concerns about the possible wood bison restoration project. The main concern identified was the need for input from community members since the project would affect the entire community. They requested a copy of the report on the environmental impact on the area used for the project.

Response: The Holy Cross Tribal Council will be provided with a copy of this report and there will be several additional opportunities for community input before any actions would be taken to restore wood bison in the lower Innoko–Yukon River area. After this letter was received, ADF&G staff provided an informational presentation on wood bison at the Grayling–Anvik–Shageluk–Holy Cross Advisory Committee and the committee unanimously endorsed the project. ADF&G recognizes that further efforts to discuss the wood bison restoration project with residents of local communities are needed.

MINTO, NENANA, AND MANLEY HOT SPRINGS VILLAGE COUNCILS

ADF&G received telephone calls and/or emails from representatives of the Minto, Manley Hot Springs, and Nenana Village Councils requesting more information and expressing interest, or in the case of Manley Hot Springs and Nenana, expressing concerns about wood bison restoration. An initial email from the Manley Hot Springs Tribal Council stated that the council had voted “no” on the project because there were too many questions. They wanted to know what kind of

hunting regulations would be used, if the landowners all agreed, what kind of affects there would be on vegetation and animals and what subsistence hunting rights there would be. They indicated more studies are needed to answer these questions.

Response: As mentioned in the introduction to this section, some village councils may have been surprised by the direct request in the scoping letters for comments about permitting wood bison restoration facilities near their communities, when they had little prior opportunity to learn about the project and discuss issues of concern. The Minto, Nenana, and Manley Village Councils will be provided with a copy of this report and there will be several additional opportunities for community input before any actions would be taken to restore wood bison in the Minto Flats area. After this letter was received ADF&G staff provided an informational presentation on wood bison at the Minto–Nenana and Tanana–Manley–Rampart advisory committees and both committees unanimously endorsed the project. ADF&G recognizes that further efforts to discuss the wood bison restoration project with residents of local communities are needed.

SECTION 7: PERMITTING REQUIREMENTS AND ENVIRONMENTAL AND WILDLIFE LAW AND POLICY REVIEW

This section summarizes the basic permitting requirements for wood bison restoration and provides a detailed review of federal and state environmental laws and policies that must be considered as part of the wood bison restoration project. Issues related to pertinent laws and policies that are reviewed in this section include: 1) ESA considerations, 2) ensuring wood bison restoration is done in compliance with NEPA, 3) a review of Alaska National Interest Lands Conservation Act and an analysis of the issues raised by FWS regarding the possibility that the presence of wood bison on refuge lands (Yukon Flats) might not be compatible with FWS policies, 4) the need for wood bison restoration programs that might involve BLM lands to be addressed in their land use plans, 5) completion of the review of wood bison restoration under the ADF&G Wildlife Transplant Policy, and 6) Animal Health Certification by the Alaska State Veterinarian and USDA.

The Native village corporations that responded to scoping letters did not mention specific land use permitting requirements for possible wood bison restoration activities on their lands. Nonetheless, as further planning and consultation occurs, ADF&G intends to comply with all private land use permitting requirements and hopes to establish formal agreements with private landowners regarding activities related to wood bison restoration and/or long-term management activities that would occur on privately owned lands.

PERMITTING REQUIREMENTS

CITES Export Permit

The State of Alaska will be required to obtain an export permit from the Canadian Wildlife Service because wood bison are listed on Appendix II, Convention in International Trade in Endangered Species and Wild Flora and Fauna (CITES). There should be no difficulty in obtaining the CITES Export Permit. ADF&G will apply for a CITES Export Permit a few months before an export of wood bison from Canada is expected to occur.

Endangered Species Import Permit

Wood bison are classified as “threatened” on Canada’s list of species at risk, having been downlisted from endangered status in 1988. However, because they are currently classified as “endangered”... “in Canada” on the U.S. Endangered Species list, the state must apply to FWS for an Endangered Species Import Permit, which would allow the importation of wood bison stock in connection with restoration efforts. This requires a finding that the activity would enhance the survival of the species in the wild. It may also require some level of NEPA documentation. ADF&G submitted an application for an ESA Import Permit in March 2007.

DWC Animal Welfare Policy/Assurance of Animal Care

All management actions and research involving handling live animals must undergo review as per the DWC Animal Welfare Policy. An “Animal Care and Use Committee Assurance of Animal Care Form” must be completed and submitted to the Animal Care Use Committee at least six weeks prior to the date that wood bison would be transported from Canada to Alaska and any other activities involving the handling of live animals. This application was submitted in 2006 and has been approved by the committee.

State Historic Preservation Office Consultation

HEA submitted A Cultural Resource Section 106 consultation request to the State Historic Preservation Officer on behalf of ADF&G. Based on their review of the proposed project and site locations, the State Historic Preservation Officer concurs with the preliminary finding of “No Historic Properties Affected.” ADF&G will consult with the Office of History and Archeology before initiating construction of temporary facilities at a specific site in any of the potential restoration areas as requested to confirm that the project will not affect listed cultural sites.

Alaska Division of Mining, Land, and Water Land Use Permit

If there is a need for construction of any temporary facilities for wood bison restoration on state lands, whether on the MFSGR or elsewhere, a state Land Use Permit would be required. Because temporary facilities would likely be located on Native corporation land near a village, a state Land Use Permit is not likely to be needed. If state lands were used for construction of temporary holding facilities significant problems obtaining a permit are not expected because any facilities would be temporary and not cause any permanent environmental effects. If a state Land Use Permit does become necessary, ADF&G will submit an application for the permit with sufficient lead time to allow processing before any activities occur on state land.

Alaska Department of Environmental Conservation Air Quality Permit

Section 5 includes an evaluation of potential air quality permitting requirements. In terms of effects on air quality, a Record of Non-Applicability has been deemed unnecessary based on emissions calculated for chainsaws, generators, or other equipment that might be needed during construction of a temporary holding facility (R. Gesin, DEC, personal communication 2005). None of the proposed alternative site locations are within nonattainment zones for hazardous air pollutants. Based on this analysis, an air quality permit from DEC is not required.

U.S. Army Corps of Engineers, Section 404 Wetlands Permit

Initially, the USACE Regulatory Office indicated that the current proposed actions and alternative sites are not specific enough to conduct a jurisdictional determination. Later, based on additional information provided by HEA, the USACE indicated that the proposed project would not require a Department of Army permit, even for work conducted in wetlands. The project does not entail the use of mechanized land clearing equipment and the following precautions have been incorporated in attempt to minimize fill material in a navigable waterway.

- ◆ Placement of cement blocks to support a 24 feet × 24 feet floating floor on which hay would be stored would be placed during winter and removed by June 15.
- ◆ Fencing pile placement is linear.
- ◆ A mobile camper would be used to house personnel.

Once a specific campsite has been selected and a construction method is chosen, ADF&G will consult with the USACE again to determine whether a Department of Army permit is needed and/or to conduct a jurisdictional determination for the site(s).

ENVIRONMENTAL AND WILDLIFE LAW AND POLICY REVIEW*Endangered Species Act*

Wood bison are currently listed as a “threatened” species under Canada’s Species at Risk Act, which is similar to the U.S. ESA. The Committee on the Status of Endangered Wildlife in Canada downlisted wood bison from “endangered” to “threatened” status in 1988 because Canadian populations of wood bison were recovering. The U.S. Endangered Species list (which includes both foreign and domestic species) currently lists wood bison as endangered “in Canada.” The FWS is considering a proposal to revise the status of wood bison under the ESA to threatened “in Canada,” which would correspond to their current legal status in Canada.

In October 2004, in response to an inquiry from the Commissioner of the ADF&G, the Director of the FWS determined that, if wood bison are restored to Alaska, they would not need to be listed domestically under the ESA (Appendix B). Wood bison brought into Alaska would be treated as a foreign listed species, which means that federal permits would be required for import and export as long as the species remains listed in Canada. As noted in Section 2, wood bison in Alaska would have the same legal status as other resident wildlife, although depending on their status as a foreign listed species (whether they are still listed as endangered or threatened in Canada), it is possible that federal approval of some type may be required in order for a harvest to take place. However, it is still unclear whether federal authorization would be required. FWS indicates they have not previously encountered a similar situation. It is hoped that future discussions with FWS will lead to the development of an efficient authorization process if one is required. If wood bison are downlisted to threatened status “in Canada,” an action likely to occur by the time a harvest of Alaska wood bison would be proposed, obtaining any needed federal authorization to harvest wood bison and/or export trophies should be less difficult. Even if their status under the ESA is not revised, FWS indicates that, if federal authorization is required, provisions can be made to allow harvests that are necessary for herd management. Sections 3 and 7 provide more information on ESA considerations.

Restoring wood bison to Alaska would help to secure the future of the species and, as such, is consistent with the purposes of the ESA. There would be no additional conservation benefit from listing wood bison under the ESA and such an action would likely delay or preclude wood bison restoration. As discussed in Section 3, there are still concerns about potential listing of wood bison under the ESA, due in part, to the provision of the Act that allows the public to file a petition for listing. If a third party filed a petition to list wood bison in Alaska under the ESA, a review of the criteria for listing a species under the ESA suggests that listing would not be warranted. An analysis of the listing criteria as they would apply to wood bison in Alaska follows:

Section 4 (a) of the ESA states “The Secretary shall by regulation promulgated with subsection (b) determine whether any species is an endangered species or a threatened species because of any of the following factors:

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

Discussion: This is not a significant factor in Alaska and northern Canada, but loss of habitat has constrained recovery in the southern part of the species original range in Canada. Although part of the original range of wood bison in Alaska is unavailable because of the presence of introduced plains bison populations, substantial unoccupied high-quality habitat continues to exist. Even if large scale oil development were to occur on Yukon Flats, it would be unlikely to reduce the suitability of this habitat, or the total potential wood bison habitat in Alaska, to a significant degree.

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

Discussion: Wood bison are not currently threatened by overutilization. Although the species was extirpated from Alaska, in part, because of unregulated hunting, reintroduced herds would be protected until they reached a level that could support a closely regulated harvest. It is extremely unlikely that overutilization would be a threat in the future.

(C) Disease or predation;

Discussion: The occurrence of cattle diseases (bovine tuberculosis and brucellosis) is an important factor constraining progress in wood bison conservation in part of their original range in Canada. These diseases are not known to occur in Alaska, and the remote areas where wood bison would be restored are specifically intended to provide a safeguard against exposure to disease. This is one of the key conservation benefits underlying the proposal. There is no indication that wood bison were threatened by disease in Alaska prior to their disappearance, and it is unlikely this would occur in the future. Disease prevention and safeguards would be addressed in both a management plan and in protocols governing importation. Bison populations have historically been subject to predation, primarily by wolves. Healthy bison populations, including initially small founding populations used to reestablish wild herds are not known to be threatened by predation, which is notably rare in populations of 500 or less bison (Gates et al. 2001).

(D) The inadequacy of existing regulatory mechanisms;

Discussion: Regulatory mechanisms would be similar to those used by state and federal agencies to establish and enforce harvest regulations and manage wildlife habitat elsewhere in Alaska. This regulatory regime has been effective in successfully implementing a number of similar reintroductions, and in managing other wildlife populations.

(E) Other natural or manmade factors affecting the species' continued existence.

Discussion: It is difficult to foresee other factors that would negatively affect wood bison in Alaska. Habitat limitations and disease are the major factors constraining the reestablishment of wood bison in parts of their original range in Canada. The Alaska restoration program is specifically intended to restore disease-free wood bison populations in additional parts of their former range, thereby improving the outlook for the long-term existence of disease-free herds and increasing the number of free-ranging bison in herds that are subject to natural selection.

ADF&G has consulted with FWS and others to consider any options that might be available to lessen the chance of wood bison being listed under the ESA. One option considered is developing a "management or conservation plan" that meets the requirements of FWS "Policy for Evaluation of Conservation Efforts When Making Listing Decisions." This policy may be used to "guide the development of conservation efforts that sufficiently improve a species' status so as to make listing the species as threatened or endangered unnecessary." In addition, consideration has been given to the FWS "Interagency Cooperative Policy Regarding the Role of State Agencies in Endangered Species Act Activities" which specifies that FWS utilize the expertise "...of the states in implementing prelisting stabilization actions...to alleviate threats so that the priority is reduced or listing as endangered or threatened is not warranted...". FWS has also developed "No Surprises" agreements that are intended to give private landowners and others a greater level of assurance that changes in ESA policies or interpretations will not restrict other land uses.

FWS ESA staff has recommended that using these policies might be counter-productive because they are intended to apply to species either listed or that have a high potential for listing under the ESA. FWS has already decided that listing is not necessary or desirable. The only mechanism identified that might give complete assurance that wood bison will not be listed under the ESA is congressional action to exempt wood bison in Alaska from listing.

ADF&G intends to continue consultations with FWS, Doyon and others, to try and provide all possible assurances that wood bison restoration will not impact other resource development activities due to some involvement of the ESA in the future. Conceptually, ADF&G would support congressional action to exempt wood bison populations in Alaska from the ESA if there is sufficient public support and it can be accomplished in a way that is not viewed as undermining the ability of the ESA to protect other species of plants or animals in cases where application of the provisions of the ESA will benefit the species. At the same time, ADF&G views the FWS policy decision that wood bison brought into Alaska do not need to be listed domestically under the ESA to be well founded and defensible. The department does not consider congressional action to resolve concerns about the ESA to be an essential requirement for moving forward with wood bison restoration in Alaska.

National Environmental Policy Act

NEPA compliance can be required when a project involves the use of federal money or federal land, constitutes a major federal action, or requires a federal permit. Even if NEPA compliance were not required, conducting this environmental review is beneficial. As NEPA intends, an Environmental Assessment (EA) can serve as a neutral planning document that anticipates and analyzes any significant impacts, permitting issues, and possible mitigations for those impacts. It also serves as a compilation of information from public meetings and correspondence. All this information helps serve as the basis for making wise decisions about wood bison restoration and, if a decision is made to proceed, define what is necessary to move forward with the project with minimal or no adverse environmental impacts.

Obtaining an ESA Import Permit from the FWS may require a NEPA evaluation. Use of federal funds for planning and evaluation of wood bison restoration is excluded from NEPA requirements. If federal funds were used to physically implement wood bison restoration a NEPA review might be required (e.g., if Pitman–Robertson funds disbursed by FWS were used for transplanting wood bison to the wild), although the reintroduction of native species into suitable habitat within their historic range, where no or negligible environmental disturbances are anticipated, is categorically excluded from NEPA as discussed below.

If a project includes a federal action that requires a review under the NEPA process, and a “categorical exclusion” cannot be applied, an EA is required. If this results in a 'Finding of No Significant Impact,' then no further action is required. If potentially significant environmental impacts are identified in an EA or there is significant public controversy about a project, an Environmental Impact Statement may be required.

NEPA allows “categorical exclusions” for specific actions that do not require application of the full NEPA environmental review process. Each federal agency has its own specific list of categorical exclusions, and “exceptions” which preclude the use of a categorical exclusion. If one or more of the exceptions apply, then the proposed action cannot be categorically excluded.

Much of the information in this report (Section 5 in particular) is patterned after an EA that might be prepared to fulfill NEPA requirements. If wood bison restoration moves forward to the point where NEPA compliance is required, much of the information in this report can be used to develop an EA, in cooperation with the appropriate federal agency. In view of the minor and generally beneficial environmental effects of wood bison and the biological monitoring that would occur, it appears that a Finding of No Significant Impact decision may be a likely outcome of an EA. Therefore, it does not appear that wood bison restoration would constitute a major federal action that would require an Environmental Impact Statement. More detail on the specific NEPA regulations that apply to FWS and BLM, including categorical exclusions, are reviewed below.

BLM NEPA Requirements. There do not appear to be any BLM or Department of Interior categorical exclusions that would apply to wood bison restoration if it were implemented on BLM land (see BLM Manual 516 DM 2.3A(3) and 516 DM 2, Appendix 1, 3/8/04). Therefore, if temporary holding facilities for wood bison were constructed on BLM land, an EA would be required. However, if bison were reintroduced on private or state land (which is likely) where

they might eventually roam onto BLM land, it does not appear that NEPA compliance would be required.

FWS NEPA Requirements. The proposed wood bison restoration effort appears to be categorically excluded (see FWS Departmental Manual 516 DM 6, Appendix 1, 1/16/97 and Department of Interior regulations 516 DM 2, Appendix 1 and 2, 3/8/04). Categorical exclusion B(6) in 516 DM 6 Appendix 1 states:

“B(6) The reintroduction or supplementation (e.g., stocking) of native, formerly native, or established species into suitable habitat within their historic or established range, where no or negligible environmental disturbances are anticipated.”

There are two exceptions to categorical exclusion B6 that could potentially apply to wood bison restoration on FWS lands (see Department Manual in 516 DM 2, Appendix 2, 9/26/84). Section 2.2 is quoted below and does not appear to apply to the wood bison restoration project.

“2.2 Have significant impacts on such unique geographic characteristics as historic or cultural resources; park, recreation or refuge lands; wilderness areas; wild or scenic rivers, sole or principal drinking water aquifers, prime farmlands; wetlands (Executive Order 11990); floodplains (Executive Order 11988); or ecologically significant or critical areas, including those listed on the Department's National Register of Natural Landmarks.”

Exception 2.2 indicates that if the project would have any significant impacts to the listed resources or features the categorical exclusion B(6) would not apply and an EA would have to be prepared. As summarized in Table 1, other sections of this report, and scoping comments from other agencies it does not appear that wood bison restoration would have a significant impact on resources at any of the potential restoration sites. Therefore, this exception would not apply, and categorical exclusion B(6) would exempt wood bison restoration on FWS lands from further NEPA documentation. As noted above, restoration efforts would most likely be implemented on nonfederal lands because of logistic considerations.

Exemption 2.8 involves potential adverse effects to threatened or endangered species or critical habitat and states:

“2.8 Have adverse effects on species listed, or proposed to be listed, on the List of Endangered or Threatened Species, or have adverse effects on designated Critical Habitat for these species.”

There are no threatened or endangered species or designated critical habitats in Interior Alaska that could be affected by wood bison. FWS has indicated that should wood bison be restored to Alaska, the ESA would not need to be modified to add the imported population as endangered or threatened, and that FWS does not intend to revise the list to include domestic populations. The restoration would benefit wood bison conservation, and importing bison would have no impact on existing, free-ranging wood bison in the listed population in Canada because stock would be obtained from captive herds. It does not appear that exception 2.8 would apply since there would be no adverse effects on listed species.

If the use of federal funds, the ESA import permit application or other matters require NEPA documentation, ADF&G will work with FWS to complete the necessary EA. This ER was prepared in general conformance with NEPA regulations and could be easily modified to help satisfy those requirements.

Alaska Lands Act and FWS Refuge Management Policies

As previously noted, FWS legal and policy interpretations have had a significant influence on the wood bison restoration project over the years. The history of FWS involvement in considering wood bison restoration on Yukon Flats is reviewed below. This is followed by a review of FWS legal mandates and policies and a discussion of the main issues raised by FWS relative to the purposes of the YFNWR, and the FWS policy on maintaining the biological integrity and natural diversity of the refuge.

History of FWS Involvement in Wood Bison Restoration on Yukon Flats. When the concept of wood bison restoration was first considered on the Yukon Flats, the YFNWR cooperated with ADF&G to evaluate the proposal and consult with local residents. In 1997 the FWS Regional Director for Alaska informed ADF&G that FWS could not support the proposal to restore wood bison on Yukon Flats because of concerns about compatibility with the purposes of the refuge, based on their interpretation of provisions in the Alaska National Interest Lands Conservation Act.

In 2002, ADF&G renewed efforts to seek cooperation from FWS in restoring wood bison in Alaska. In July 2003, ADF&G and FWS completed a joint review of wood bison restoration in Alaska, with an emphasis on the Yukon Flats (Appendix A, Gardner and DeGange 2003). The review concluded that wood bison would be compatible with other Alaskan wildlife, including other big game and waterfowl, and that significant environmental problems are unlikely. Despite these joint conclusions, the FWS did not rescind their 1997 decision to withdraw support for the proposal to restore wood bison on Yukon Flats.

In 2004 DWC staff met with FWS Office of Endangered Species staff to discuss how wood bison brought into Alaska would be classified under the ESA. Subsequently, the Commissioner of ADF&G wrote to the Director of the FWS to request clarification of FWS's view on the status that wood bison brought into Alaska would have under the ESA. The FWS Director responded with a letter indicating that wood bison would be classified as a foreign listed species, that animals brought into Alaska do not need to be listed under the ESA, and that FWS has no intention of modifying the ESA to list domestic populations of wood bison (Appendix B). This policy determination has been quite helpful but, as noted in Section 3, has not resolved all concerns related to the ESA.

During the WBRAG meetings in 2005 the YFNWR Manager restated his position that wood bison restoration is not compatible with the refuge purposes or FWS policy on maintaining the biological integrity of refuges. He emphasized his view that wood bison should not be considered part of the natural biological diversity of the refuge because the existing information is insufficient to conclude that humans contributed to the disappearance of wood bison.

The scoping comments received from FWS in September 2005 when this ER was initiated indicate FWS would strongly prefer that the initial proposed wood bison introduction occur on the Minto or Innoko locations and that the FWS Alaska Regional Director reiterated that an imported population of wood bison in Alaska does not need to be listed as endangered or threatened under the ESA.

In August 2006 the Commissioner of ADF&G wrote to the Director of the Alaska Region of the FWS asking them to reevaluate their position on wood bison restoration on the Yukon Flats and consider rescinding the 1997 letter stating they would no longer cooperate in the project. The FWS Regional Director responded stating “While the Service prefers wood bison restoration in a sequential approach and learning from actions taken on Minto Flats before advancing to other areas, our concerns are not sufficient to object to your proposal to pursue reintroduction of wood bison onto *private lands* in the Yukon Flats...” (Emphasis in original, see letter by FWS dated November 2, 2006 in Appendix E). The FWS understands that if wood bison are restored on private lands in the Yukon Flats, the animals will eventually occur on refuge lands. While the FWS recently stated they do not object to the proposal to restore wood bison on private lands in the Yukon Flats, a discussion of these issues will help the reader understand FWS policies, the relevant historical and biological information, and the extent to which issues have been addressed.

Two key issues raised in the past by FWS and discussed in this section of the ER are:

1. Whether restored populations of wood bison should be considered part of the “natural diversity” of wildlife in the YFNWR, and;
2. Potential for unintended adverse ecological consequences from wood bison restoration and the need for monitoring the effects of wood bison at other sites before proceeding with wood bison restoration on refuge lands.

Overview of FWS Legal Mandates and Policies. The purposes of the YFNWR, as defined in Sec. 302 of Alaska National Interest Lands Conservation Act, are to:

(i) Conserve fish and wildlife populations and habitats in their natural diversity, including, but not limited to, canvasbacks and other migratory birds, Dall sheep, bears, moose, wolves, wolverines and other furbearers, caribou (including participation in coordinated ecological studies and management of the Porcupine and Fortymile caribou herds) and salmon [*emphasis added*];

(ii) Fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) Provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) Ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge.

The FWS policy on Biological Integrity, Diversity and Environmental Health of the National Wildlife Refuge System (2001), adopted under the authority of the Refuge Administration Act, states that the Service intends to manage refuges to restore or maintain composition, structure and functioning of ecosystems comparable to historic conditions. These are defined as conditions that “were present prior to human related changes to the landscape.” Native species are defined as those “that other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.” “The highest measure of biological integrity, diversity, and environmental health is viewed as those intact and self-sustaining habitats and wildlife populations that existed during historic conditions.” The policy states “where practical, we support the reintroduction of extirpated native species. We consider such reintroductions in the context of surrounding landscapes. We do not introduce species on refuges outside their historic range or introduce species if we determine they were naturally extirpated.”

Other organizations have similar definitions which recognize that extirpation by humans is one element that makes a given translocation of wildlife a reintroduction, rather than an introduction. For example, the IUCN Position Statement on Translocation of Living Organisms defines reintroductions as “the intentional movement of an organism into a part of its native range from which it has disappeared or become extirpated in historic times as a result of human activities or natural catastrophe.”

According to the FWS policy cited above, Native species are defined as those “that other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.” (*emphasis added*). Recent correspondence from the FWS states “Information exists to support the environmental review’s conclusion that the Yukon Flats was within the wood bison’s historic range” (Appendix B, letter from Thomas Melius, November 2006). They also state that the cause of extirpation is less clear and that this remains the primary basis for FWS’s position.

Natural Wildlife Diversity and the Causes of Wood Bison Extirpation in Alaska. FWS policy defines “natural diversity” as “the number and relative abundance of indigenous species which would occur without human interference.” The causes for the disappearance of wood bison from Alaska are an important issue in determining whether they should be considered part of the natural diversity of wildlife under FWS policy. If the cause of wood bison extirpation in Alaska was solely a loss of habitat through natural processes, then it would not be appropriate to consider them part of the natural wildlife diversity and restore them to parts of their original range on refuge lands. However, if humans played a significant role in the extirpation of wood bison from Alaska, then it would be appropriate to consider them part of the natural diversity of wildlife and restore them.

Peer reviewed and published scientific literature indicates that humans played a role in the extirpation of wood bison from the Yukon Flats and elsewhere in Interior Alaska, and from adjacent parts of Canada (Stephenson et al. 2001). This conclusion was supported by a technical review conducted by *The Wildlife Society*–Alaska Chapter, which stated “the most likely cause of the extirpation of wood bison was the combined action of declining suitable habitat and unregulated hunting of declining and restricted populations of bison by indigenous peoples” (Griffith et al. 1998). It was also supported by a joint review of the published historical information conducted by FWS and ADF&G (Gardner and DeGange 2003, Appendix A) which

concluded that: 1) wood bison were the last bison subspecies that occurred in Alaska, 2) wood bison persisted in Alaska into the 19th century, 3) wood bison were once an important subsistence resource, 4) the most likely factors causing the extirpation of wood bison from Alaska were habitat changes and harvest and that significant environmental problems are unlikely (emphasis added, see Appendix A).

The study conducted by Stephenson et al. (2001) includes a detailed evaluation of the potential role of predation, hunting, habitat availability, and climate in the decline and disappearance of wood bison. Noting that bison persisted in Alaska for a few hundred thousand years despite dramatic fluctuations in environmental conditions, the study concludes:

The available information supports the conclusion that geographical isolation and hunting were factors that acted in combination and led to the extirpation of wood bison. The discontinuous nature of late Holocene habitat probably played an important, albeit indirect, role while hunting is the most likely proximate factor that reduced numbers and prevented the recovery of subpopulations or recolonization of suitable habitat. Bison have recently prospered in suitable habitat in Yukon and other parts of northwestern Canada, and in Alaska, and we now know that additional suitable habitat exists in Alaska. The recent expansion of wood bison populations demonstrates that earlier declines, and the extirpation of bison in various regions, were not caused solely by changes in habitat.

Some of the factors that led to this conclusion include: 1) the expansion of forests and tundra during the last several thousand years, which limited the best bison habitat to low elevation areas adjacent to major rivers, where human activity was also concentrated; 2) bison populations were isolated from each other, with no refugia from hunting; 3) changes in hunting technology, including the development of archery, during the last few thousand years would have increased the efficiency of hunters; 4) hunters would select for female and juvenile bison and sometimes kill more than one bison in an encounter; 5) alternative big game resources were scarce, and hunting pressure would have been relatively high, even when bison became scarce, because of the high return for the effort; and 6) there is no indication of severe weather or other environmental events that would have extirpated bison over a large region in Alaska and northwest Canada, and no way to explain the disappearance of bison unless hunting was a factor. It is clear that substantial amounts of suitable wood bison habitat continue to exist on Yukon Flats, and may expand in the future as a result of global climate change. There would be no point in pursuing restoration if suitable habitat had dramatically declined or completely disappeared.

Bison are widely regarded as a keystone North American herbivore by wildlife ecologists and biologists (e.g., Knapp et al. 1999; Gates et al. 2001), and wood bison restoration in areas from which the species has been extirpated has been recognized as a “valid intervention,” that is “necessary...to maintain the integrity of the ecosystem, particularly to repair past disturbance” (Arcese and Sinclair 1997). In this case the “disturbance” is the disappearance of a large herbivore due, in part, to unregulated hunting.

A number of conservation and wildlife management authorities and organizations recognize, either explicitly or implicitly, that wood bison are an extirpated indigenous species, that humans likely played a role in their disappearance, and that they are part of the natural diversity of the

Yukon Flats and other areas in Interior and Southcentral Alaska. These include *The Wildlife Society*–Alaska Chapter (Griffith et al. 1998), the Alaska Department of Fish and Game (Appendix F), the International Union for the Conservation of Nature (IUCN)/SSC-Bison Specialist Group-North America and Canada’s National Recovery Team for the Wood Bison (Gates et al. 2001). Wood bison restoration in Alaska is consistent with the IUCN Position Statement on the Translocation of Living Organisms and IUCN Guidelines for Re-Introductions, which ADF&G has used to evaluate and guide restoration planning.

Potential for Unintended Consequences and Need for Monitoring at Other Sites Prior to Restoring Wood Bison on Refuge Lands. Bison have a demonstrated ability to thrive in northern habitats, and their effects on the environment are predictable and well documented based on experience with other northern bison populations, including plains bison herds that have existed in Alaska since the 1920s. As detailed in this review, there is no reason to anticipate significant adverse effects on other wildlife and the environment. To the contrary, the scientific evidence indicates these effects will be neutral or positive. Wood bison were restored in Yukon beginning in the 1980s, and currently number nearly 800 animals. Thomas Jung, a wildlife biologist and wood bison manager with the Yukon Department of the Environment attended the June 2005 WBAG meeting and explained the significant benefits of wood bison in the Yukon (Appendix D). The herd has prospered in a generally mountainous area that offers limited grazing habitat compared to potential sites in Alaska, and no substantial adverse impacts to other species of wildlife have been observed.

After reviewing the historical and ecological information about wood bison the WBAG recommended that ADF&G pursue wood bison restoration at three sites, including the Yukon Flats. In making their recommendations the group considered the issues identified by FWS, but nonetheless recommended that the Yukon Flats continue to be considered as a potential release site. The group also concluded that restoration initiatives should not be delayed until monitoring of an initial restoration was completed, as reflected in the following recommendation:

“Independent of whichever site is implemented first, knowledge gained from restoring wood bison at the first site should be used to benefit restoration planning and monitoring at the other potential release sites. There should be no fixed time required to wait for the results of studies at one site before proceeding with wood bison releases at the other sites.”

An appropriate level of biological monitoring will accompany each wood bison restoration effort. However, as has been the case with a wide variety of other wildlife restoration efforts in North America (i.e., caribou and muskoxen in Alaska; wolves, elk, and wild turkeys in the lower 48), the restoration of a species to other parts of its original range should not be pursued in piecemeal fashion, with each restoration effort being delayed until the results of a previous effort had been studied for years or decades. The ecological effects of wood bison will be essentially undetectable until populations increase to a few hundred animals or more. This means it would be a decade or more before useful biological information would be available in any case.

Given the large amount of available scientific information and experience in managing bison populations ADF&G believes it is unnecessary, and would be inefficient, to approach wood

bison restoration as a series of individual experiments. Such an approach would retard progress in making a major step forward in wildlife conservation. It would also substantially increase costs and create logistic problems associated with maintaining the appropriate number of wood bison in captivity for a decade or more, or going through the difficult process of maintaining infrastructure and importing additional animals again after a period of years.

Conclusions. ADF&G believes Alaska's wood bison restoration effort is consistent with Division of Refuges guidelines, with their stated definitions of "natural diversity" and "biological integrity," and with established and accepted conservation and restoration principles. The department also recognizes that, while designed to address important biological considerations that the FWS is legally mandated to follow, these policies are subject to interpretation. The record of public comment on wood bison restoration on Yukon Flats will be available for consideration by the FWS and could be used when interpreting and applying these policies.

In addition, ADF&G believes that implementing wood bison restoration on private lands adjacent to refuge lands on the Yukon Flats, and the future presence of wood bison on refuge land in this area, would be consistent with the Master Memorandum of Understanding between ADF&G and FWS. This agreement includes the following: "The Department and the Service mutually agree...1) To coordinate planning for management of fish and wildlife resources on Service lands so that conflicts arising from differing legal mandates, objectives, and policies either do not arise or are minimized"... the Service recognizes "the Department as the agency with the primary responsibility to manage fish and resident wildlife within the state of Alaska..." and ADF&G agrees "...to manage fish and resident wildlife populations in their natural species diversity on Service lands."

BLM Land Use Planning Requirements

As noted in the review of the scoping letter received from the State Director of BLM the only restoration site where a significant amount of BLM lands occur is the lower Innoko–Yukon River area. BLM Manual 1745 requires BLM to amend its land use plan, if that plan does not address reestablishment of a population of wildlife in the planning area. The current Management Framework Plan for that area does not address wood bison restoration; however, BLM is scheduled to begin preparing a Resource Management Plan for the area in 2008 with a completion date of 2010. Unless ADF&G can work with BLM to amend the current Management Framework Plan, this could cause a delay in efforts to restore wood bison in the lower Innoko–Yukon River area.

ADF&G Wildlife Transplant Policy

The WTP requires that the Commissioner determine that it is in the best interest of the state to transplant a species of wildlife in Alaska. ADF&G has worked toward meeting the requirements of the WTP and will complete all necessary steps before implementing a wood bison restoration project.

As explained in Section 2, in August 2006 the department initiated an evaluation of the proposal to restore wood bison according to the process required in DWC's WTP. The DWC Director approved a WTP Scoping Report, issued a finding regarding the legal and management status of wood bison in Alaska and directed staff to establish a WTP Review Committee for the project.

The primary duty of the review committee, as defined in the WTP, is to determine whether wood bison restoration is likely to effect a significant reduction in the range, distribution, habitat, or preexisting human use of other species.

In January 2007 the committee agreed that wood bison restoration is not likely to effect a significant reduction in the range, distribution, habitat, or preexisting human use of other species. The finding on the status of wood bison in Alaska and the Findings of the Wood Bison Restoration Wildlife Transplant Policy Review Committee are included in Appendix F. Public comment is being sought on the findings of this committee as part of the review of this ER. Following the review the committee will consider any comments received and then submit their final recommendations to the Director. If the Director approves the proposed transplant, DWC staff will prepare a detailed transplant plan and itemized budget to be submitted to the Commissioner for final approval.

State Veterinarian and USDA, Animal Health Certification

The diseases of greatest concern in bison conservation are bovine tuberculosis, bovine brucellosis, and anthrax (Gates et al. 2001). Serologic and empirical evidence indicates that neither bovine brucellosis nor tuberculosis is present in Alaska. There are also no records of anthrax in Alaska. Wood bison are not known to harbor parasites that could adversely affect Alaskan wildlife. There is little reason to expect that wood bison might contract a pathogenic disease endemic to Alaska wildlife (ADF&G 1994). *Brucella suis* biovar IV is serologically evident in various caribou herds and sometimes in other ungulates (Zarnke 1991). However, this disease does not appear to be pathogenic in bison, and is not a disease risk (Bevins et al. 1996).

As noted above, the state Division of Agriculture indicates they have no specific concerns or permitting jurisdiction over any of the proposed release sites for the wood bison. Except for the federal regulation relating to BSE, USDA import health certification requirements are similar to, and will be met by satisfying the requirements of the State of Alaska.

The procedures that must be followed to allow importation of animals into Alaska to prevent the introduction and spread of infectious and contagious diseases were outlined by the Alaska State Veterinarian. The Alaska Animal Health Regulations (18 AAC 36.005 – 36.930) include the following measures:

(a) Cattle and bison imported into the state must be accompanied by a permit and health certificate which, for cattle or bison over six months of age, must include certification that within 30 days before importation the cattle or bison tested negative to the following tests at laboratories approved by the USDA to conduct such tests:

- ◆ a brucellosis test unless the animal is under 18 months of age and has been officially vaccinated and permanently identified as an official brucellosis vaccinee;
- ◆ an anaplasmosis test; and
- ◆ a blue tongue test.

(b) Cattle or bison over 6 months of age must be negative to a tuberculin test within 30 days before importation.

(c) The health certificate required by (a) of this section must indicate that the animals are free of ectoparasites or have been dipped or sprayed within 10 days before importation with an insecticide approved by the USDA.

(d) Cattle and bison imported into Alaska are subject to being retested 30 to 120 days after their arrival in the state at the discretion of the state veterinarian. Imported cattle or bison must be kept isolated from resident livestock until the retests are concluded or the state veterinarian has approved release of the animals.

The Alaska State Veterinarian notes that “these regulations specifically deal with domestic livestock that will be confined to a premise and easily controlled with regular oversight and opportunity for repeated examination and sampling. These wood bison pose a greater risk since the goal is to release them to the wild where they will be free-ranging and interact with other wildlife species. These wood bison should be confined for an extended period of time to allow adequate time for repeated examination and additional diagnostic testing.” Diagnostic tests include:

- ◆ Examination for external and internal parasites (treatment for parasites may be indicated),
- ◆ Tests for viral respiratory disease (Infectious Bovine Rhinotracheitis, Bovine Viral Diarrhea, Bovine Respiratory Syncytial Virus),
- ◆ Tests for bacterial diseases (Leptospirosis, Anthrax, *Mycobacterium avium* paratuberculosis, also known as Johne’s disease).

Dr. Gerlach also notes that testing for Johne’s disease presents some unique diagnostic challenges in bison. Testing requirements for Johne’s disease may seem arduous but the goal is to protect the wildlife resources of the state. Johne’s disease already occurs in livestock in Alaska (R. Gerlach, unpublished data).

Disease testing and health certification requirements established by the State of Alaska, USDA, and Canadian Food Inspection Agency would be followed (ADF&G 1994), which will minimize the possibility of introducing wildlife diseases in Alaska through importation of wood bison from Canada. The effectiveness of this overall approach has been demonstrated with the establishment of six wild and several captive disease-free wood bison herds in Canada. ADF&G staff is working with the state veterinarian and veterinarians in Canada to develop Johne’s disease testing protocols for EINP wood bison and has worked with wildlife veterinarians in the Yukon Department of Environment to test wood bison stock that might also be imported into Alaska. Before any wood bison are imported into Alaska for eventual release to the wild, ADF&G will work with the Alaska State Veterinarian and others to define testing and handling procedures that will be used to eliminate or minimize disease threats to other wildlife or domestic animals. Wood bison management plans can outline steps that would be taken in the unlikely event of an outbreak of a serious disease in free-ranging populations, including provisions that would allow removal of a population as a last resort.

SECTION 8: CONCLUSIONS AND PROPOSED DECISIONS

CONCLUSIONS

ADF&G concludes that wood bison restoration in Alaska can be accomplished with minimal or no negative environmental impacts, and that wood bison restoration can enhance the diversity of Alaska's wildlife resources and could provide significant benefits to people. Wood bison restoration in Alaska would make a significant contribution to international efforts to conserve wood bison and would help fulfill key goals in Canada's Wood Bison Recovery Plan. No negative effects on moose, waterfowl or other wildlife are anticipated, particularly with biological monitoring and control of wood bison herd size. Because few, if any, adverse environmental impacts are expected at any of the individual sites, the anticipated level of cumulative negative effects is very limited. Bison population sizes would be limited based on habitat and other considerations, and populations would be monitored and mitigation measures that can be applied, if needed.

Most of the permitting requirements for the project can be met without a great deal of difficulty. However, at the same time, some significant legal and policy issues must be adequately addressed before wood bison restoration can proceed. A number of factors should be considered when evaluating the three potential wood bison restoration sites. No one site is most favorable relative to all the factors. Key considerations include:

- ◆ Suitability of habitat for wood bison.
- ◆ Extent of suitable habitat and size of herd that could be supported. Larger herds can make a greater contribution to maintaining genetic diversity and the evolutionary future of wood bison.
- ◆ Abundance of other wildlife species and relative need to enhance the wildlife resources in the area.
- ◆ Proximity to domestic cattle or plains bison.
- ◆ Extent of public consultation and support in the specific areas.
- ◆ Legal mandates and policies of land managing agencies and their willingness to support restoration.
- ◆ Other existing or potential resource developments or land uses that may affect wood bison or be affected by them.
- ◆ The presence of state or federal lands and the associated differences in how subsistence and nonsubsistence harvest of wood bison might be managed.
- ◆ Logistic requirements and cost of transportation and biological monitoring.

Alternative A – Yukon Flats

Because the Yukon Flats has been considered as a potential site for wood bison restoration for nearly 15 years, the level of biological information and public consultation exceeds that in the other two, more recently identified areas. With its extensive high quality bison habitat and record of public awareness and support, the Yukon Flats is the most attractive site for an initial restoration location. Because the Yukon Flats could support a relatively large herd of up to 2,000 wood bison or more it could also make a relatively large contribution to maintaining the genetic diversity of the subspecies. There are no cattle or domestic plains bison on the Yukon Flats that might interbreed or be a source of disease.

The moose population on Yukon Flats is one of the lowest in the state and subsistence resources and other hunting opportunities are limited compared to the other two sites. The Yukon Flats also has the most limited potential for an increase in the moose population due to constraints on predator control on FWS lands. The Yukon Flats includes some state land (primarily below the ordinary high water line of navigable waters), but most potential wood bison habitat is found on private or federal public lands. It is likely that a wood bison harvest on federal lands would be controlled by both state hunting regulations and federal subsistence hunting regulations. It would be important to define the number of wood bison necessary for subsistence and how large the herd would have to be to provide nonsubsistence hunting opportunities and to ensure that opportunities for wood bison harvest are available to a diversity of wildlife users.

While there are many factors that favor the Yukon Flats as the best initial wood bison restoration site, the FWS prefers that the Yukon Flats not be the initial location for wood bison restoration. In addition, there is significant interest in oil and gas development on the Yukon Flats and concerns about possible restrictions on development that might result from a possible future connection between wood bison and the ESA. Even though there has been a strong record of support for wood bison restoration from village councils and CATG in the past, additional consultation with local residents should occur to determine the current level of support.

Alternative B – Minto Flats

ADF&G's wood bison habitat assessment concluded that Minto Flats could support a population of 500 wood bison, which is sufficient to meet the recommendations of Canada's Wood Bison Recovery Team. From a long-term perspective, it would be desirable to maintain larger herds to achieve greater genetic diversity. Minto Flats supports a relatively abundant moose population that provides for subsistence and general hunting opportunities. Some people have suggested that Minto Flats is already a relatively productive ecosystem and has less need for wood bison than does the Yukon Flats. Oil and gas exploration is planned or is occurring on the Minto Flats and the area south of the Tanana River and, as in the case of the Yukon Flats, there is concern about potential restrictions on oil development as a result of the ESA. There has been less consultation with local residents in the Minto Flats area than on the Yukon Flats and some comments received during the scoping process for this ER included concerns about wood bison restoration. However, Fish and Game advisory committees in the Minto Flats area voted to support wood bison restoration after more information was presented, and they had an opportunity to ask questions and more fully discuss the project. Nonetheless, more consultation is needed to determine the level of local support for the project.

Minto Flats is the only site where there would be road access to a temporary wood bison holding facility. This could make the site more cost-effective. Road access might also make biological monitoring more cost-effective, however much of the work would likely involve aircraft and occur in remote areas. Minto Flats is predominately state and private land and future harvest would be regulated by the Alaska Board of Game. There are no conflicts between the management purposes of the MFSGR and restoration of wood bison.

Alternative C – Lower Innoko–Yukon River

The lower Innoko–Yukon River area was found to have suitable habitat and forage to support 400 or more wood bison. The habitat assessment identified concerns about short-term flooding and occasional deep snow and recommended further study to determine if wood bison would have access to sufficient forage before allowing the population to increase to more than 500. It appears that suitable wood bison habitat extends further up both the Innoko and Yukon River valleys, suggesting a larger number of bison could be supported in this region. Moose are relatively abundant in Game Management Unit (GMU) 21E compared to the Yukon Flats, however in GMU 21A the moose population appears to be significantly lower than in GMU 21E. A recent moose management plan developed for the area identified concerns about a possible decline in the moose population and increasing predation on moose. Logistically, the lower Innoko–Yukon is the furthest from the road system and might entail the highest cost for restoring and monitoring a wood bison population. At this time there is no active exploration for oil and gas in this area and there may be less concern about potential effects of the ESA on resource development activities. The local Fish and Game advisory committee for the area has voted to support wood bison restoration. However, as for the Minto Flats, there is a need to further discuss wood bison restoration with local residents to better gauge local public support for the project. There is a mixed pattern of landownership in the lower Innoko–Yukon River area, with roughly equal proportions of private and BLM land and a small amount of state land, primarily below the ordinary high water mark of navigable rivers. The Innoko NWR lies just to the north of the identified potential wood bison habitat area. It is possible that wood bison would occur on refuge lands and this may result in some of the same concerns being expressed by the FWS as has been the case with the Yukon Flats. BLM has indicated that wood bison restoration should be included in the land use plan for this area. A new Resource Management Plan for the area is scheduled to be started in 2008 and completed in 2010. This could delay wood bison restoration in this area, unless planning for a project on private lands can proceed, with the project being addressed in BLM management plans later. However, it does not appear that a restoration effort can be implemented at any site until 2010 or later.

All three sites considered in the ER are suitable for wood bison restoration. The environmental effects of restoration at the three alternative sites are similar. However, the three areas differ in terms of habitat potential, long-term conservation benefits, current levels of public awareness and support, and potential difficulties related to federal policies. Overall, Alternative A, the Yukon Flats ranks most favorably, except for the FWS preference that Yukon Flats not be the initial location for wood bison restoration. Implementing wood bison restoration on more than one of the potential sites would result in the greatest positive effect in terms of wood bison conservation, biological diversity, and socioeconomic benefits.

Currently, free-ranging wood bison are found only in Canada where there are six, healthy free-ranging herds including about 4,000 animals. Opportunities for further expansion in numbers or range are constrained by human developments and some herds are threatened with the possibility of being infected with cattle diseases. The existence of wood bison infected with bovine tuberculosis and brucellosis in the Wood Buffalo National Park area is an important factor preventing the expansion of healthy populations in a large part of the original range of wood bison in Canada (Gates et al. 2001).

Restoring additional populations in Alaska would be a major step forward and would dramatically improve the outlook for the long-term survival for the species by increasing the number of animals in large, free-ranging herds subject to natural selection and providing a safe haven from the threat of livestock diseases. Wood bison restoration also represents an opportunity to reestablish a key grazing herbivore at a time when global climate change is likely to increase the amount of grazing habitat over the long term (Starfield and Chapin 1996; Chapin and Starfield 1997).

PROPOSED DECISION TO PROCEED WITH WOOD BISON RESTORATION IN ALASKA

ADF&G will proceed with efforts to restore wood bison in Alaska and continue to consider all three of the potential restoration sites identified in this ER. The department will work to initiate site-specific planning efforts for both the Yukon Flats and Minto Flats locations while at the same time increasing efforts to discuss wood bison restoration with residents of the lower Innoko–Yukon River area and evaluate local support for the project. Table 12 provides a graphic representation of the approximate timeline for several of the main actions needed to proceed with wood bison restoration in Alaska.

Seeking to restore wood bison almost simultaneously on the Yukon Flats and Minto Flats is an approach that has the potential to provide the most benefits for various wildlife user groups in the shortest period of time. This approach has the advantage of pursuing restoration in one area that is predominately federal and private lands (Yukon Flats) and another that is predominately state and private lands (Minto Flats). In all areas where wood bison restoration is pursued there will be a need to develop general harvest management plans that will describe how both subsistence and nonsubsistence harvest opportunities will be provided in the future. The Minto Flats site is an area where harvest is regulated by the Alaska Board of Game which is responsible for providing both subsistence and nonsubsistence hunting opportunities. Minto Flats would also provide a road accessible area where there could be greater opportunities for people to view and photograph wood bison, although bison may not remain close to road accessible areas.

As has been stated previously, even if ADF&G reaches a final decision to proceed with wood bison restoration in Alaska, there are several significant challenges that must be overcome and there is no guarantee of success at any of the alternative sites. USDA import regulations will have to change, or a permit obtained, to allow importation of wood bison stock from Canada. ADF&G may be able to undertake a genetic management program using artificial insemination on the wood bison already at AWCC. However, relying on this approach to produce sufficient stock would delay restoration in the wild for several years, and it is not a good alternative to obtaining additional stock from Canada. It would, however, be a worthwhile adjunct to a genetic management program if suitable genetic material can be obtained and used to augment genetic

diversity. Disease testing protocols must also be met before wood bison are released into the wild.

Because of the more advanced consideration of wood bison restoration on Yukon Flats, the Yukon Flats location should be the first place to attempt a site-specific planning process. This would also be consistent with ADF&G's commitment to pursue wood bison restoration on the Yukon Flats, which has developed through 15 years of biological research and public consultation and the partnership with the CATG and local communities.

If planning is initiated for the Yukon Flats site and a planning team recommends proceeding with wood bison restoration in that location, several issues must be resolved before implementation could occur. For example, concerns about wood bison being listed under the ESA must be reasonably addressed. Concerns about the ESA could also affect project implementation at the Minto Flats site and possibly the lower Innoko–Yukon River site in the future. Changing circumstances could make it feasible to restore wood bison at the lower Innoko–Yukon site before the other two locations. Therefore, ADF&G will remain flexible and take advantage of opportunities to restore wood bison in any of the three areas as they arise.

Because wood bison restoration in Alaska is an outstanding opportunity for wildlife conservation, and is the focus of broad public support, ADF&G proposes to continue the effort and seek to achieve the following goal:

“Restore wood bison populations to portions of their former habitat in Alaska so they are again an integral part of Alaska’s wildlife, providing Alaskans and others the opportunity to enjoy, and benefit from, this ecologically important northern animal.”

Central to proceeding with the wood bison restoration program, ADF&G is committed to:

- ◆ Following the disease testing and health certification requirements established by the Alaska State Veterinarian and USDA.
- ◆ Conducting area-specific planning efforts to provide additional opportunity for public review and comment and close involvement of local residents and other wildlife users.
- ◆ Conducting a biological research and monitoring program to monitor restored herds of wood bison and evaluate potential wildlife and ecological impacts. The program will be as comprehensive as possible but must also be cost-effective and affordable.
- ◆ Continuing to work with FWS and others to address issues related to the U.S. Endangered Species Act in a manner that ensures that wood bison restoration in Alaska does not limit opportunities for future uses and enjoyment of wood bison, or other resource development activities.
- ◆ Working with all wildlife users and within the state and federal regulatory programs to ensure that future harvest opportunities for wood bison will be shared in a reasonable manner.
- ◆ Working in partnership with other public agencies and nongovernmental organizations to seek sufficient funding to implement wood bison restoration.

Activity	Prior to Oct 2006	Nov –Dec 2006	Jan–Feb 2007	Mar –Apr 2007	May –Jun 2007	Jul–Aug 2007	Sep–Oct 2007	Nov –Dec 2007	Jan–Feb 2008	Mar –Apr 2008	May –Jun 2008	Jul–Aug 2008	Sep–Oct 2008	Nov –Dec 2008	Jan–Feb 2009	Mar –Apr 2009	May –Jun 2009			
Phase I planning.																				
Complete the first site-specific implementation and management plan.																				
Seek revision of USDA regulations to allow wood bison import to Alaska.																				
Disease testing and health certification to bring wood bison into Alaska.																				
Transport wood bison from Canada to temporary holding facility (AWCC).																				
Disease testing and health certification prior to releasing wood bison.*																				

Activity	Prior to Oct 2006	Nov –Dec 2006	Jan– Feb 2007	Mar –Apr 2007	May –Jun 2007	Jul– Aug 2007	Sep– Oct 2007	Nov –Dec 2007	Jan– Feb 2008	Mar –Apr 2008	May –Jun 2008	Jul– Aug 2008	Sep– Oct 2008	Nov –Dec 2008	Jan– Feb 2009	Mar –Apr 2009	May –Jun 2009
Complete requirements for permits, landowner approvals and cooperative agreements.																	
Initiate baseline biological monitoring program.																	
Target date for initial wood bison release*																	

* This date depends on the length of time that will be required for wood bison to be held in a temporary holding facility for completion of disease testing and health certification. It now appears likely that the earliest date wood bison could be released to the wild would be in spring 2010. Disease testing would continue, as needed, until wood bison stock is approved for release to the wild.

LITERATURE CITED

- ALASKA DEPARTMENT OF FISH AND GAME. 1992. Minto Flats State Game Refuge Management Plan. Alaska Department of Fish and Game, Fairbanks, Alaska, USA.
- ALASKA DEPARTMENT OF FISH AND GAME. 1994. Reintroducing wood bison to the upper Yukon valley, Alaska: a feasibility assessment. Alaska Department of Fish and Game, Fairbanks, Alaska, USA.
- ALASKA DEPARTMENT OF FISH AND GAME. 2002. Yukon Flats Cooperative Moose Management Plan. Unpublished report. Alaska Department of Fish and Game, Fairbanks, Alaska, USA.
- ARCESE, P., AND A. R. E. SINCLAIR. 1997. The role of protected areas as ecological baselines. *Journal of Wildlife Management* 61(3):587–602.
- BAILEY, A. 2005. Nenana gas project analyzing seismic. *Petroleum News*. September 4, 2005.
- BELLROSE, F. 1980. Ducks, geese, and swans of North America. Harrisburg, Pennsylvania: Stackpole Books. Third edition.
- BELSKY, A. J., A. MATZKE, AND S. USELMAN. 1999. Survey of livestock influences on stream and riparian ecosystems in the western United States. *Journal of Soil and Water Conservation* 54:419–431.
- BERGER, M. 1996. Summer habitat relationships and foraging ecology of the Delta bison herd. Thesis, University of Alaska Fairbanks, Alaska, USA.
- BERGER, M., R. O. STEPHENSON, P. KARCZMARCZYK, AND C. C. GATES. 1995. Habitat inventory of the Yukon Flats as potential wood bison range. Alaska Department of Fish and Game, Fairbanks, Alaska, USA.
- BERTRAM, M., AND M. VIVION. 2002. Moose mortality in eastern Interior Alaska. *Journal of Wildlife Management* 66(3):747–756.
- BEVINS, J. S., J. E. BLAKE, L. G. ADAMS, J. W. TEMPLETON, J. K. MORTON, AND D. S. DAVIS. 1996. The pathogenicity of *Brucella suis* biovar IV for bison. *Journal of Wildlife Diseases* 32(4):581–585.
- BLYTH, C. B., N. L. COOL, A. DICKINSON, B. MCDUGALL, R. KAYE, W. OLSON, D. MADSEN, AND T. OSCO. 1993. Ecosystem status and management recommendations, Elk Island National Park. Heritage Resource Conservation. Unpublished report.
- BLYTH, C. B., AND R. J. HUDSON. 1987. A plan for the management of vegetation and ungulates, Elk Island National Park. Parks Canada. Unpublished report.
- BOUDREAU, T. A. 2002. Farewell bison. Pages 15–24 in C. Healy, editor. Bison management report of survey and inventory activities. Alaska Department of Fish and Game. Study 9.0. Juneau, Alaska, USA.
- BURR, J. 2004. Fishery management report for Sport Fisheries in the Arctic–Yukon–Kuskokwim Management Area, 2002–2003. Alaska Department of Fish and Game, Fishery Management Report No. 04-02, Anchorage, Alaska, USA.

- CARBYN, L. N., AND T. TROTTIER. 1988. Description of wolf attacks on bison calves in Wood Buffalo National Park. *Arctic* 41:297–302.
- CHAPIN, III, F. S., T. S. RUPP, A. M. STARFIELD, L. DEWILDE, E. S. ZAVALITA, N. FRESCO, J. HENKELMAN, AND A. D. MCGUIRE. 2003. Planning for resilience: modeling change in human–fire interactions in the Alaskan boreal forest. *Frontiers in Ecology and Environment* 1(5):255–261.
- CHAPIN, F. S., III AND A. M. STARFIELD. 1997. Time lags and novel ecosystems in response to transient climatic change in arctic Alaska. *Climatic Change* 35:449–461.
- DECHANT, J. A., M. L. SONDRAL, D. H. JOHNSON, L. D. IGL, C. M. GOLDADE, M. P. NENNEMAN, AND B. R. EULISS. 2003. Effects of management practices on grassland birds: Short-eared Owl. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center
Online. <http://www.npwrc.usgs.gov/resource/literatr/grasbird/seow/seow.htm>
(Version 12DEC2003).
- DUBOIS, S. D. 2002. Delta bison. Pages 25–54 *in* C. Healy, editor. Bison management report of survey and inventory activities. Alaska Department of Fish and Game. Study 9.0. Juneau, Alaska, USA.
- DUBOIS, S. D., AND R. O. STEPHENSON. 1998. Alaska's Delta bison herd: managing free-ranging bison in an area with diverse land uses. Pages 211–213 *in* L. Irby and J. Knight, editors. International Symposium on Bison Ecology and Management in North America. Montana State University, Bozeman, Montana, USA.
- FISCHER, L. A., AND C. C. GATES. 2005. Competition potential between sympatric woodland caribou and wood bison in Southwestern Yukon, Canada. *Canadian Journal of Zoology* 83:1162–1173.
- FITCH, L., AND B. W. ADAMS. 1998. Can cows and fish co-exist? *Canadian Journal of Plant Science* 78:191–198.
- FORTIN, D., J. M. FRYXELL, AND L. O'BRODOVICH. 2003. Foraging ecology of bison at the landscape and plant community levels: the applicability of energy maximization principals. *Oecologia* 134:219–227.
- FRANK, D. A., S. J. MCNAUGHTON, AND B. F. TRACY. 1998. The ecology of the earth's grazing ecosystems. *BioScience* 48(7):513–521.
- GARDNER, C. L. 2007. Habitat assessment of potential wood bison restoration sites in Alaska. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Annual Research Performance Report. Grant W-33-2. Project 9.10. Juneau, Alaska, USA.
- GARDNER, C. L., AND A. R. DEGANGE. 2003. A review of information on wood bison in Alaska and adjacent Canada, with particular reference to the Yukon Flats. Alaska Department of Fish and Game. U.S. Fish and Wildlife Service. Unpublished report.
- GATES, C. C., T. CHOWNS, AND H. W. REYNOLDS. 1992. Wood Buffalo at the Crossroads. Pages 139–165 *in* J. Foster, B. Harrison, and I. S. MacLaren, editors. Buffalo. Alberta Nature and Culture Series, University of Alberta Press, Edmonton, Canada.

- GATES, C. C. AND N. C. LARTER. 1990. Growth and dispersal of an erupting large herbivore population in northern Canada: the Mackenzie wood bison (*Bison bison athabasca*). *Arctic* 43:231–238.
- GATES, C. C., R. O. STEPHENSON, H. W. REYNOLDS, C. G. VAN ZYLL DE JONG, H. SCHWANTJE, M. HOEFS, J. NISHI, N. COOL, J. CHISOLM, A. JAMES, AND B. KOONZ. 2001. National recovery plan for the wood bison (*Bison bison athabasca*). National Recovery Plan No. 21. Recovery of Nationally Endangered Wildlife (RENEW). Ottawa, Ontario, Canada. 50 pp.
- GRIFFITH, B., R. T. BOWYER, J. S. SEDINGER, P. MORROW, G. BUCARIA, AND R. POST. 1998. Technical peer review of reintroducing wood bison to the Upper Yukon Valley, Alaska: a feasibility assessment. Unpublished report. Alaska Chapter of *The Wildlife Society*.
- GUTHRIE, R. D. 1990. Frozen fauna of the Mammoth Steppe: the story of Blue Babe. The University of Chicago Press, Chicago, Illinois, USA.
- HEGLUND, P. J., AND J. R. JONES. 2003. Limnology of shallow lakes in the Yukon Flats National Wildlife Refuge, Interior Alaska. *Lake and Reservoir Management* 19(2):133–140.
- JUNG, T. 2005. Yukon Department of the Environment. Comments provided at the June 2005 Wood Bison Restoration Advisory Group meeting, Fairbanks, Alaska, USA.
- KANTRUD, H. A., AND R. L. KOLOGISKI. 1982. Effects of soils and grazing on breeding birds of uncultivated upland grasslands of the northern great plains. U.S. Fish and Wildlife Service. Wildlife Research Report 15.
- KING, J. G. 1962. An arctic oasis. U.S. Department of Interior, Fish and Wildlife Service. Unpublished Report. Juneau, Alaska, USA.
- KNAPP, A. K., J. M. BLAIR, J. M. BRIGGS, S. L. COLLINS, D. C. HARNETT, L. C. JOHNSON, AND E. G. TOWNE. 1999. The keystone role of bison in North American Tallgrass Prairie. *Bioscience* 49(1):39–50.
- KOCHERT, M. N., B. A. MILLSAP, AND K. STEENHOF. 1988. Effects of livestock grazing on raptors with emphasis on the southwestern U.S. Pages 325–334 in R. L. Glinski, B. G. Pendleton, M. B. Moss, M. N. Lefranc, Jr., B. A. Millsap, and S. W. Hoffman, editors. Proceedings of the Southwest Raptor Management Symposium and Workshop. 21–24 May 1986, University of Arizona, Tucson. National Wildlife Federation, Washington, DC, National Wildlife Federation Scientific and Technical Series No. 11.
- LARTER, N. C., AND C. C. GATES. 1990. Home ranges of wood bison in an expanding population. *Journal of Mammalogy* 71:604–607.
- LARTER, N. C., AND C. C. GATES. 1991. Diet and habitat selection of wood bison in relation to seasonal changes in forage quantity and quality. *Canadian Journal of Zoology* 69:2677–2685.
- LARTER, N. C., A. R. E. SINCLAIR, AND C. C. GATES. 1994. The response of predators to an erupting bison, *Bison bison athabasca*, population. *Canadian Field-Naturalist* 108:318–327.
- LENT, P. 1998. Alaska's Indigenous Muskoxen: A History. *Rangifer* 18:133–144.

- LINDBERG, M. 2005. Associate Professor of Wildlife, University of Alaska-Fairbanks. Comments provided to the Wood Bison Restoration Advisory Committee June 2005. Fairbanks, Alaska, USA.
- MACDONALD, S. O., AND J. A. COOK. 2002. Catalog of the recent mammals of Alaska. Draft Report. University of Alaska Museum.
- MEAGHER, M. 1973. The bison of Yellowstone National Park. NPS Scientific Monograph. No. 1. USGPO. Washington, D.C. 161 pp.
- MECKLENBURG, C. W., T. A. MECKLENBURG, AND L. K. THORSTEINSON. 2002. Fishes of Alaska. American Fisheries Society. Bethesda, Maryland, USA.
- MILLER, F. 1982. Caribou. Pages 923–959 in J. A. Chapman and G. A. Feldhamer, editors. Wild mammals of North America; biology, management and economics. Johns Hopkins University Press.
- OLOSENBURG, S., AND L. N. CARBYN. 1985. Wolf predation of bison in Wood Buffalo National Park. Canadian Wildlife Service Final Report.
- PETRULA, M. J. 1994. Nesting ecology of ducks in Interior Alaska. Thesis, University of Alaska, Fairbanks, Fairbanks, Alaska, USA.
- REYNOLDS, H. W., R. M. HANSEN, AND D. G. PEDEN. 1978. Diets of the Slave River lowland bison herd, Northwest Territories, Canada. *Journal of Wildlife Management* 42:581–590.
- REYNOLDS, H. W., AND A. W. L. HAWLEY, EDITORS. 1987. Bison ecology in relation to agricultural development in the Slave River lowlands, NWT. Canadian Wildlife Service Occasional Paper No. 63.
- REYNOLDS, H. W., AND D. G. PEDEN. 1987. Vegetation, bison diets, and snow cover. N.W.T. Canadian Wildlife Service Occasional Paper 63. 74 pp.
- ROWINSKI, L. J. 1958. A review of waterfowl investigations and a comparison of aerial and ground censusing of waterfowl at Minto Flats, Alaska. Thesis, University of Alaska, Fairbanks, Fairbanks, Alaska, USA.
- SLATER, G. L., AND C. ROCK. 2005. Northern Harrier (*Circus cyaneus*): a technical conservation assessment. [Online]. USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/northernharrier.pdf>
- SMITH, D. L. 1990. The impacts of wood bison (*Bison bison athabasca*) grazing on a sub-hygric Shrub Meadow plant community type, Mackenzie Bison Sanctuary, Northwest Territories. Thesis, University of Alberta, Canada.
- SOPER, J. D. 1941. History, range, and home life of the northern bison. *Ecological Monographs* 11:347–412.
- STARFIELD, A. M., AND F. S. CHAPIN, III. 1996. A dynamic model of arctic and boreal vegetation change in response to global changes in climate and land-use. *Ecological Applications* 6:842–864.

- STEINMAN, A. D., J. CONKLIN, P. J. BOHLEN, AND D. G. UZARSKI. 2003. Influence of cattle grazing and pasture land use on macroinvertebrate communities in freshwater wetlands. *Wetlands* 23(4):877–889.
- STEPHENSON, R. O. 2002. Units 25A, 25B, and 25D moose management report. Pages 537–566 in C. Healy, editor. Moose management report of survey and inventory activities 1 July 1999–30 June 2001. Alaska Department of Fish and Game. Study 1.0. Juneau, Alaska, USA.
- STEPHENSON, R. O., AND P. J. FIX. 2005. Preliminary cost:benefit analysis; wood bison restoration program. Unpublished report. Alaska Department of Fish and Game, Fairbanks, Alaska, USA.
- STEPHENSON, R. O., S. C. GERLACH, R. D. GUTHRIE, C. R. HARINGTON, R. O. MILLS, AND G. HARE. 2001. Wood bison in late Holocene Alaska and adjacent Canada: paleontological, archaeological and historical records. *Wildlife and People in Northern North America. Essays in honor of R. Dale Guthrie*. S. C. Gerlach, and M. S. Murray, editors. British Archaeological Reports, International Series 944. <http://www.wildlife.alaska.gov/index.cfm?adfg=game.restoration>
- TELFER, E. S., AND J. P. KELSALL. 1979. Studies of morphological parameters affecting ungulate locomotion in snow. *Canadian Journal of Zoology*. 57:2153–2159.
- U.S. DEPARTMENT OF INTERIOR. 2005. Evaluation and review of a proposed land exchange of Native lands within the Yukon Flats National Wildlife Refuge, Alaska. Fish and Wildlife Service, Region 7, Anchorage, Alaska, USA.
- U.S. FISH AND WILDLIFE SERVICE. 1987. Final Yukon Flats National Wildlife Refuge comprehensive conservation plan, environmental impact statement, and wilderness review. U.S. Fish and Wildlife Service, Anchorage, Alaska, USA.
- VAN CAMP, J. 1975. Snow conditions and the winter feeding behavior of *Bison bison* in Elk Island National Park. Canadian Wildlife Service Report CWS-53-75. 91 pp.
- VAN CAMP, J., AND G. W. CALEF. 1987. Population dynamics of bison. Pages 21–23 in H. W. Reynolds and A. W. L. Hawley, editors. *Bison ecology in relation to agriculture development in the Slave River lowlands, NWT*. Occasional Paper 63. Canadian Wildlife Service (Ottawa, Ontario, Canada).
- VANIA, T., V. GOLEMBESKI, B. M. BORBA, T. L. LINGNAU, J. S. HAYES, K. R. BOECK, AND W. H. BUSH. 2002. Annual management report, Yukon and Northern area, 2000. Alaska Department of Fish and Game, Regional Information Report No. 3A02-29, Anchorage, Alaska, USA.
- WALKER, J. 2004. Nest and duckling survival of Scaup at Minto Flats, Alaska. Thesis, University of Alaska, Fairbanks, Fairbanks, Alaska, USA.
- WHITMAN, J. S., AND R. O. STEPHENSON. 1998. History and management of the Farewell bison herd, Alaska. Pages 267–270 in L. Irby and J. Knight, editors. *International symposium on bison ecology and management in North America*. Montana State University, Bozeman, Montana, USA.

- WIGGINS, D. 2004. Short-eared Owl (*Asio flammeus*): a technical conservation assessment. [Online] USDA Forest Service, Rocky Mountain Region. Available: <http://www.fs.fed.us/r2/projects/scp/assessments/shortearedowl.pdf>
- ZARNKE, R. L. 1991. Serologic survey of Alaska wildlife for microbial pathogens. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research final report. Projects W-22-6 through W-23-4. Study 18.6. Juneau, Alaska, USA.

APPENDIX A — Joint ADF&G and FWS review of wood bison restoration on Yukon Flats

**A REVIEW OF INFORMATION ON WOOD BISON IN
ALASKA AND ADJACENT CANADA, WITH
PARTICULAR REFERENCE TO THE YUKON FLATS**

by

Craig L. Gardner
Alaska Department of Fish and Game
Division of Wildlife Conservation
1300 College Road
Fairbanks, Alaska 99701-1599

and

Anthony R. DeGange
U.S. Fish and Wildlife Service
1011 E. Tudor Road
Anchorage, Alaska 99503

July 21, 2003

EXECUTIVE SUMMARY

Bison were part of Alaska's fauna for over a hundred thousand years. Bison skeletal remains from throughout this period have been found including one dated as recently as 170 years ago. Based on skeletal measurements, wood bison (*Bison bison athabasca*) were the last bison subspecies that occurred in Alaska. Archaeological and paleontological evidence in combination with historic accounts from Alaska Native elders indicate that bison persisted in Alaska into the nineteenth and early twentieth centuries and were once a subsistence resource for Alaska's indigenous people. Factors that are responsible for the extirpation of wood bison from Alaska may never be known with certainty. However the combined effect of changes in habitat and harvest by humans is the most likely cause. Recent habitat studies concluded that substantial suitable habitat for wood bison exists on the Yukon Flats and in other areas of Alaska. A low to medium density wood bison population is unlikely to have negative effects on waterfowl, moose or other wildlife. Wood bison are susceptible to a variety of diseases, most notably bovine brucellosis and bovine tuberculosis. Although diseased herds of wood bison exist in Canada, only disease-free stock are used in transplants of wood bison to unoccupied range and additional protocols are in place to minimize the risk of disease transmission.

CONTENTS

EXECUTIVE SUMMARY	i
INTRODUCTION	1
HISTORIC RANGE OF HOLOCENE BISON IN ALASKA	2
TAXONOMIC STATUS OF HOLOCENE BISON IN ALASKA	2
PALEONTOLOGICAL, ZOOARCHAEOLOGICAL, AND ETHNOGRAPHIC INFORMATION ON WOOD BISON IN ALASKA	2
FACTORS INFLUENCING THE DECLINE AND EXTIRPATION OF BISON FROM ALASKA	4
CURRENT DISTRIBUTION, POPULATION SIZE, AND TAXONOMIC STATUS OF WOOD BISON	5
ECOLOGICAL ISSUES AND CONCERNS	6
HABITAT AND FORAGING REQUIREMENTS	6
EFFECTS OF WOOD BISON ON VEGETATION COMMUNITIES	7
POSSIBLE EFFECTS OF WOOD BISON ON WATERFOWL	8
INTERACTIONS BETWEEN WOOD BISON AND MOOSE	10
<i>Potential Competition for Forage</i>	11
<i>Potential for Indirect Effects on Wolf–Moose Relationships</i>	11
DISEASE ISSUES	13
ACKNOWLEDGEMENTS	13
LITERATURE CITED	14
FIGURE 1 Location of Holocene bison remains in Alaska and adjacent Canada	20
TABLE 1 Location and radiocarbon dates for bison specimens representing the end of the Pleistocene–Holocene transition or the Holocene in Alaska and adjacent Canada	21
TABLE 2 Summary status of wood bison populations for 1978, 1987, 1999, and 2002	25

INTRODUCTION

The establishment of wood bison populations in Alaska and in particular on the Yukon Flats has been considered by the U.S. Fish and Wildlife Service (FWS), the Alaska Department of Fish and Game (ADF&G), and communities of the Yukon Flats since the early 1990s. ADF&G conducted assessments of the habitat and feasibility of establishing a population of wood bison in the upper Yukon Valley and concluded that the habitat is suitable (Berger et al. 1995) and the overall project feasible (ADF&G 1994). The release of wood bison in Alaska is supported by the Canadian National Wood Bison Recovery Team and the International Union for the Conservation of Nature – Bison Specialist Group and in the Yukon Flats by local villages, Alaska Native organizations, and hunting organizations.

In December 1997, FWS's Regional Director informed ADF&G that the FWS could not support a proposal to establish wood bison on the Yukon Flats National Wildlife Refuge (NWR) because the information provided by ADF&G was insufficient for FWS to conclude that wood bison inhabited the Yukon Flats in historical times. FWS also concluded that wood bison likely disappeared from Alaska as a result of natural environmental changes, and therefore they are no longer part of the natural diversity of the Yukon Flats NWR. As a result the proposed introduction would likely be incompatible with one of the primary purposes for which the Refuge was established, namely, "...to conserve fish and wildlife populations and their habitats in their natural diversity...."

In subsequent discussions and correspondence, FWS also questioned the taxonomic status of late Holocene bison; the origin and date of the most recent bison specimen in Alaska; whether late Holocene bison accounts represented resident, viable populations; the reliability of oral accounts of bison on the Yukon Flats; and whether possible interactions between bison and other wildlife, in particular moose and waterfowl, have been adequately addressed.

Since the 1997 decision by FWS, additional paleontological, archaeological, and historical data on wood bison in late Holocene Alaska and adjacent Canada were analyzed and presented in Stephenson et al. (2001) and a technical review of the feasibility assessment for establishing wood bison on the Yukon Flats by *The Wildlife Society*–Alaska Chapter (Griffith et al. 1998) was completed. In June 2002, Safari Club International requested that the FWS Director reverse the 1997 decision not to establish a population of wood bison on the Yukon Flats NWR, and to support Canada in their wood bison conservation program.

In light of Safari Club International's request and the availability of new information on bison in Alaska, in September 2002 the Director of FWS, the Regional Director of FWS in Alaska, and the Director of ADF&G's Division of Wildlife Conservation agreed that a joint review of the information on wood bison in Alaska, focusing on the identified concerns was needed. This review would then provide the basis to determine whether establishing wood bison in the Yukon Flats is consistent with FWS policies.

This paper is part of that review and summarizes information on wood bison in Alaska and Canada with particular emphasis on taxonomic status, historical accounts, factors influencing wood bison extirpation in Alaska, and wood bison ecology.

HISTORIC RANGE OF HOLOCENE BISON IN ALASKA

McDonald (1981) and Gates et al. (1992) estimated the historic range of wood bison, including Alaska, based on the locations of subfossil specimens. A more recent estimate by Stephenson et al. (2001) is based on additional archaeological and paleontological specimens as well as oral and written accounts, and is reproduced here (Fig 1). This map indicates that the range of bison in Alaska within the last 5,000 years was widespread, including the Tanana and Yukon basins in eastern Interior Alaska, north to the Brooks Range, south to Anchorage and west to about Ruby along the Yukon River. The historic range of Holocene bison in Alaska continues to be refined. It is well known that preservation of specimens during the Holocene was poor because of the moist, acidic conditions of the boreal forest. Nevertheless, additional specimens continue to be found (R. Stephenson, ADF&G, pers. commun.) that will hopefully improve the description of the former range of bison in Alaska.

TAXONOMIC STATUS OF HOLOCENE BISON IN ALASKA

North American bison, *Bison bison*, descended from ancestral stock that originally colonized North America from Eurasia via the Bering land bridge. Morphological and taxonomic studies indicate that wood bison and plains bison were the only bison subspecies that existed in North America during the late Holocene and that wood bison were the last type to occupy Alaska (Harington 1977; McDonald 1981; van Zyll de Jong 1986, 1993; Guthrie 1990).

Of the 58 Holocene bison specimens from Alaska and adjacent Canada (Table 1), 27 have been identified as wood bison, many based on measurements that fall within the ranges of those published for wood bison by van Zyll de Jong et al. (1995) (R. Stephenson, ADF&G, pers. commun.). Most of the remaining 31 specimens from the Holocene are also most likely wood bison since it is unlikely that two similar but distinct taxa of bison would coexist. Fifteen of the wood bison specimens are from Alaska, including 11 from the Yukon Flats. The most recent wood bison specimen from Alaska has a radiocarbon date of 170 years Before Present (BP); the most recent specimen from the Yukon Flats has a radiocarbon date of 1,730 years BP (Table 1).

PALEONTOLOGICAL, ZOOARCHAEOLOGICAL, AND ETHNOGRAPHIC INFORMATION ON WOOD BISON IN ALASKA

The historical evidence for wood bison in Alaska and adjacent Canada is detailed in Stephenson et al. (2001). Table 1 lists 58 Holocene bison specimens from 55 locations in Alaska and adjacent Canada. At least 15 of these specimens are from archaeological sites found in Alaska indicating human use of this taxon. Twenty-five of these specimens are from Alaska, including 15 from the Yukon Flats. Radiocarbon dates for the Alaska specimens range from 170 years BP to 8,860 years BP; the specimens from the Yukon Flats range from 1,730 years BP to 9,000 years BP. Table 1 also includes some bison specimens from the late Pleistocene in Alaska and nearby

Canada. Many of these are from the Yukon Flats attesting to the long occupancy of the area by bison.

The 170-year-old specimen is a well-preserved male skull with horn cores, suggesting that bison were present in Alaska until recently. It was found in 1969 emerging from the bank of Chester Creek in Anchorage, and has attracted attention, not only because of its recency but because some other bones found nearby have been dated as post-World War II (T. Heuer, FWS, pers. commun.). However, comparative analyses of the bones at the University of Alaska (Fairbanks) Museum and simultaneous redating of the skull and the other bones indicate these were not bison bones, but represent a small or medium-sized mammal (Gerlach, pers. commun.). A 370-year-old bison molar from adjacent Yukon, Canada and a 420-year-old skull from northwestern Northwest Territories also indicate the relatively recent occurrence of bison in the general region.

Stephenson et al. (2001) presented oral accounts of bison in Alaska from 15 Alaska Native elders describing the recent presence of bison in Alaska. Most of the accounts were stories passed down through generations describing the presence of bison, the importance of bison as a source of food and clothing, and how they were hunted. They also provided Athabascan names for bison. There were two secondhand and one firsthand account of bison on the Yukon Flats during the late 1800s and early 1900s. Stephenson et al. (2001) recognized the possibility of bias in oral accounts and attempted to reduce bias by conducting multiple interviews with individuals. They also compared their results with the results of two independent researchers who interviewed two of the elders and reviewed the other accounts.

Based on the narratives provided by the elders, and the specimen record, Stephenson et al. (2001) concluded that wood bison were widely distributed in the upper Yukon and Tanana River drainages until late in the Holocene and that they were sufficiently abundant to be an important natural resource to people of the area as recently as 200–300 years ago. Historic accounts have also been provided by First Nation elders in Yukon, Canada indicating that bison were also present during the late Holocene in this area and disappeared during the same general period (Lotenberg 1996).

Stephenson et al. (2001) conducted a “substantial but not exhaustive” search for early written documentation of wood bison in Alaska; they found little. Independent searches by FWS staff have been similarly unfruitful (T. Heuer and J. Stroebele, pers. commun.). We did not conduct an independent search for early written records.

There are two written accounts of bison in Alaska from the early to mid-1990s (Stephenson et al. 2001). Stephenson et al. (2001) reference the journal of James Geoghegan, who noted the presence of bison near Donnelly, Alaska in 1918 or 1920. They noted that the Geoghegan journal entries are confusing in terms of dates and he may have been referring to the plains bison that were released at Delta in 1928. C. Gardner examined a copy of the journal and concurs with the conclusion of Stephenson et al. (2001).

Stephenson et al. (2001) also mentions McKennan's (1965) formal ethnographic studies with the Chandalar Gwich'in and his interview with Chief Christian. McKennan (1965) stated "Muskoxen, now extinct in the area, were said to have frequented the Chandalar territory in former days, and a small mountain near the forks of Smoke Creek is known to the Natives as ch'itthay ik; which they translate as Muskox Shirt Mountain." However, McKennan's original field notes (copy of original document located in the archives, University of Alaska Fairbanks) documenting information obtained from Chief Christian differed from that statement. McKennan's field notes indicate that Chief Christian referred to this mountain as Buffalo Shirt Mountain but McKennan assumed this reference was incorrect. Stephenson et al. (2001) interviewed T. E. Taylor, a U.S. Geological Survey engineer who visited Venetie in 1956. He was told by the village elders and other residents that the mountain near Smoke Creek was called Buffalo Shirt Mountain because buffalo were formerly hunted there. Stephenson et al. (2001) recognized that the ambiguity of McKennan's notes remain difficult to explain because there were a few muskox present in the eastern Brooks Range until the late 1800s (Lent 1998).

FACTORS INFLUENCING THE DECLINE AND EXTIRPATION OF BISON FROM ALASKA

Skeletal remains and oral history accounts suggest that bison had largely disappeared from Interior Alaska during the last 200–400 years (Guthrie 1990; Stephenson et al. 2001). The possible cause(s) of extirpation were explored by Stephenson et al. (2001). They analyzed how various factors including predation, harvest by humans, habitat availability, and meteorological or climatic factors could have acted alone or in combination. This analysis concluded that habitat availability or environmental and climatic factors did not cause the extirpation of bison. Bison persisted in Alaska for at least several hundred thousand years despite climatic fluctuations that were far more variable during the Pleistocene compared to those during the Holocene (Stephenson et al. 2001).

The warmer and less arid conditions that occurred during the Pleistocene–Holocene transition favored the expansion of trees and shrubs in Interior Alaska resulting in a change from treeless steppe to boreal forest, with an accompanying reduction of grassland habitat (Guthrie 1990). Some other grazing species, such as horses and mammoths, disappeared from the region by the end of the Pleistocene. Bison, however, persisted in Interior Alaska and adjacent parts of Canada until recently. By the late Holocene, the amount of bison habitat in Alaska had become much reduced and discontinuous. Recent habitat studies, together with the successful introductions of plains bison in Alaska and wood bison in parts of Canada, suggest that the remaining grasslands could have supported viable bison herds (Berger et al. 1995).

If changes to climate and habitat alone did not cause the extirpation of bison, they may have increased the vulnerability of bison to predation, hunting, and stochastic effects through a reduction in herd size and increased isolation of herds. Various studies show that isolated populations of birds and mammals are more vulnerable to extinction than are contiguous populations (MacArthur and Wilson 1967; Brown 1978, 1986; Grayson 1991). Once a wood bison subpopulation became extirpated, geographic separation from other herds by large

expanses of forest would have reduced the chance of recolonization (Gates and Larter 1990; Stephenson et al. 2001).

Studies of bison herds in Alaska and Yukon suggest it is unlikely that predation by wolves and bears caused the extirpation of bison in Alaska (Gates and Larter 1990; DuBois and Stephenson 1998; Whitman and Stephenson 1998). In disease-free herds, wood bison are not the primary prey for bears or wolves. The history and status of the Farewell, Copper River, and Chitina plains bison herds in Southcentral Alaska illustrates how predators might affect relatively small, isolated herds. The Copper River and Chitina herds are limited by habitat (Tobey 2000, 2002). Wolf and grizzly bear populations are not limited by human harvest in these areas. Predators have been observed on bison kills but the occurrence is low. Fall composition data suggest that predators take some bison calves during the summer, and yearlings throughout the year, but predation has a minor effect on these three populations (Whitman and Stephenson 1998; Tobey 2000, 2002; Boudreau 2002). Harvest and accidents, and starvation in the Copper River and Chitina herds, are the primary limiting factors. The fact that predation has not reduced these isolated herds, two of which are habitat limited, suggests that predation alone did not cause the extirpation of wood bison from Alaska.

Archaeological data and oral accounts indicate that native peoples hunted wood bison in Alaska until wood bison disappeared during the last few hundred years. Several factors may have increased the vulnerability of small and discontinuous herds of bison to hunting: 1) the juxtaposition of late Holocene bison habitat with human settlements; 2) the scarcity of moose during the late Holocene that may have elevated the importance of bison as a subsistence resource, 3) behavioral traits of bison that increase their vulnerability to hunters and the likelihood that more than one animal would be killed during an encounter with humans; and 4) improvements in hunting technology, including the development of archery and the use of dogs, during the late Holocene (Stephenson et al. 2001) and the acquisition of metals through trade (D. Guthrie, pers. commun.).

There is evidence that aboriginal hunting in Alaska caused declines or local extirpation of other large mammals in the late Holocene, including Dall sheep, muskox, moose, and brown bears (LeResche et al. 1974; Campbell 1978; Coady 1980; Birkedal 1993; Lent 1998; Stephenson et al. 2001). Aboriginal hunting appears to have been an important factor in the decline or extirpation of muskoxen in parts of Canada and Alaska (Gunn et al. 1984; Will 1984; Lent 1998). The timing and causes for the disappearance of muskoxen and wood bison from Alaska appear to be similar (Stephenson et al. 2001).

CURRENT DISTRIBUTION, POPULATION SIZE, AND TAXONOMIC STATUS OF WOOD BISON

The history and population status of wood bison in Canada is summarized in Gates et al. (2001) and the number of wood bison currently found in Canada is summarized in Table 2. By September 2002, there were about 3,100 wood bison in six disease-free, free-ranging herds, including about 2,000 bison in the McKenzie population of Northwest Territories, 170 bison in the Nahanni/Laird River herd in the Northwest Territories, 530 wood bison in the Nisling River

herd in Yukon Territory, 234 bison in the Hay–Zama population in northwestern Alberta, 70 bison in the Chitek Lake population in Manitoba, and 60 bison in the Nordquist Flats population in British Columbia. An additional free-ranging population of 40–50 wood bison was established in 2002 in southeastern British Columbia at Enhithun Lake (C. Gates, pers. commun.). The status of these herds has a major bearing on any decisions by the Canadian and U.S. governments to delist or downlist this subspecies under Canada’s list of threatened and endangered species and the U.S.’s Endangered Species Act.

In addition, there are more than 4,000 other wood bison in four free-ranging herds that are either infected or exposed to bovine tuberculosis and bovine brucellosis (C. Gates, pers. commun.). Almost 900 additional wood bison are found in publicly-owned, captive breeding herds or privately-owned herds (Table 2).

All of the wood bison in the free-ranging, disease-free herds originated from bison discovered in 1957 in the Nyarling River area of Wood Buffalo National Park that were believed, at that time, to have escaped hybridization with plains bison introduced to Wood Buffalo National Park in 1925. The McKenzie population was founded with 18 wood bison from the Nyarling River area. All of the remaining disease-free herds came from stock from Elk Island National Park, which was founded with 21 wood bison from Nyarling River. Thus all existing wood bison originated from a relatively small number of animals. Wilson and Strobeck (1999) found that all wood bison herds today likely contain some plains bison genetic material in their gene pool, and that wood bison would be even more distinct genetically from plains bison had the introduction of plains bison to Wood Buffalo National Park not occurred.

Geist (1991) challenged the subspecific status of wood bison contending that phenotypic differences in size and pelage were the result of environmental influences such as food quality. Van Zyll de Jong et al. (1995) however, contend that differences in phenotypic characters between wood and plains bison are heritable. Molecular studies provide some clarity to the controversy from a management perspective, but do not completely resolve the question of subspeciation. Studies of blood characteristics, restriction fragment length polymorphisms, mitochondrial DNA haplotypes, and DNA microsatellites all found varying degrees of difference between plains and wood bison (Peden and Kraay 1979; Bork et al. 1991; Polziehn et al. 1996; Wilson and Strobeck 1999). Polziehn et al. (1996) did not dispute the subspecific status of plains and wood bison but conclude that they have only recently been separated from each other and neither is a well-defined taxon. Wilson and Strobeck (1999) concluded that the three populations of wood bison they studied were “functioning as entities distinct from plains bison, and should continue to be managed separately.”

ECOLOGICAL ISSUES AND CONCERNS

FWS and Griffith et al. (1998) pointed out several ecological concerns relative to establishing wood bison in Alaska, specifically on the Yukon Flats. These are the effects of bison on vegetative communities, the effects of bison on waterfowl, and the direct and indirect effects of

bison on moose. We address these issues below. More thorough treatments of wood bison ecology and behavior are available elsewhere (ADF&G 1994; Gates et al. 2001).

HABITAT AND FORAGING REQUIREMENTS

Wood bison are primarily grazers, foraging primarily on a variety of sedges and grasses, but also on shrubs, and where available, lichens on a seasonal basis (Reynolds et al. 1978; Reynolds and Hawley 1987; Gates and Larter 1990; Larter and Gates 1991). Wood bison show seasonal changes in habitat use and diet, selecting for forage that provides the highest amounts of crude protein (Larter and Gates 1991). During spring and summer, wood bison primarily use mesic meadows and eat a variety of sedges, grasses, and shrubs. They use a greater variety of habitats during the fall as forage quality declines. During winter, wet meadows are most often used and sedges constitute nearly 100% of the diet (Larter and Gates 1991). During most of the year, wood bison occur in small groups ranging from 1–60 animals. The larger groups include primarily cows, calves, and juveniles. Wood bison move frequently, generally remaining in a meadow for less than one day and moving before forage is depleted (Reynolds et al. 1978; Komers et al. 1993). Bison usually select only part of a plants annual growth (Reynolds et al. 1978).

Larter and Gates (1991) found that meadows represent 5–20% of most wood bison ranges in Canada. The Nisling herd in Yukon has increased 10–20% annually (M. Oakely, pers. commun.) on range that is comprised of less than 5% meadow habitat (Reynolds 1982), indicating that wood bison can thrive in areas where the proportion of meadow habitat is relatively low.

Snow depths up to 30 inches (76 cm) and 24 inches (61 cm) do not restrict foraging behavior of adult and calf bison, respectively (Van Camp 1975). Wood bison can withstand deeper snows without affecting mortality or productivity as long as wind or icing does not increase snow density. Plains bison have been observed foraging in snow about 4' deep in Yellowstone National Park (Meagher 1973). Wood bison are well adapted for cold weather and are commonly observed grazing in open meadows on calm days at temperatures approaching -50° F (Fuller 1962).

Berger et al. (1995) evaluated wood bison habitat on the Yukon Flats by sampling vegetation in 30 meadows greater than 200 acres and 88 meadows smaller than 200 acres in two areas totaling 1043 mi² near Fort Yukon. Meadows covered 7 and 11% of the two study areas, including both wet and dry meadows that supported plant communities similar to those in wood bison ranges in northern Canada. Berger et al. (1995) found that slough sedge (*Carex atherodes*) and other plant species commonly used by bison are abundant on the Yukon Flats. When available, slough sedge is the most important forage species for wood bison (Reynolds et al. 1978; Larter and Gates 1990; Fortin et al. 2003). Based on foraging models and comparisons with other wood bison habitat, Berger et al. (1995) estimated that the two intensively studied areas could support at least 2,000 wood bison. High quality bison habitat is interspersed within an area of approximately 3,800 mi² (ADF&G 1994).

Climatological data indicate that temperature, wind, and snow conditions on the Yukon Flats are similar to areas in northern Canada that support wood bison. There are numerous small, sheltered meadows (<200 acres) with plentiful forage that bison could use on the Yukon Flats if snow hardness becomes restrictive or wind chill too severe in large meadows (ADF&G 1994; Berger et al. 1995; Stephenson et al. 2001).

EFFECTS OF WOOD BISON ON VEGETATION COMMUNITIES

Ungulates can have a profound effect on plant species composition, richness, diversity, productivity, and physiognomy of plant communities (Smith 1990). Grazing intensity, frequency, and season influence the degree of impact. In general, ungrazed areas tend to have low species richness and diversity, overgrazed areas are species-poor and provide little forage value, while moderate grazing results in increased species diversity, richness, and quality (Smith 1990). Within preferred meadows, plant diversity will eventually increase as well as the presence of bare ground due to the development of bison wallows and trails (Smith 1990; S. DuBois, pers. commun.).

Smith (1990) studied the effects of wood bison on meadow habitats used as summer range in the Mackenzie Bison Sanctuary in Northwest Territories. This habitat is similar to the Yukon Flats, being characterized by open boreal forest interspersed with wet and dry meadows (Larter and Gates 1990). Smith (1990) found that moderate grazing caused increased productivity in many graminoid species, in part due to the reduced accumulation of dead material. Knapp et al. (1999) concluded that it is primarily the aboveground accumulation of dead plant material that limits productivity in undisturbed tallgrass prairie, and that like fire, bison grazing reduces dead biomass. Berger (1996) found that moderate grazing during the summer by the Delta bison herd did not affect aboveground primary productivity, but did enhance forage quality and cause changes in plant composition by reducing preferred grass species and leguminous plants in favor of less palatable sedges and forbs.

Smith (1990) hypothesized that wood bison increased plant productivity by acting as nutrient conduits, moving nutrients among vegetative sites, and as nutrient concentrators, harvesting nutrients over large areas and concentrating them in smaller areas. Bison grazing and wallowing can shift species composition of meadows from graminoid dominated, species-poor assemblages with low species diversity to species-rich, and more diverse associations of graminoids and forbs. Smith (1990) also found that grazing can temporarily reduce (by $\leq 10\%$) the height of meadow sedges and grasses. Wood bison grazed between 30% and 50% of the individual plants that were preferred species, selecting for the annual growth, and any changes to the physiognomy of meadow vegetation was limited to patches that quickly recovered. S. DuBois (ADF&G, pers. commun.) has observed that the effects of grazing and trampling in the preferred wintering areas on the Delta Junction Bison Range were not detectable during the following spring.

Grasslands and wild ungulates have coexisted for millions of years indicating the high sustainability of the grazing ecosystem (Frank et al. 1998). The key factors are the large spatial and temporal variation in mineral-rich forage, the ability of defoliated grass and sedges to

regrow, and the migratory nature of bison and other grazers. Typically, these grazers are continually on the move and grazing at any one site may be intense but never lasts long (Frank et al. 1998). When the grazers are removed, the functional character of the ecosystem is changed, transforming a consumer-controlled, rapidly cycling system into one that is detritivore based and slow cycling (Frank et al. 1998).

POSSIBLE EFFECTS OF WOOD BISON ON WATERFOWL

The Yukon Flats is one of the most productive waterfowl breeding areas in North America producing approximately 1.6 million ducks, geese, and swans annually (U.S. Fish and Wildlife Service 1987). The significance of the Flats for waterfowl breeding has increased because of waterfowl habitat loss in Canada and the continental United States. In terms of continental waterfowl populations, the Yukon Flats area is most important for production of lesser scaup and white-winged scoters; for Alaska, the Flats is most important for canvasback, mallard, American widgeon, green-winged teal, northern shoveler, and possibly Barrow's goldeneye (Hodges et al. 1996; M. Lindberg, UAF, pers. commun.). During 1988–1991, 26% of the breeding ducks in Alaska were found on the Yukon Flats (Grand 1995). The number of ducks observed per square mile of habitat was 116.2 on the Yukon Flats, the highest of any of the waterfowl survey areas in Alaska (Conant and Groves 2002). This area is also of continental importance in the number of molting ducks it supports. The possible effects of bison on waterfowl were raised as an issue by FWS and Griffith et al. (1998) because of the importance of the Flats for waterfowl.

Information regarding waterfowl nest distribution and density on the Yukon Flats is limited. The available data indicate that nest density is low compared to areas with less extensive habitat in the prairie pothole region and in Colorado. Grand (1995) intensively searched about 1,025 acres including meadow, shrub, and forested habitats along two lakes over three summers in the western portion of the Yukon Flats. The greatest number of nests found during any one year was 87 (0.08 nests/acre). M. Lindberg (UAF, pers. commun.) studied waterfowl nesting near five waterbodies and found that the most common nesting habitats for lesser scaup and canvasbacks were wet meadows adjacent to waterbodies. Nest density was low, with the greatest density on islands. White-winged scoter nests occurred at low density from water's edge to 400 m.

Sample sizes and sample areas were small in the Yukon Flat's studies because determining nest density was not the focus, but initial indications are that waterfowl nests are dispersed over the vast amount of suitable nesting habitat (about 7250 mi² or 4.64 million acres reported in Platte and Butler 1992). Waterfowl nests are much more concentrated in other nesting areas in North America. Gilbert et al. (1996) summarized nesting densities for areas in the prairie pothole region and in Colorado. The highest density occurred in a wet meadow habitat in Colorado (2.4 nests/acre) and an idle agricultural area in South Dakota (1.4 nests/acre). Nesting habitat in these areas was limited compared to the Yukon Flats, the largest being 58 mi².

There are numerous studies assessing the effects of cattle grazing on waterfowl (examples include Kirsch 1969; Mundinger 1976; Kantrud 1986; Gilbert et al. 1996) but none on bison and none in taiga wet meadows. Cattle grazing has been used as a tool to manage and improve

waterfowl nesting habitat in some areas, but its usefulness has been questioned (Kirsch 1969; Gilbert et al. 1996). Kirsch (1969), Mundinger (1976), and Gilbert et al. (1996) reported that even light grazing (evaluated grazing densities were 43–320 cattle/mi²) by cattle was detrimental to ducks. However, it is difficult to infer much about the effects of bison grazing on waterfowl from cattle grazing because the grazing behavior of cattle differs from that of bison, and the cattle grazing intensities that have been evaluated are much higher than those that would be associated with a free-ranging bison population.

Based on range use patterns of wood bison populations in Canada, densities approximate 5–7 bison/mi² of meadow habitat. The densities of cattle at which some negative effects of grazing have been documented range from approximately 43–320 cattle/mi² or more (Kirsch 1969; Mundinger 1976; Gilbert et al. 1996). Grazing during winter by cattle at densities ranging from approximately 116–320/mi² was found to reduce nesting habitat (Mundinger 1976) and nest density (Gilbert et al. 1996). Wood bison select for wet meadows during winter (Gates and Larter 1990) where probably most waterfowl nesting occurs on the Yukon Flats. Based on the regression models presented by Gilbert et al. (1996), and assuming wood bison population densities as described above, the effect of wood bison grazing on nesting density and success should approximate that in an ungrazed system. S. DuBois (ADF&G, pers. commun.) reports that extensive grazing by the Delta bison herd in preferred habitats during winter does not appear to affect the height or density of vegetation during the following summer.

Bison select different habitats during the year (Gates and Larter 1990; Larter and Gates 1991). Intensive grazing during nesting is more likely to hinder waterfowl production than grazing at other times of year (Glover 1956; Mundinger 1976). However, wood bison avoid wet meadows, the primary waterfowl nesting habitat (M. Lindberg, UAF, pers. commun.) during spring and summer (Larter and Gates 1991). This would tend to minimize nest disturbance and other potential effects of grazing. Bison are also unlikely to occur on nesting islands during this period. Wood bison select for dry meadows during the spring and summer. Waterfowl nesting occurs less frequently in these habitats, but they are still important for several species (D. Groves, pers. commun.). Larter and Gates (1994) observed no difference in the standing crop of vegetation in grazed and ungrazed dry meadows in an area supporting a herd of about 550 bison.

Bison generally graze in a given area for short periods (Reynolds et al. 1978) and differ from cattle in that they allocate less time to grazing during a set period (Peden 1996), select primarily for annual growth, and spend less time in an area before moving (Hein and Preston 1998). Because of these behavioral differences, the effect of bison on habitats will be different than that of cattle. Gilbert et al. (1996) suggest that grazing by native herbivores such as bison may provide a more suitable way to manage waterfowl habitat where some vegetation removal is necessary.

Although the effects of grazing by bison on waterfowl have not been studied in detail, there are relevant case studies. Elk Island National Park (75.5 mi²) includes boreal and aspen parkland habitat that supports approximately 227 bird species, including 50 wetland species (Burns and Cool 1986). Ungulate density is about 40/mi², with bison densities of 10–12/mi² relative to the

total park area, and more than 30 bison/mi² in grassland, sedge meadow, and shrub habitat (Blyth and Hudson 1987; Blyth et al. 1993). The number of lesser scaup, bufflehead, ring-necked ducks, blue-winged teal, gadwall, mallard, American widgeon and red-necked grebes that use the park during spring and fall migrations is in the tens of thousands (Burns and Cool 1986). American widgeon, lesser scaup, buffleheads, ruddy duck, common goldeneye, blue and green-winged teal, and mallard are common nesters in the park, using wet and dry meadows and tree cavities as nest sites (Burns and Cool 1986). Waterfowl have been inventoried in the park since the early 1900s with more intensive data collected since the 1930s. No management problems/concerns were reported for any of the waterfowl species due to competition with large mammals (Burns and Cool 1986). In the opinion of park biologists, the presence of bison has a beneficial effect on waterfowl populations by maintaining or increasing productivity and diversity of meadow vegetation (ADF&G 1994).

The status of bison and waterfowl in the Mackenzie Bison Sanctuary and Wood Buffalo Park also suggest a lack of any negative effect by bison on waterfowl. Both areas support substantial populations of waterfowl similar in species composition to the Yukon Flats. Biologists familiar with the ecology of these areas see no evidence of adverse effects (ADF&G 1994). There is also no indication of adverse effects of wood bison on waterfowl populations in the Mills Lake area near Fort Providence, NWT. Surveys show Mills Lake has continued to be an important premigratory and migratory staging area for large numbers of tundra swans, lesser snow and greater white-fronted geese, as well as large numbers of ducks during the past 25 years. Wood bison have used the wetlands surrounding Mills Lake on a regular basis, especially in years when water level in the Mackenzie River recedes enough to allow access to sedge meadows (P. Latour, Canadian Wildlife Service, pers. commun.). Based on his experience conducting aerial waterfowl surveys in Wood Buffalo National Park, FWS biologist C. Ferguson (pers. commun.), could see no reason to anticipate negative effects of bison on waterfowl, noting that waterfowl populations are known to be affected by numerous other factors that are far more important.

INTERACTIONS BETWEEN WOOD BISON AND MOOSE

Moose are the only ungulate that regularly occurs on the Yukon Flats. Densities on the Flats are low, ranging from 0.2–0.3 moose/mi² (Stephenson 2002). Griffith et al. (1998) suggested there could be possible effects of wood bison on the Yukon Flats moose population if there was competition for browse. FWS voiced concerns that if the presence of bison caused wolf numbers to increase then increased wolf predation on moose may result.

Potential Competition for Forage

In Alaska, the Delta (400–475 bison) and Farewell (350 bison) bison herds coexist with high-density moose populations (1–2 moose/mi²). Bison and moose are commonly observed feeding and resting in close proximity, suggesting a high degree of behavioral tolerance (S. DuBois and J. Whitman, ADF&G, pers. commun.). Generally, there is little competition for food because moose and bison rely on different forage types. Wood bison are primarily grazers, consuming mainly sedges and grasses, while moose are primarily browsers, relying on willow,

birch, and aspen. In Elk Island National Park, Blyth and Hudson (1987) found little overlap in the food of bison and moose despite relatively high overlap in habitat use.

Bison forage on willows shrubs to varying degrees during May and June, taking advantage of the period when willow leaves are high in protein and low in fiber (Waggoner and Hinkes 1986; Larter and Gates 1991; Berger 1996). Larter and Gates (1991) reported that shrubs comprised 50% of the Mackenzie wood bison herd's May diet. During June, the proportion of shrubs in the diet ranged from 10% to 35% and varied considerably between years. The greatest use occurred when sedges were not available. Waggoner and Hinkes (1986) reported that during June along the migration route, 94% of the bison diet in the Farewell herd was shrubs. Due to the topography in this area, bison movements are limited and there are few areas of grass or sedge. Larter and Gates (1991) reported that wood bison did not actively seek areas with the highest biomass of high-quality willow, but used willow opportunistically where available. M. Berger (pers. commun.) noted that the available biomass of sedges and grass in and around the meadows surveyed on the Yukon Flats was much higher than that of palatable willows.

High quality moose browse appears to be abundant on the Yukon Flats, as indicated by high moose calf weights and high twinning rates, and relatively low browsing intensity (Bertram and Vivion 2002; Stephenson 2002; Seaton in press; T. Seaton and C. Fleener, unpublished data). A comparison of moose browsing intensity on the Yukon Flats with other areas in Interior Alaska indicates that forage availability is not limiting population growth (Gasaway et al. 1983; Risenhoover 1987; Stephenson 2002). Most dietary overlap between moose and bison occurs during late spring/early summer when forage quality and quantity is highest and competition between species would be lowest. The amount of browse consumed during the spring by a wood bison herd at a minimum viable population level (recommended by Gates et al. 2001 at > 400 bison) would be small, would affect a relatively small area, and should not be detrimental to moose.

Potential for Indirect Effects on Wolf–Moose Relationships

FWS has questioned if the presence of wood bison would affect the wolf–moose relationship on the Yukon Flats. Their concerns are based on a hypothesis presented by Larter et al. (1994) who suggested that a large bison population could indirectly result in increased wolf predation on moose. They suggested that wolf numbers and predation rates on moose appeared to be higher, and moose numbers lower, in a portion of the Mackenzie Bison Sanctuary that supported about 1,900 bison compared to an adjacent area that supported about 550 bison.

In many areas in Alaska and northern Canada, moose populations are often maintained at low density equilibrium ($0.2\text{--}1.0$ moose/mi²) due to wolf and bear predation (Gasaway et al. 1983, 1992). This situation can occur regardless if moose are the only ungulate species in an area or if other ungulate species are present and moose remain the preferred prey. Disease-free wood bison have not been found to be the preferred prey for wolves but wolves can be an important predator on bison, especially on calves (Oosenbrug and Carbyn 1985; Van Camp and Calef 1987; Carbyn and Trottier 1988; Larter et al. 1994). The hypothesis presented by Larter et al. (1994) suggests

that moose continue to be the primary prey for wolves, while bison become alternate prey that allow wolf numbers to increase, resulting in yet higher predation on moose.

The Yukon Flats moose population has been at low equilibrium density since the 1970s, currently exists at 0.2–0.3 moose/mi², and appears to be limited by bear and wolf predation and harvest by humans. Wolves occur at low density on the Yukon Flats (4.4–5.4 wolves/1000 km²), are lightly harvested, and are probably limited by food availability (Stephenson 2000). Evidence from areas where moose, bison, wolves and bears are present indicates that moose would continue to be the preferred prey for wolves on the Yukon Flats (Larter and Gates 1994; S. DuBois and J. Whitman, ADF&G, pers. commun.).

The conditions that would hypothetically be necessary to cause changes in wolf prey selection and increased predation on moose do not seem to occur during the first 15–20 years after wood bison are established in an area. Wolf predation on wood bison still has not been detected 15 years after their release in the Nisling River valley (B. Hayes, M. Oakley, Yukon Department of Environment, pers. commun.) and was not detected during the first 19 years in the Mackenzie Bison Sanctuary (Gates and Larter 1990). Both herds increased by at least 15% annually during these periods, suggesting low levels of predation. Few wolf kills have been documented in the 40-year history of the Farewell herd, which has numbered 300–400 bison since 1992 (Whitman and Stephenson 1998; Boudreau 2002). These studies indicate there is little interaction between wolves and bison when bison numbers are below 500 (Gates et al. 2001; Boudreau 2002; DuBois 2002) and are not limited by habitat (Gates and Larter 1990). Based on the empirical evidence, Gates et al. (2001) concluded that the potential for indirect effects of bison on moose or other ungulates can be mitigated by limiting bison population size.

Another factor that would determine how the presence of bison might affect wolf numbers is the number of packs that could be affected by an increased prey base. The range of a Yukon Flats wood bison population of about 400 animals would probably include about 700 mi², based on population behavior in Mackenzie Bison Sanctuary (Gates and Larter 1990). A range of this size would most likely include parts of only a few wolf pack territories. Burch (2002) reported an average home range of 886 mi² for wolf packs in nearby Yukon–Charley Rivers National Preserve, where moose density is similar to the Yukon Flats (0.3 moose/mi²).

If wood bison were allowed to increase to high numbers ($\geq 1,000$) on the Yukon Flats and range expansion occurred including more wolf packs, there is evidence that the hypothesis outlined by Larter et al. (1994) would still not apply. Systematic moose surveys (Shank 1991; Bradley and Johnson 2000) conducted in Larter et al.'s study area found no difference in moose densities between the two areas with different bison numbers which contradicts their hypothesis.

Predation on bison by black or brown bears has rarely been documented and does not appear to be a significant source of mortality for any bison herd, regardless of size. The existence of wood bison on the Yukon Flats is unlikely to cause changes in bear numbers or bear predation rates on moose.

Based on changes in moose composition within the range of the Yukon wood bison herd, the existence of wood bison on the Yukon Flats could eventually benefit the moose population indirectly by reducing hunting pressure on moose. The wood bison herd in southern Yukon numbers about 500 bison and hunting has been allowed since 1998. Moose density in that area was about 0.2 moose/mi² and was limited by predation and hunting. Harvest of cow moose was one of the factors limiting the population. The annual bison harvest quota is presently 80–100, with about 20 bison allocated to the First Nation. This has led to a reduction in the harvest of cow moose (B. Hayes, M. Oakley, Yukon Department of Environment, pers. commun.).

DISEASE ISSUES

The diseases of greatest concern in bison conservation are bovine tuberculosis, bovine brucellosis, and anthrax (Gates et al. 2001). Serologic and empirical evidence indicates that neither bovine brucellosis nor tuberculosis is present in Alaska. There are also no records of anthrax in Alaska. Wood bison are not known to harbor parasites that could adversely affect Alaskan wildlife. There is little reason to expect that wood bison might contract a pathogenic disease endemic to Alaska wildlife (ADF&G, 1994). *Brucella suis* biovar IV is serologically evident in various caribou herds and sometimes in other ungulates (Zarnke 1991). However, this disease does not appear to be pathogenic in bison, and is not a disease risk (Bevins et al. 1996).

The threat of introducing diseases in Alaska through importation of wood bison from Canada is minimal. Strict disease testing and health certification requirements would be followed (ADF&G 1994). There are certified disease-free sources for wood bison in Canada (Table 1) including Elk Island National Park in Alberta, Canada which has had been certified as disease-free for decades. Anthrax is not known to occur at Elk Island National Park (ADF&G 1994). Disease testing and disease-free certification are required for export by Elk Island National Park/Parks Canada and for import by the State of Alaska. Established and proven testing protocols for diseases are in place. As an additional precaution, bison could be treated with a broad-spectrum parasiticide (Ivermectin) before being transported. The effectiveness of this overall approach is proven with the establishment of six wild and several captive disease-free wood bison herds in Canada.

ACKNOWLEDGMENTS

We thank Dr. Kimberlee Beckmen, Mark Bertram, Craig Fleener, Dr. Cormack Gates, Dr. S. Craig Gerlach, Dr. Dale Guthrie, Ted Heuer, David James, Bob Stephenson, and Pat Valkenburg for reviewing an earlier draft of this paper. Bob Stephenson provided unpublished data on wood bison specimens included in Table 1.

LITERATURE CITED

- ALASKA DEPARTMENT OF FISH AND GAME. 1994. Reintroducing wood bison to the upper Yukon valley, Alaska: a feasibility assessment. Alaska Department of Fish and Game, Fairbanks, Alaska, USA. 94 pp.
- BERGER, M. 1996. Summer habitat relationships and foraging ecology of the Delta bison herd. Thesis, University of Alaska Fairbanks, Alaska, USA. 113 pp.

- BERGER, M., R. O. STEPHENSON, P. KARCZMARCZYK, AND C. C. GATES. 1995. Habitat inventory of the Yukon Flats as potential wood bison range. Alaska Department of Fish and Game, Fairbanks, Alaska, USA.
- BERTRAM, M. AND M. VIVION. 2002. Moose mortality in eastern Interior Alaska. *Journal of Wildlife Management* 66(3):747–756.
- BEVINS, J. S., J. E. BLAKE, L. G. ADAMS, J. W. TEMPLETON, J. K. MORTON, AND D. S. DAVIS. 1996. The pathogenicity of *Brucella suis* biovar IV for bison. *Journal of Wildlife Diseases* 32(4):581–585.
- BIRKEDAL, T. 1993. Ancient hunters in the Alaska wilderness: human predators and their role and effect on wildlife populations and the implications for resource management. In: *Partners in Stewardship; Proceedings of the Seventh Conference on Research and Resource Management in Parks and on Public Lands*, edited by W. E. Brown and S. D. Veirs, pp. 228–234. The George Wright Society, Hancock.
- BLYTH, C. B., AND R. J. HUDSON. 1987. A plan for the management of vegetation and ungulates, Elk Island National Park. Parks Canada. Unpublished Report. 343 pp. + appendix.
- BLYTH, C. B., N. L. COOL, A. DICKINSON, B. MCDUGALL, R. KAYE, W. OLSON, D. MADSEN, AND T. OSCO. 1993. Ecosystem status and management recommendations, Elk Island National Park. Heritage Resource Conservation. Unpublished Report. 49 pp.
- BORK, A. M., C. M. STROBECK, F. C. YEH, R. J. HUDSON, AND R. K. SALMON. 1991. Genetic relationship of wood bison and plains bison based on restriction fragment length polymorphisms. *Canadian Journal of Zoology* 69:43–48.
- BOUDREAU, T. A. 2002. Farewell bison management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-27-3 and W-27-4. Study 9.0. Juneau, Alaska, USA.
- BRADLEY, M. AND F. JOHNSON. 2000. Fort Providence moose census, November–December 1997. Department of Natural Resources, Wildlife and Economic Development. Government of the Northwest Territories, Fort Smith, NWT. Manuscript Report 135. 16 pp.
- BROWN, J. H. 1978. The theory of insular biogeography and the distribution of boreal mammals and birds. In: *Intermountain Biogeography: A Symposium*, edited by K. T. Harper and J. L. Reveal, pp. 209–228. Great Basin Naturalist Memoirs 2.
- BROWN, J. H. 1986. Two decades of interaction between the MacArthur–Wilson model and the complexities of mammalian distributions. *Biological Journal of the Linnean Society* 28:231–251.
- BURCH, J. 2002. Ecology and demography of wolves in Yukon–Charley Rivers National Preserve, Alaska. Technical Report NPS/AR/NRTR-2001/41. National Park Service–Alaska Region.

- BURNS, G. R. AND N. L. COOL. 1986. A biophysical inventory of the birds of Elk Island National Park. Final Report. Parks Canada. Edmonton, Alberta. 480 pp.
- CAMPBELL, J. M. 1978. Aboriginal human overkill of game populations: Examples from Interior Alaska. *In: Archaeological Essays in Honor of Irving B. Rouse*, edited by R. C. Dunnell and E. S. Hall, pp. 179–208. Mouton Publishers, New York.
- CARBYN, L. N. AND T. TROTTIER. 1988. Description of wolf attacks on bison calves in Wood Buffalo National Park. *Arctic* 41:297–302.
- COADY, J. W. 1980. History of moose in northern Alaska and adjacent regions. *Canadian Field Naturalist* 94:61–68.
- CONANT, B. AND D. J. GROVES. 2002. Waterfowl breeding population survey: Alaska–Yukon (crew area 1). Unpublished report. U.S. Fish and Wildlife Service. Juneau, Alaska, USA. 35 pp.
- DUBOIS, S. D. 2002. Delta bison management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-27-3 and W-27-4. Study 9.0. Juneau, Alaska, USA.
- DUBOIS, S. D. AND R. O. STEPHENSON. 1998. Alaska's Delta bison herd: Managing free-ranging bison in an area with diverse land uses. *In: International Symposium on Bison Ecology and Management in North America*, edited by L. Irby and J. Knight, pp. 211–213. Montana State University, Bozeman.
- FORTIN D., J. M. FRYXELL, AND L. O'BRODOVICH. 2003. Foraging ecology of bison at the landscape and plant community levels: the applicability of energy maximization principals. *Oecologia* 134:219–227.
- FRANK, D. A., S. J. MCNAUGHTON, AND B. F. TRACY. 1998. The ecology of the earth's grazing ecosystems. *BioScience* 48(7):513–521.
- FULLER, W. A. 1962. The biology and management of the bison of Wood Buffalo National Park. Canadian Wildlife Service Wildlife Management Bulletin Series 1(16).
- GASAWAY, W. C., R. O. STEPHENSON, J. L. DAVIS, P. E. K. SHEPHERD, AND O. E. BURRIS. 1983. Interrelationships of wolves, prey, and man in Interior Alaska. *Wildlife Monographs* 84. 50 pp.
- GASAWAY, W. C., R. D. BOERTJE, D. V. GRANGAARD, D. G. KELLEYHOUSE, R. O. STEPHENSON, AND D. G. LARSEN. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. *Wildlife Monographs* 120. 59pp.
- GATES, C. C. AND N. C. LARTER. 1990. Growth and dispersal of an erupting large herbivore population in northern Canada: the Mackenzie wood bison (*Bison bison athabasca*). *Arctic* 43:231–238.
- GATES, C. C., T. CHOWNS, AND H. W. REYNOLDS. 1992. Wood buffalo at the crossroads. Pages 139–165 in J. Foster, B. Harrison, and I. S. MacLaren, editors. Alberta: studies on

- the arts and sciences. Vol. 3(1). Special Issue on the Buffalo. University of Alberta Press, Edmonton.
- GATES, C. C., R. O. STEPHENSON, H. W. REYNOLDS, C. G. VAN ZYLL DE JONG, H. SCHWANTJE, M. HOEFS, J. NISHI, N. COOL, J. CHISOLM, A. JAMES, AND B. KOONZ. 2001. National recovery plan for the wood bison (*Bison bison athabasca*). National Recovery Plan No. 21. Recovery of Nationally Endangered Wildlife (RENEW). Ottawa, Ontario. 50 pp.
- GEIST, V. 1991. Phantom subspecies: The wood bison *Bison bison* "athabasca" Rhoads 1897 is not a valid taxon, but an ecotype. *Arctic* 44:283–300.
- GILBERT, D. W., D. R. ANDERSON, J. K. RINGELMAN, AND M. R. SZYMCAK. 1996. Response of nesting ducks to habitat and management on the Monte Vista National Wildlife Refuge, Colorado. *Wildlife Monographs* 131. 44 pp.
- GLOVER, F. A. 1956. Nesting and production of the blue-winged teal (*Anas discors Linnaeus*) in Northwest Iowa. *Journal of Wildlife Management* 20:28–46.
- GRAND, J. B. 1995. Nesting success of ducks on the central Yukon Flats, Alaska. *Canadian Journal of Zoology* 73:260–265.
- GRAYSON, D. K. 1991. The biogeographic history of mammals in the Great Basin: Observations on the last 20,000 years. *Journal of Mammalogy* 68:359–75.
- GRIFFITH, B., R. T. BOWYER, J. S. SEDINGER, P. MORROW, G. BUCARIA, AND R. POST. 1998. Technical peer review of reintroducing wood bison to the Upper Yukon Valley, Alaska: A feasibility assessment. Unpublished report. Alaska Chapter of *The Wildlife Society*. 14 pp.
- GUNN, A., R. DECKER, AND T. W. BARRY. 1984. Possible Causes and Consequences of an expanding muskox population, Queen Maud Gulf Area, Northwest Territories. In: *Proceedings of the First International Muskox Symposium*, D. R. Klein, R. G. White and S. Keller, editors. Biological Papers of the University of Alaska, Special Report 4:41–46.
- GUTHRIE, R. D. 1990. *Frozen Fauna of the Mammoth Steppe: The Story of Blue Babe*. The University of Chicago Press, Chicago, Illinois, USA.
- HARINGTON, C. R. 1977. Pleistocene mammals of the Yukon Territory. Dissertation, University of Alberta, Edmonton, Canada. 1060 pp.
- HEIN, F. J. AND C. R. PRESTON. 1998. Summer nocturnal movements and habitat selection by *Bison bison* in Colorado. In: *International Symposium on Bison Ecology and Management in North America*, L. Irby and J. Knoght, editors. pp. 96–106. Montana State University, Bozeman, Montana, USA.
- HODGES, J. I., J. G. KING, B. CONANT, AND H. A. HANSON. 1996. Aerial surveys of water birds in Alaska 1957–94: Population trends and observer variability. Information and Technology Report 4. U.S. Department of the Interior–National Biological Service. 24 pp.

- KANTRUD, H. A. 1986. Effects of vegetation manipulation on breeding waterfowl in prairie wetlands: a literature review. U.S. Fish and Wildlife Service, Fish Wildl. Tech. Rep. 3. 15 pp.
- KIRSCH, L. M. 1969. Waterfowl production in relation to grazing. *Journal of Wildlife Management* 33:821–828.
- KNAPP, A. K., J. M. BLAIR, J. M. BRIGGS, S. L. COLLINS, D. C. HARNETT, L. C. JOHNSON, AND E. G. TOWNE. 1999. The keystone role of bison in North American Tallgrass Prairie. *Bioscience* 49(1):39–50.
- KOMERS, P. E., F. M. MESSIER, AND C. C. GATES. 1993. Group structure in wood bison: nutritional and reproductive determinants. *Canadian Journal of Zoology* 71(7):1367–1371.
- LARTER, N. C. AND C. C. GATES. 1990. Home ranges of wood bison in an expanding population. *Journal of Mammalogy* 71:604–607.
- LARTER, N. C. AND C. C. GATES. 1991. Diet and habitat selection of wood bison in relation to seasonal changes in forage quantity and quality. *Canadian Journal of Zoology* 69:2677–2685.
- LARTER, N. C. AND C. C. GATES. 1994. Home-range size of wood bison: effects of age, sex, and forage availability. *Journal of Mammalogy* 75:142–149.
- LARTER, N. C., A. R. E. SINCLAIR AND C. C. GATES. 1994. The response of predators to an erupting bison, *Bison bison athabasca*, population. *Canadian Field-Naturalist*. 108:318–327.
- LENT, P. 1998. Alaska's Indigenous Muskoxen: A History. *Rangifer* 18:133–144.
- LERESCHE, R. E., R. H. BISHOP AND J. COADY. 1974. Distribution and habitat of moose in Alaska. *Naturaliste Canadien* 101:143–178.
- LOTENBERG, G. 1996. History of wood bison in the Yukon: A reevaluation based on traditional knowledge and written records. Report submitted to Yukon Department of Renewable Resources, Whitehorse.
- MACARTHUR, R. H. AND E. O. WILSON. 1967. *The Theory of Island Biogeography*. Princeton University Press, Princeton.
- MCDONALD, J. N. 1981. North American bison, their classification and evolution. University of California Press, Berkely.
- MCKENNAN, R. A. 1965. *The Chandalar Kutchin*. Arctic Institute of North America Technical Paper 17, Montreal.
- MEAGHER, M. 1973. The bison of Yellowstone National Park. NPS Scientific Monograph. No. 1. USGPO. Washington, D.C. 161 pp.
- MUNDINGER, J. G. 1976. Waterfowl response to rest–rotation grazing. *Journal of Wildlife Management* 40:60–68.

- OLOSENBRUG, S. AND L. N. CARBYN. 1985. Wolf predation of bison in Wood Buffalo National Park. Canadian Wildlife Service Final Report. 264 pp.
- PEDEN, D. G. 1976. Botanical composition of bison diets on shortgrass plains. *American Midland Naturalist* 996:225–229.
- PEDEN, D.G. AND G. J. KRAAY. 1979. Comparison of blood characteristics in plains bison, wood bison, and their hybrids. *Canadian Journal of Zoology* 57: 1778–1784.
- PLATTE, R. M. AND W. I. BUTLER. 1992. Aerial surveys and mapping of water bird distribution and abundance for impact assessment of potential oil development on Yukon Flats National Wildlife Refuge, Alaska. USDI, Fish and Wildlife Service, Migratory Bird Management. Unpublished Report. Anchorage, Alaska, USA. 12 pp.
- POLZIEHN, R. O., R. BEECH, J. SHERATON, AND C. STROBECK. 1996. Genetic relationships among North American bison populations. *Canadian Journal of Zoology* 74:738–749.
- REYNOLDS, H. W. 1982. Range assessment of the Nisling River valley, Yukon Territory, as habitat for wood bison. Unpublished report. Canadian Wildlife Service (Edmonton, Alberta). 64 pp.
- REYNOLDS, H. W. AND A. W. L. HAWLEY. 1987. Bison ecology in relation to agricultural development in the Slave River lowlands, N.W.T. Canadian Wildlife Service Occasional Paper 63. 74 pp.
- REYNOLDS, H. W., R. M. HANSEN, AND D. G. PEDEN. 1978. Diets of the Slave River lowland bison herd, Northwest Territories, Canada. *Journal of Wildlife Management* 42:581–590.
- RISENHOOVER, K. L. 1987. Winter foraging strategies of moose in subarctic and boreal forest habitats. Dissertation, Michigan Technological University, Houghton. 108 pp.
- SEATON, C. T. In press. A preliminary relationship between browse plant architecture and moose twinning rate. *Alces*.
- SHANK, C. 1991. Fort Providence moose survey–November 1991. G.N.W.T. Draft Manuscript Report. 51 pp.
- SMITH, D. L. 1990. The impacts of wood bison (*Bison bison athabasca*) grazing on a sub-hygic Shrub Meadow plant community type, Mackenzie Bison Sanctuary, Northwest Territories. Thesis, University of Alberta. 215 pp.
- STEPHENSON, R. O. 2000. Units 25A, 25B, 25D, 26B, and 26C wolf management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-24-5 and W-27-2. Study 14.0. Juneau, Alaska, USA.
- STEPHENSON, R. O. 2002. Units 25A, 25B, and 25D moose management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-27-3 and W-27-4. Study 1.0. Juneau, Alaska, USA.
- STEPHENSON, R. O, S. C. GERLACH, R. D. GUTHRIE, C. R. HARINGTON, R. O. MILLS AND G. HARE. 2001. Wood bison in late Holocene Alaska and adjacent Canada: paleontological,

- archaeological and historical records. *Wildlife and People in Northern North America. Essays in Honor of R. Dale Guthrie*. S. C. Gerlach and M. S. Murray, editors. British Archaeological Reports, International Series 944.
- TOBEY, R. W. 2000. Unit 11 Copper and Chitina bison management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-27-1 and W-27-2. Study 9.0. Juneau, Alaska, USA.
- TOBEY, R. W. 2002. Unit 11 Copper and Chitina bison management report of survey–inventory activities. Alaska Department of Fish and Game. Grants W-27-3 and W-27-4. Study 9.0. Juneau, Alaska, USA.
- U.S. FISH AND WILDLIFE SERVICE. 1987. Final Yukon Flats National Wildlife Refuge comprehensive conservation plan, environmental impact statement, and wilderness review. U.S. Fish and Wildlife Service. Anchorage, Alaska, USA.
- VAN CAMP, J. 1975. Snow conditions and the winter feeding behavior of *Bison bison* in Elk Island National Park. Canadian Wildlife Service Report CWS-53-75. 91 pp.
- VAN CAMP, J. AND G. W. CALEF. 1987. Population dynamics of bison. Pages 21–23 in H. W. Reynolds and A. W. L. Hawley, editors: *Bison ecology in relation to agriculture development in the Slave River lowlands, NWT*. Occasional Paper 63. Canadian Wildlife Service (Ottawa, ON). 74 pp.
- VAN ZYLL DE JONG, C. G. 1986. A systematic study of recent bison with particular consideration of the wood bison. Canada National Museum of Natural Sciences Publications in Natural Sciences 6. 69 pp.
- VAN ZYLL DE JONG, C. G. 1993. Origin and geographic variation of recent North American bison. *Alberta: Studies in the Arts and Sciences* 3(2):21–35.
- VAN ZYLL DE JONG, C. G., C. GATES, H. REYNOLDS, AND W. OLSON. 1995. Phenotypic variation in remnant populations of North American bison. *Journal of Mammalogy* 76:391–405.
- WAGGONER, V. AND M. HINKES. 1986. Summer and fall browse utilization by an Alaskan bison herd. *Journal of Wildlife Management* 50(2):322–324.
- WHITMAN, J. S. AND R. O. STEPHENSON. 1998. History and management of the Farewell bison herd, Alaska. In: *International Symposium on Bison Ecology and Management in North America*, L. Irby and J. Knight, editors. pp. 267–270. Montana State University, Bozeman, Montana, USA.
- WILL, R. T. 1984. Muskox procurement and use on Banks Island by nineteenth century Copper Inuit. *Biological Papers of the University of Alaska. Special Report* 4:153–161.
- WILSON, G. A. AND C. STROBECK. 1999. Genetic variation within and relatedness among wood and plains bison populations. *Genome* 42:483–496.
- ZARNKE, R. L. 1991. Serologic survey of Alaska wildlife for microbial pathogens. Alaska Department of Fish and Game. Federal Aid in Wildlife Restoration. Research Final Report. Projects W-22-6 through W-23-4. Study 18.6. Juneau, Alaska, USA. 58 pp.

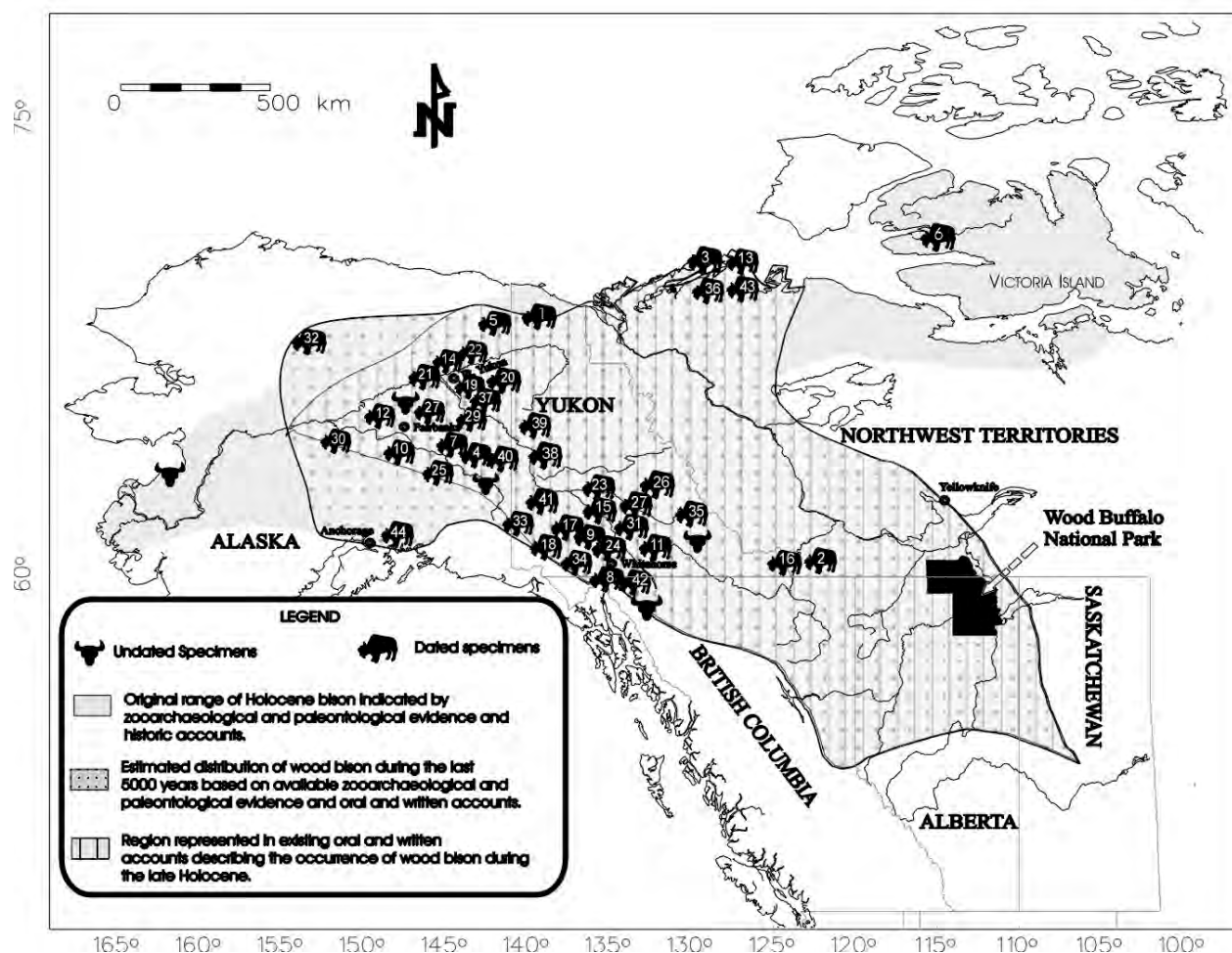


Figure 1. Approximate location of Holocene bison remains in Alaska and adjacent Canada, and estimated original and late Holocene range of wood bison in North America based on available zooarchaeological, paleontological, oral and written historical documentation (Stephenson et al. 2001). Location numbers correspond to map numbers in Table 1. Figure does not include findings since 2001.

Table 1. Location and radiocarbon dates for bison specimens representing the end of the Pleistocene-Holocene transition or the Holocene in Alaska and adjacent Canada. Map numbers for specimens dated to within the last 10,000 years correspond with those in Figure 3. Most radiocarbon ages are corrected for isotopic fractionation. **Note:** this table (from Stephenson et al. 2001) is being periodically updated. This version reflects additional radiocarbon dates for Holocene bison in Alaska and adjacent Canada, as well as late Pleistocene dates for the upper Yukon region. Dates added to the original table are in bold font.

Map No.	Location	Conventional Radiocarbon Age	Reference	Lab No.	Comments
	Black R. (Englishhoe Bar), Yukon Flats, AK	58,200±3900	B. Shapiro, <i>pers commun</i>	OxA-11276	Bison radius
	Black R. (Englishhoe Bar), Yukon Flats, AK	57,700±3200	B. Shapiro, <i>pers commun</i>	OxA-11138	Male bison humerus
	Black R. (Englishhoe Bar), Yukon Flats, AK	49,100±1700	B. Shapiro, <i>pers commun</i>	OxA 11164	Bison tibia
	Black R. (Cutoff), Yukon Flats, AK	40,800±1600	B. Shapiro, <i>pers commun</i>	OxA-11275	Female bison humerus
	Black R. (Salmon Fork), eastern AK.	37,590±660	S. Dickson, <i>pers. commun.</i>	Beta-108404	Male bison skull and horn cores, vertebrae
	Black R. (Englishshoe bar), Yukon Flats, AK	36,500±2200	ADF&G, this study	AA- 49155	Female Bison horn core and cranium
	Lower Rampart Cave, Porcupine R., AK	21,050±320	Dixon 1984	DIC-1333	Bison metacarpal
	Limestone Gulch, White Mts., AK	13,300±160	R. Mills, BLM, <i>pers commun.</i>	AA-44530 AK-029-001-1	Bison tarsal found in small cave
	Black R. (near mouth), Yukon Flats, AK	12,425±45	B. Shapiro, <i>pers commun.</i>	OxA-12067	Bison radius
-----	Old Crow, (Loc. 11-1), Y.T.,	11,990±180	Harrington 1978	I-7765	Bison scapula
-----	Fairbanks Creek, AK	11,980±135	Harrington 1978	ST-1633	Bison bone
-----	Old Crow, (Loc. 11-1), Y.T.,	11,990±180	Harrington 1978	I-7765	Bison scapula
-----	Birch Creek, Yukon Flats, AK	11,900±70	ADF&G, this study	Beta-67494	Female bison skull with horn sheaths
-----	Cleary Creek, AK	11,735±130	Péwé 1975	ST-1631	Bison bone
-----	Old Crow Flats, Y.T.	11,530±200	Harrington 1977	QU-780	Bison humerus
-----	Broken Mammoth Site, Delta Junction, AK. Cultural Zone IV	11,510±120 11,420±70	Holmes 1996	WSU-4262 CAMS-5358	Bison bones with processing marks; associative charcoal dates at hearth site
-----	Dry Creek, AK	10,715±225	Guthrie 1985	ST-1561	Bison bone
-----	Lost Chicken Creek, AK	10,370±160	Harrington 1978	I-8582	Distal portion of bison tibia, evidently modified by humans
-----	Broken Mammoth Site, Delta Junction, AK. Cultural Zone III	10,290±70 10,270±110	Holmes 1996	CAMS-5357 WSU-4263	Bison bones with processing marks; associative charcoal dates at hearth site

Map No.	Location	Conventional Radiocarbon Age	Reference	Lab No.	Comments
	Bluefish Cave II (MgVo-2), Y.T.	10,230±140	Burke and Cinq-Mars 1998	RIDDL-561	Bison metacarpal at archaeological site
1	Engigstciak Site, Y.T.	9,870±180 9,770±180 9,400±230	Cinq-Mars et al. 1991	RIDDL-362 RIDDL-281 RIDDL-319	Bison bones (tibia, metacarpal, and metatarsal) showing processing marks
2	Muskeg River, N.T.	9,645± 190	R. Harington, this study	I-9997	Bison cranial fragment
3	Cape Bathurst, N.T.	9,560± 60	R. Harington, this study	Beta-79861 CAMS-18424	Left scapula from bison
4	Gerstle River Site, AK	8,860±70	Potter (2001)	Beta-133750	Post-cranial remains of multiple bison in direct association with hearth features and artifacts.
5	Porcupine River, AK	9,000±250	UAF Museum, unpubl.	Beta-18552	Bison bone
6	Victoria Island, Minto Inlet, Kuujua River, N.T.	8,080±60	R. Harington, this study	TO-3709	Partial male <i>B. bison</i> skeleton with cranium and horn cores
7	(a) Broken Mammoth Site, Delta Junction, AK. Cultural Zone II	7,600±140	Holmes 1996	WSU-4264	(a) Bison bones with processing marks; associative charcoal date at hearth site
	(b) Cultural Zone IA	2,260±40	D. Yesner, <i>pers. commun.</i>	Beta-128716	(b) Bison naviculo-cuboid; associative charcoal date
8	Mt. Granger, Whitehorse, Y.T.	7,510±90	M. Hoefs, <i>pers. commun.</i>	Beta 135361	Female <i>B. bison</i> horn sheath from alpine ice patch
9	Canyon Site, Aishihik River, Y.T.	7,195±100	Workman 1974, Harington 1978	SI-1117	Fragments of bison bones around buried hearth; charcoal dated
10	Sullivan Pit, AK	6,730±260	Repenning et al. 1964	W-1108	Bison bone
11	Porcupine R., Fort Yukon, Yukon Flats, AK	6,596±70	ADF&G, this study	AA-51505	Male <i>B. bison</i> horn core and cranium
12	Sucker R. - Porcupine R, Yukon Flats, AK	6,401±81	ADF&G, this study	AA-51506	Male <i>B. bison</i> horn core and cranium
13	McIntyre Creek, Y.T.	ca. 5,840 ±70	G. Hare, this study	Beta 70100 CAMS-11243	Bison bone in association with cultural material
14	Goldstream Creek, AK	5,340±110	Péwé 1975	SI-845	Bison horn sheath
15	Harrowby Bay, Beaufort Coast, N.T.	5,230±200	Cinq-Mars 1991. Harington 1990	RIDDL-321	Metacarpal at archaeological site. Date from R.

Map No.	Location	Conventional Radiocarbon Age	Reference	Lab No.	Comments
					McGhee, Can. Museum of Civilization
16	Fort Yukon, Yukon Flats, AK	5,045±45	R.D. Guthrie, this study	AA4379, VP4157	Male <i>B. bison</i> skull
17	Carmacks, Y.T.	4,880±80	R. Harington, this study	Beta 25120	<i>B. bison</i> skull from terrace
18	Julian Site (JcRw-13), Fisherman Lake, N.T.	4,800±160	J.F.V. Millar, <i>pers. commun.</i>	S-0906	Bison bone at archaeological site
19	Canyon Site (JfVg-1), Y.T.,	4,730±320	MacNeish 1964	W-1125	Date from charcoal associated with bison bone
20	Kusawa Bluffs Site (JdVa-2), Y.T.	4,490±130	Greer 1986	Beta-14402	Date from elk bone located below bison bones in archaeological site
21	Black River, Yukon Flats, AK	4,495±60	ADF&G, this study	Beta 65662	Male <i>B. bison</i> , horn core and cranium
22	JcVa-14, Sandpiper Ice Patch site, west of Whitehorse Y.T	4,660±40	R. Farnell, <i>pers. commun.</i>	Beta 152446	Mandible of immature bison
23	Black River, Yukon Flats, AK	4390±70	ADF&G, this study	Beta 136731	Male <i>B. bison</i> , skull with horn sheaths
24	Porcupine R., Fort Yukon, Yukon Flats, AK	3,710±70	ADF&G, this study	Beta 74344	Female <i>B. bison</i> horn core and part of cranium
25	Porcupine R., Fort Yukon, Yukon Flats, AK	3,520±40	S.C. Gerlach, this study	Beta 104823	Male <i>B. bison</i> skull with both horn sheaths
26	Delta River Overlook Site (XMH-297), Delta Jct. AK	3,980±150 2,285±145	Holmes and Bacon 1982	GX-6752 GX 6750	Fragment of bison tibia at archaeological site; associative charcoal dates
27	Friday Creek (FRI-99-19), Y.T.	3,500+/-60	R. Farnell, <i>pers. commun.</i>	Beta-162359	Frozen bison dung from ice patch
28	Ruby Range, Kluane District, Y.T.	3,470±70	M. Hoefs, <i>pers. commun.</i>	Beta 136362	Bison tibia at archaeological site
29	Pelly Farms Site (KfVd-2), Y.T.	3,100±70	MacNeish 1964	S-193	<i>B. bison</i> ; associative charcoal date
30	Pelly Farms Site (KfVd-2), Y.T.	2,920±140	MacNeish 1964	GSC-127	<i>B. bison</i> ; associative charcoal date
31	Black River (Cut off), Yukon Flats, AK	3,069±42	ADF&G, this study	AA-49156	Male <i>B. bison</i> horn core and cranium
32	Friday Creek (YHB-01-56), Y.T.	2,840+/-60	R. Farnell, <i>pers. commun.</i>	Beta-165096	Frozen bison dung from ice patch

Map No.	Location	Conventional Radiocarbon Age	Reference	Lab No.	Comments
33	Fairbanks, AK (railroad terminal)	2,900±80	R.D. Guthrie, this study	AA3220, AMNH A-508-5331	Male <i>B. bison</i> skull
34	Black R., (Cut-off), Yukon flats, AK.	2,776±36	B. Shapiro, pers. commun.	OxA-11631	Male bison metacarpal
35	Montague House, Y.T.	2,720 ± 60	G. Hare, this study	Beta 70101	Bison ribs
36	¾ mile downstream from Circle, Yukon Flats, AK	2,545±80	R.D. Guthrie, this study	AA3217, AMNH A-479-4783	Male <i>B. bison</i> skull
37	Hadweenzic R., Yukon Flats, AK	2526±26	B. Shapiro, pers commun	OxA-11989	Male bison metacarpal
38	Lower Tanana River, AK	2,460±70	R.D. Guthrie, this study	Unknown	Male <i>B. bison</i> skull
39	Braeburn, Y.T.	2,460±40	M. Hoefs, pers. commun.	Beta 137731	<i>B. bison</i> skeleton in dry lake bed
40	Lower mouth, Birch Creek, Yukon Flats, AK	2,415±25	B. Shapiro, pers commun	OxA-11990	Male <i>B. bison</i> horn core and cranium
41	Kluane Lake, (Congdon Creek) Y.T.	2,180±30	M. Hoefs, pers. commun.	Beta 91755	Male <i>B. bison</i> cranium
42	Black R. (Englishoe Bar), Yukon Flats, AK	2,172±37	B. Shapiro, pers commun	OxA-11248	Bison radius
43	Takhini River, Y.T.	2,150±40	M. Hoefs, pers. commun.	Beta 91756	Male <i>B. bison</i> frontal
44	Finlayson River, Y.T.	2,130±60	R. Harington, this study	Beta-79854	Young male <i>B. bison</i> cranium
45	Baillie Islands, N.T.	1,890±90	Harington 1980	I-5407	Bison horn sheath
46	Black River, Yukon Flats, AK	1,730±60	ADF&G, this study	Beta 62999	Male <i>B. bison</i> skeleton
47	Dawson (Loc. 16), Y.T.,	1,545±85	Harington 1980	I-11051	Bison tibia, apparently fractured by humans
48	Quartz Creek, Dawson, Y.T.	1,430±95	Harington 1977	I-5404	<i>B. bison</i> horn core
49	Tetlin-Tanacross area, AK	1,270±55	R.D. Guthrie, this study	AA3218, AMNH A-393-1013	Male <i>B. bison</i> skull
50	Frenchman Lake Site (KaTx-6), Y.T.	<1250	J. Hunston, pers. commun.		Bison bone above White River Ash strata
51	Cowley Lake, Y.T.	940±90	R. Harington, this study	Beta 69762	Female <i>B. bison</i> skull
52	Old Horton River mouth, N.T.	420±65	Harington 1990 Morrison 1997	Beta-28765	Adult male <i>B. bison</i> skull, showing cut marks
53	JeUx-16 Annie Ned Creek, west of Whitehorse, Y.T.	370±40	R. Farnell, pers commun	Beta 152441	Bison molar at archeological site
54	Anchorage, AK	170±30	S.C. Gerlach, this study	Beta 136732	Male <i>B. bison</i> skull with horn sheath

Map No.	Location	Conventional Radiocarbon Age	Reference	Lab No.	Comments
55	Fort d'EpINETTE (Fort St. John), B.C. Canada	145±37	B. Shapiro, <i>pers commun</i>	OxA-10579	Bison bone

TABLE 2 Summary status of wood bison populations for 1978, 1987, 1999, and 2002

Herd Category/Herd name/Location	COSEWIC ^a 1978	COSEWIC ^a 1987	Recovery plan 1999	Current 2002
<u>Wild, free-ranging herds</u>				
Mackenzie Bison Sanctuary, NT	300	1718	1908	2000
Nahanni/Liard River, NT		30	160	170
Nisling River, YT		45 ^b	500	530
Hay/Zama Lakes, AB		43 ^b	130	234
Chitek Lake, MB			70	70
Nordquist Flats, BC			50	60
Subtotal:	300	1836	2818	3064
<u>Captive breeding herds – Public</u>				
Elk Island National Park, AB	100	256	350	350
Hook Lake Recovery, NT (for reintroduction)			65	122
Etthithun Lake, BC (for reintroduction)			43	43
Subtotal:	100	256	458	515
<u>Captive Breeding Herds – Private</u>				
Calgary Zoo, AB		3	-	-
Metro Toronto Zoo, ON		27	20	20
Moose Jaw Wild Animal Park, SK		37	-	-
San Diego Zoo, CA (USA)		9	9	9
Valley Zoo, AB		2	-	-
Alberta Wildlife Park, AB		44	-	-
Banff National Park, AB		13	-	-
Munich Zoo, Germany		9	9	9
Syncrude Canada Ltd., AB			150	150
LaPrairie Ranch, YT			50	
Waterhen Wood Bison Ranches Ltd., MB		106 ^c	185	185
Subtotal:	0	250	423	373
TOTAL:	400	2342	3699	3952

^a Committee on the Status of Endangered Wildlife in Canada.

^b Captive herd established for reintroduction to the wild.

^c Captive herd provided stock for Chitek Lake reintroduction to the wild.

APPENDIX B — FWS Determination on the status of wood bison in Alaska under the Endangered Species Act



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240In Reply Refer To:
FWS/AIA/018417

OCT 26 2004

Mr. Kevin C. Duffy
Commissioner
Department of Fish and Game
P.O. Box 25526
Juneau, Alaska 99802-5526

Dear Mr. Duffy:

Thank you for your letter of August 2, 2004, concerning the import of wood bison into Alaska, and your request to clarify the status of wood bison under the Endangered Species Act (ESA) should they be imported to Alaska.

We note that there has been considerable confusion over this issue due to the historic listing designation of the species (35 FR 8495; June 2, 1970) and the subsequent publication of our Distinct Population Segment Policy (61 FR 4722-4725, Feb. 7, 1996), some 26 years later.

The wood bison is listed as a foreign species throughout its known range (Canada) at the time of listing. As such, any imports would be treated consistently with all imports of foreign listed species into the United States. An ESA import permit is required to import Canada wood bison into the United States, and commercial movement within the United States, outside of Alaska, would be controlled through ESA interstate commerce permits. These individuals and their progeny would remain under the jurisdiction of the ESA for import, export, and interstate commerce purposes, as long as the wood bison continues to be listed in Canada.

Within the U.S. Fish and Wildlife Service, foreign species listings and all permitting issues for foreign species are handled routinely by our International Affairs Program, and they would be happy to provide assistance to your staff to outline the permit requirements. As you are aware, the wood bison is included on Appendix II of CITES, and export permits from Canada will be required for any animals imported into Alaska. We would be happy to work with our colleagues in Canada to assist with your CITES permit application as well.

For your information, biologists in the International Affairs Program have been working directly with the Canada Wood Bison Recovery Team to track the continued recovery of wood bison in Canada, in order to ensure the current listing accurately reflects the status of the species. We will keep you informed of any contemplated changes in that listing that may affect your proposed importation.



Mr. Kevin C. Duffy

2

We concur with your opinion that the listing of the wood bison in Canada under the ESA does not need to be modified to add the imported population of wood bison in Alaska as endangered or threatened. We intend to treat any wood bison imported into Alaska as a foreign listed species and have no intention of revising the list so that they are listed domestically.

We look forward to learning more of your proposed importation of wood bison to Alaska. Please feel free to contact Kenneth Stansell, the Assistant Director for International Affairs, at 202-208-6393, regarding the permits issue, and if I can be of future assistance, please let me know.

Sincerely,



Acting
DIRECTOR

APPENDIX C — Record of previous public involvement

C-1: DOCUMENTS OF SUPPORT FROM EARLY PUBLIC CONSULTATION ON THE YUKON FLATS

Dendu Gwitch'in Tribal Council
P O Box KBC
Fort Yukon, Alaska 99740
907-221-2211
221-2312

June 26, 1996

Bob Stephenson, Area Biologist
Alaska Dept. Fish & Game
1300 College Rd.
Fairbanks, Alaska 99701

Subj: Environmental Assessment

Dear Mr. Stephenson,

The Dendu Gwitch'in Tribal Council (formerly Birch Creek Village Council) is interested in working cooperatively with the State and Federal agencies to study the possibility of reintroducing the Wood Bison to the Yukon Flats.

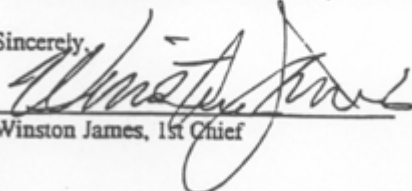
We understand that the first step in undertaking the reintroduction process is in environmental assessment, and the Dendu Tribal Council is very excited to see that this assessment begin in the very near future.

The Dendu Tribe has participated in a recent discussion information meeting here at the Tribal Council office, in which preliminary introductions to the wood bison and its habitat area, behavior, food source, the variety of animal contact, was brought on as a presentation was given by the Wood Bison Reintroduction Committee member, Craig Fleener of Fort Yukon.

As a result of the meeting, and the contents, by which everyone was well pleased with what was presented, there seemed to have been a very satisfied feeling about the future presence of an animal that once roamed this area, much like the dominating moose that seems to be in need of this former counterpart on the survivability in harsh winter seasons.

If there is an answer to the above information on the "return" of the wood bison, please contact myself or Craig at the Fort and we'll talk more on this subject as the progress continues to grow. My phone contact number is here at the Tribal office, located above. Thank You very much on the attention of this matter.

Sincerely,



Winston James, 1st Chief

cc: Wood Bison Reintroduction Committee
CATG members

Chalkyitsik Village Council
P.O. Box 57

Chalkyitsik, Alaska 99788

phone #907-848-8117

fax #907-848-8986

June 28, 1996

Bob Stephenson, Area Biologist
Alaska Dept. Fish & Game
1300 College Road
Fairbanks, Alaska 99701

Ted Hauer, Refuge Manager
U.S. Fish-N-Wildlife
Yukon Flats Wildlife Refuge
101 12th Avenue
Fairbanks, Alaska 99701

Subj: Environmental Assessment

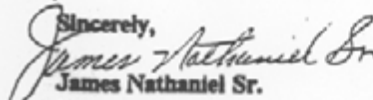
Dear Mr. Stephenson;

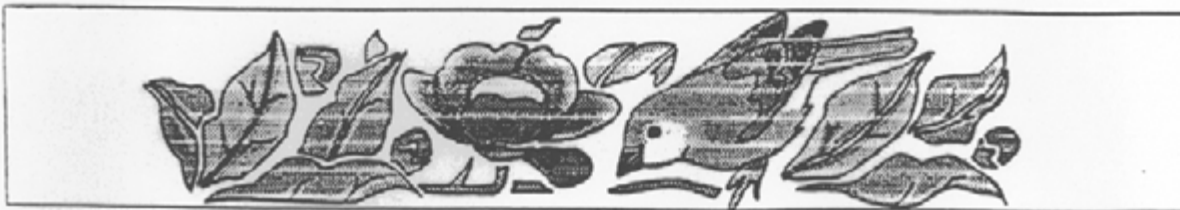
The Chalkyitsik Village Council is interested in working cooperatively with the State and Federal agencies to study the possibility of reintroducing the Wood Bison to the Yukon Flats.

We understand that the first step in undertaking the reintroduction process is in environmental assessment, and the Chalkyitsik Village Council is very excited to see that this assessment begin in the very near future.

The Chalkyitsik Village Council has participated in a recent discussion information meeting here at the Community Center in which preliminary introductions to the wood bison and it's habitat area, behavior, food source, the variety of animal contact, was brought on as a presentation was given by Craig Fleener of Fort Yukon.

As a result of the meeting, and the contents, by which everyone was sell pleased with what was presented, there seemed to have been a very satisfied feeling about the future presence of an animal that once roamed this area, much like the dominating moose that seems to be in need of this former counterpart on the survivability in harsh winter seasons. If there is an answer to the above information on the "return: of the wood bison, please contact myself or Craig at the Fort and we'll talk more on the subject as the progress continues to grow, my phone contact number is here at the Tribal office, located above. Thank You very much on the attention of this matter.

Sincerely,

James Nathaniel Sr.
First Chief



CIRCLE VILLAGE COUNCIL
P.O. Box 0
CIRCLE, ALASKA 99703
P11/FAX: 907-773-2622

TO: Bob Stephenson
Ak. Dept. of Fish & Game

FROM: Angela M. Ludwick
Circle Village Council
Tribal Administrator

DATE: August 7, 1996

Mr. Stephenson,

The Circle Village Council is interested in possibly reintroducing the Wood Bison to the Yukon Flats. We would like to request the ADF&G and USF&F to begin the environmental assessment.

Thank You,

A handwritten signature in cursive script that reads "Angela M. Ludwick".

Angela M. Ludwick
Tribal Administrator

CITY OF FORT YUKON, INC.
RESOLUTION NO. 97-05

A RESOLUTION TO GIVE SUPPORT FOR THE REINTRODUCTION OF WOOD BISON TO THE AREA OF FORT YUKON.

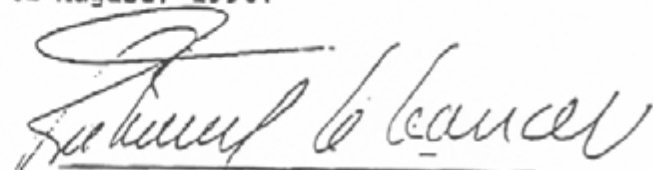
WHEREAS, Mr. Craig Fleener, student under the Alaska Dept. of Fish & Game, working on the Reintroduction of Wood Bison Study. Wishes the support of all the villages in the Yukon Flats for the reintroduction of the wood bison to the Yukon Flats area.

WHEREAS, City Council desires to to give support for the reintroduction of wood bison to the area of Fort Yukon.

NOW THEREFORE, BE IT RESOLVED BY THE FORT YUKON CITY COUNCIL THAT:

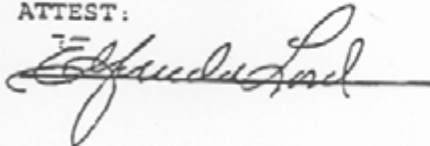
The City of Fort Yukon give it's support for the reintroduction of wood bison to the area of Fort Yukon.

Passed and Approved this 20 Day of August, 1996.


Mayor Richard Carroll



ATTEST:



Beaver Village Council
P.O. Box 24029
Beaver, Alaska 99724

August 23, 1996

Bob Stephenson, Area Biologist
Alaska Department of Fish & Game
1300 College Road
Fairbanks, Alaska 99701

Ted Heuer, Refuge Manager
U.S. Fish & Wildlife Service
Yukon Flats National Wildlife Refuge
101 12th Avenue
Fairbanks, Alaska 99701

Subj: Wood Bison Reintroduction

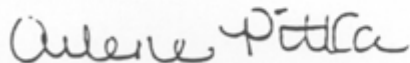
Dear Sirs:

The Beaver Tribal Council is interested in exploring the possibility of a wood bison reintroduction with the state and federal agencies along with the local tribal governments.

We understand that the first step in the possible reintroduction is an environmental assessment and we would like to see the agencies work together with the tribes in completing the assessment as soon as possible.

As long as the agencies are willing to cooperate with the tribal governments in the Yukon Flats and include us in all areas of the reintroduction we will be willing to cooperate and would be interested in doing the reintroduction.

Sincerely,



Arlene Pitka
First Chief

Fort Yukon Elders Incorporated
P.O. Box 49
Fort Yukon, Alaska 99740

September 7, 1996

Bob Stephenson, Area Biologist
Alaska Dept. of Fish & Game
1300 College Road
Fairbanks, Alaska 99701

Ted Heur, Refuge Manager
U.S. Fish & Wildlife Service
Yukon Flats National Wildlife
Refuge
101 12th Ave.
Fairbanks, Alaska 99701

Subject: Wood Bison Reintroduction

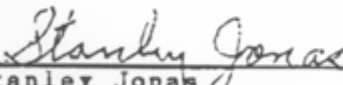
Dear Sirs,

The Fort Yukon Elders Incorporated are in support of the Wood Bison Reintroduction.

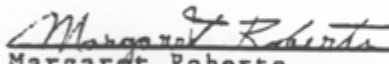
We would like to see the environmental assessment completed as soon as possible and would like to see cooperation with all local entities involved in the Yukon Flats.

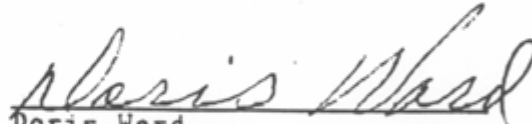
Some reasons we are in support of this project are for subsistence purposes, possible local employment, guiding opportunities for local residents, and to diversify the environment.

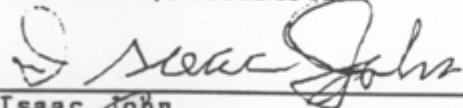
Sincerely,

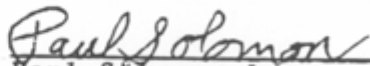

Stanley Jonas
President

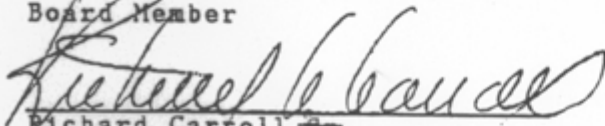

Thomas Knudson
Vice-President


Margaret Roberts
Secretary/Treasurer


Doris Ward
Board Member


Isaac John
Board Member


Paul Solomon Jr.
Board Member


Richard Carroll
Board Member

Venetie Tribal Council
Venetie, Alaska 99781

October 18, 1996

Bob Stephenson, Area Biologist
Alaska Department of Fish and Game
1300 College Road
Fairbanks, Alaska 99701

Ted Heuer, Refuge Manager
U.S. Fish and Wildlife Service
101 12th Avenue
Fairbanks, Alaska 99701

Subj: Wood Bison Reintroduction

Dear Sirs:

The Venetie Tribal Council is interested in exploring the possibility of reintroducing wood bison into the Yukon Flats.

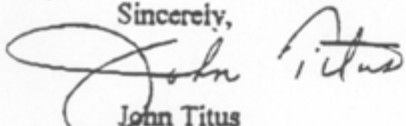
We understand bison lived here several hundred years ago but are now gone, and are on the endangered species list, and we want to help to bring them back.

We request that the environmental assessment, which is required, get underway as soon as possible.

The Venetie Tribal Council wishes to participate to the fullest extent in all areas of the reintroduction, and we will be willing to cooperate as long as we are included in the reintroduction.

Please continue to provide us with information on the project.

Sincerely,



John Titus
First Chief

NATIVE VILLAGE OF BEAVER

RESOLUTION No.: 97-17

Title: Authorizing the Tribal Council & Staff to cooperate in an effort to reintroduce wood bison on or near Beaver Tribal Land.

WHEREAS: The Beaver Village Council has been presented with information indicating that bringing wood bison back to the Yukon Flats will result in a healthy herd of these animals and provide a valuable resource for future generations; and,

WHEREAS: The Council has reviewed the assessment of the project and believes there are a number of potential benefits for our community including short and long term employment possibilities, an opportunity to develop local businesses, to build a sustainable economy, and develop an educational resource for our young people; and,

WHEREAS: The Council is concerned about the future of moose and caribou populations and we support developing other wildlife resources and can see that reintroducing wood bison could improve the reliability of our food supply; and,

WHEREAS: The Council believes the people of the Yukon Flats, Alaska, and Canada should work together to give wood bison a secure future.

NOW, THEREFORE BE IT RESOLVED THAT: The Beaver Village Council supports the reintroduction of wood bison to the Yukon Flats and requests that Fish & Game and other agencies work with Yukon Flats communities, local governments, and land owners to develop a management plan and an agreement to reintroduce wood bison that are in the best interests of both wood bison and Alaska's people.

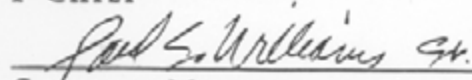
CERTIFICATION: This resolution was approved by the Beaver Village Council on July 2, 1997.

ATTEST:



1st CHIEF

DATE: June 2, 1997



COUNCIL MEMBER

2nd Chief

DATE: July 2, 1997

Beaver Village Council
POB 24029
Beaver, Alaska 99724
(907)-628-6126

June 3, 1997

_____, First Chief and
_____, Council Members

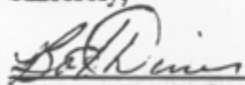
Dear Chief _____ and Council Members,

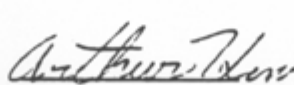
The Beaver Tribal Council is seriously interested in the possibility of bringing wood bison back to the Yukon Flats. We have studied this idea and believe it will provide important economic and resource benefits for our communities and especially for future generations. We have prepared and approved the enclosed Council resolution. On behalf of our community we are requesting your support for this initiative.

Our Council believes a healthy wood bison herd will be an important resource in the future and provide opportunities for employment, involvement in resource management, and an important connection to our history and our land. Your support and participation is important to make this a successful program. We hope you will send us a letter of support or a letter of non-objection and work with us in the future. We all agree that we need more information and we ask that representatives from your communities participate in future meetings and assist in moving ahead with a project that will benefit our people in many ways.

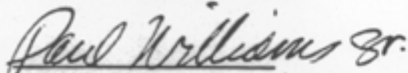
The Beaver Council is looking forward to your response and to working with you in the future.

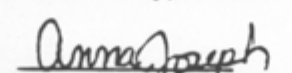
Sincerely,

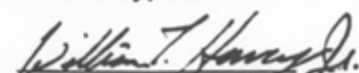

Bobby Winer, 1st Chief

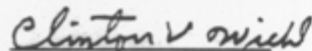

Arthur Henry, Member



Ben Henry, Member


Paul Williams, Sr., 2nd Chief


Anna Joseph, Member


William Henry, Jr., Member


Clinton Wiehl, Member


CLARA JOSEPH

**Circle Village Council**

P.O. Box 89

Circle, Ak. 99733

Circle Tribal Council

Circle, Alaska

The Circle Village Council strongly supports Beaver Tribal Council with the reintroduction of the wood bison. We feel this will have a good comeback in the near future. We believe it will provide important economic and resource benefits for our future generations.

Please inform us of any upcoming meetings so we can help with the project.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Larry Nathaniel'.

Larry Nathaniel, 1st Chief

A handwritten signature in cursive script, appearing to read 'Albert B. Carroll Jr.'.

Albert B. Carroll Jr., 2nd Chief

A handwritten signature in cursive script, appearing to read 'Sonya L. Fields'.

Sonya L. Fields, Sec/Tres.

A handwritten signature in cursive script, appearing to read 'Paul Nathaniel'.

Paul Nathaniel, Member

A handwritten signature in cursive script, appearing to read 'Kenny Ketchem'.

Kenny Ketchem, Member

Chalkyitsik Village Council
P.O. Box 57
Chalkyitsik, Ak. 99788

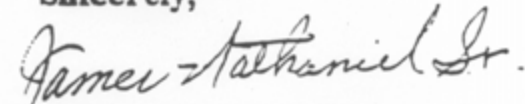
June 9, 1997

Beaver Tribal Council
Beaver, Alaska

This support letter is for Beaver Tribal Council on their interest in re-introduction of Wood Bison Project within Beaver area.

The Chalkyitsik Village Council recommends for Beaver Tribal Council to go forward with Wood Bison Project.

Sincerely,


James Nathaniel Sr.
First Chief



Native Village of Fort Yukon

P.O. Box 126
Fort Yukon, Alaska 99740
Phone: (907) 662-2581
FAX: (907) 662-2222

July 23, 1997

Beaver Village Council
General Delivery
Beaver, Alaska 99724

Dear: 1st Chief Bobby Winer

Thank you for sending your letter and resolution about your interest in reintroducing wood bison near Beaver. Our Council has discussed this issue and has passed resolution 97-22 supporting the Beaver Council's desire to reintroduce wood bison on or near their village lands.

Our major concern is that we want to ensure local communities are involved in co-management on a continued basis in all areas of management of wood bison and related activities.

If these concerns are addressed, the Native Village of Fort Yukon will continue to support the project.

We agree that bison will be an important food source in the future, and that they may provide future economic development projects.

Please keep us informed of future developments regarding wood bison.

Sincerely,

1st Chief Steven Ginnis

cc: 2nd Chief Cheryl Williams
Council Members
Ex. Director Daisy Stevens

enc. Resolution 97-22



Native Village of Fort Yukon

P.O. Box 126
Fort Yukon, Alaska 99740
Phone: (907) 662-2581
FAX: (907) 662-2222

Resolution 97-22

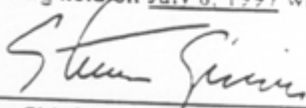
Title: Supporting the Beaver Village Council Wood Bison Project

- WHEREAS, the Native Village of Fort Yukon is the recognized native governing body for the village of Fort Yukon; and
- WHEREAS, the Beaver Village Council requested the Native Village of Fort Yukon to support the reintroduction of Wood Bison on or near Beaver lands; and
- WHEREAS, the NVFY Chief and Council Member's major concern is that co-management be included in the project.

NOW THEREFORE BE IT RESOLVED that the Native Village of Fort Yukon gives its support to the Beaver Village Council in their Wood Bison proposal; and

BE IT FURTHER RESOLVED that continued support by the Native Village of Fort Yukon is contingent upon tribal co-management.

Certification: Be it known that this resolution was brought and passed before a duly called regular council meeting held on July 8, 1997 with a quorum established.



First Chief Steven Ginnis

7/28/97

Date



Attest: Council Member

7/28/97

Date

CITY OF FORT YUKON

INCORPORATED 1959

Post Office Box 269

Fort Yukon, Alaska 99740

Telephone (907) 662-2479 or 2379

Beaver Village Council
General Delivery
Beaver, Alaska 99724

Dear 1st Chief Bobby Winer,

The City of Fort Yukon has supported the wood bison reintroduction concept for several years and on August 20th, 1996, passed resolution 97-05 affirming our support.

We appreciate the letter from the Beaver Tribal Council dated June 3rd, 1997, requesting support for the Beaver initiative to reintroduce wood bison.

The City of Fort Yukon supports local government involvement in natural resource management and would like to reaffirm our support for the reintroduction project. We are pleased that your community is taking an active role in the bison project. We believe this project will be good for Beaver and eventually the rest of the Yukon Flats.

We agree that wood bison can be an important resource in the future and may provide employment, a future food source, involvement in natural resources, and economic opportunities for local people.

Please keep us informed of future project developments and meetings that we may participate in.

Thank You,

Richard L. Carroll 7/30/97

Richard Carroll, Mayor
City of Fort Yukon
City Council

DENDU GWICH'IN TRIBAL COUNCIL
Box KBC
Fort Yukon, AK 99740

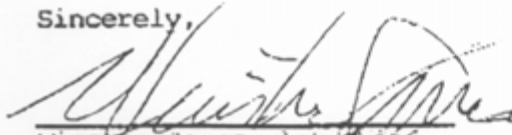
August 9, 1997


Dear Chief and Beaver Village Council Members,

Our Council has discussed the possibility of bringing back wood bison to the Yukon Flats for several years now. We believe, as you do, that wood bison have a connection to our land and our history. Our oral tradition includes instruction on bison hunting as a food source. We believe that reintroducing wood bison in the Yukon Flats is in the best interest of all those living in this basin. We recognize that careful management of a wood bison herd will provide many opportunities, not only in the present but for future generations.

We support you in your effort to establish a wood bison project that would reintroduce a healthy herd of wood bison to the Yukon Flats. We know we will all benefit from such a project. We are glad for this opportunity to show our support for your hard work.

Sincerely,


Winston James, 1st Chief


Ernest E. James Sr., 2nd Chief

cc: Bob Stevenson

DENDU GWICH'IN TRIBAL COUNCIL
RESOLUTION No.: 97-27

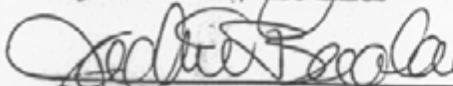
- Title: Authorizing the Tribal Council and Staff to cooperate in an effort to reintroduce wood bison on or near Dendu Gwich'in Tribal Land.
- WHEREAS: The Dendu Gwich'in Tribal Council has studied information for several years indicating that bringing wood bison back to the Yukon Flats will result in a healthy herd of these animals and provide a valuable resource for future generations; and,
- WHEREAS: Wood bison have a connection to our land and our history, in stories passed to us by our elders, our oral tradition includes instruction on bison hunting as a food source for our people; and,
- WHEREAS: This Council has reviewed the assessment of the project and believes there are a number of potential benefits for our community including short and long term employment possibilities, an opportunity to develop local businesses based on eco-tourism, to build a sustainable economy, and develop a sustainable resource for our children's future; and,
- WHEREAS: This Council is concerned about the declining moose population, and the scarcity of moose in our area which are our main food source, we support developing other wildlife resources and can see that reintroducing wood bison could improve the reliability of our food supply; and,
- WHEREAS: This Council would like our Tribal Land to be given serious consideration as a site on the south side of the Yukon for reintroduction of wood bison, and we have given our support to the Beaver Village Council's efforts and vision in order to demonstrate our belief that the people of the Yukon Flats, Alaska and Canada should work together to give wood bison a secure future.
- NOW, THEREFORE BE IT RESOLVED THAT: The Dendu Gwich'in Tribal Council supports the reintroduction of wood bison to the Yukon Flats and requests that the Department of Fish and Game and other agencies work with Yukon Flats communities, local governments, and land owners to develop a management plan and an agreement to reintroduce wood bison that are in the best interests of wood bison our village communities and Alaska's people.

CERTIFICATION: This resolution was approved by the Dendu Gwich'in Tribal Council on 8-25-97 1997.

ATTEST:


Winston James, 1st Chief

DATE: 8-25-97


Fredricka Nambar

DATE: 8-25-97

Canyon Village Tribal Council

October 6, 1997

Beaver Tribal Council
P.O. Box 24029
Beaver, Alaska 99724

Subject: Wood Bison

Dear Chief Winer,

The Canyon Village Tribal Council supports the Beaver Tribal Council's initiative to reintroduce wood bison on Beaver Tribal lands.

We are pleased that the Beaver Council supports this project and desires to participate in resource management and creating economic development opportunities in the Yukon Flats.

We support this project because of these reasons and for future subsistence opportunities, possible local employment, and future guiding opportunities.

Please keep us informed of project progress, and let us know if we can assist in the project.

Thank You,

Stanley Jonas



1st Chief, Canyon Village Tribal Council

Beaver Village Council
P.O. Box 24029
Beaver, Alaska 99724
(907) 628-6126
Fax (907) 628-6815

Mr. Rod Arno
President, Alaska Outdoor Council
P.O. Box 2790
Palmer, Alaska 99645

November 10, 1997

Dear Mr. Arno,

In recent months the Beaver Village Council and other Yukon Flats communities have expressed their support for the reintroduction of wood bison to this area (letters enclosed). I am writing on behalf of the Beaver Village Council to request the support of the Alaska Outdoor Council for this project. We are working with the ADF&G and Canada to move ahead with this project because it will benefit wood bison, the habitat in this area and also will be a positive development for the people of Alaska.

Our community is interested in improving renewable resources and developing local economies based on small businesses involving tourism, outfitting and guiding. We believe that restoring Alaskas native wood bison will make an important contribution to conservation and result in future economic benefits for our community as well as other residents of the state.

One of the few concerns of people living on the Yukon Flats is that local interests obtain benefits from wood bison. Interest in wood bison hunting and other uses by nonlocal people could bring economic benefits to local residents. It appears that there are different regulations that can be used to provide nonlocal hunters with an opportunity to apply for a wood bison permit in the future, and at the same time provide significant benefits for local communities and hunters. I would like to ask if the Outdoor Council would work with us to outline a management system that would be fair to both local and nonlocal interests in the future. I also wonder if you would support us where in developing local businesses related to wood bison and other wildlife, and the use of access fees by landowners.

I believe we can find common ground on these and other issues and hope the Alaska Outdoor Council will consider supporting a request for state funding for the wood bison project. We would like to find as much support as possible so the project can move ahead. We hope to hear back from you and feel free to call me at the Council office here in Beaver at 628-6126, or 2nd Chief Paul Williams, Sr. at 628-6213. If you would consider visiting Beaver sometime we would be happy to meet with you.

Sincerely,



Bob Winer, First Chief

**Eastern Interior Alaska Subsistence
Regional Advisory Council
c/o U.S. Fish and Wildlife Service
101 12th Avenue, Box 19
Fairbanks, Alaska 99701
Phone: (907)-456-0277, Fax: (907)-456-0208
Toll Free: 1-800-267-3997**

November 21, 1997

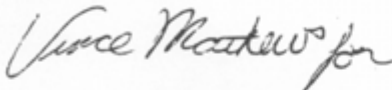
Bobby Winer, Chief
P.O. Box 24029
Beaver, Alaska 99724

Dear Chief Winer,

The Eastern Interior Regional Advisory Council at its October 1997 meeting passed a motion in support of the concept of the bison reintroduction by the Beaver Tribal Council. The Regional Council understands that reintroduction would provide an important subsistence resource as well as a possible economic benefit to Beaver and the Yukon Flats area in general. We also know that there is archaeological evidence that wood bison existed on the Yukon Flats as well as traditional stories about hunting wood bison.

We look forward to hearing from your co-management committee on your progress with this reintroduction. Please keep us informed of your actions because the Regional Council is supportive of efforts that address the unmet subsistence needs of the Yukon Flats subsistence users.

Yours truly,



Charles Miller, Sr. Chair
Eastern Interior Regional Advisory Council

cc: Pat Stanley, Council of Athabascan Tribal Governments
David Allen, Regional Director, U.S. Fish and Wildlife Service
Ted Heuer, Yukon Flats National Wildlife Refuge
Dan Reed & Bob Stephenson, Alaska Department of Fish and Game



Alaska Outdoor Council

PO Box 73902

Fairbanks, AK 99707-3902

Tel./FAX: (907) 455-4AOC (4262)

e-mail: 102262.2135@compuserve.com

www2.polarnet.com/users/outdoor/

Mr. Bob Winer
First Chief
Beaver Village Council
P.O.Box 24029
Beaver, Alaska 99724

December 5, 1997

Dear Mr. Winer:

In response to your letter of November 14, 1997, the Alaska Outdoor Council would be pleased to support the concept of reintroducing wood bison to their former range in the Yukon Flats. This could be a good opportunity to work toward a common and worthwhile conservation goal and we commend you for taking the lead on this proposal.

Our primary concerns are that bison remain wild and free ranging and opportunities for nonlocal hunting be assured. The Council believes these conditions are compatible with your expressed desire to be able to derive local economic benefits in the future.

Our seven member Board of Directors would like to meet with you to discuss the project. The Council will be holding its annual meeting in Fairbanks in mid-March, 1998. This event would provide an excellent opportunity for you and other landowners to meet with the board.

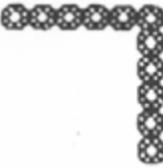
In the meantime, the board will conceptually support the project and encourage the Alaska Department of Fish and Game to move forward this winter.

Sincerely,

Rod Arno
Rod Arno
President

ID:6286815

APR 01 '98 10:40 No.002 P.01

TANANA CHIEFS CONFERENCE, INC.

122 FIRST AVENUE, SUITE 600
FAIRBANKS, ALASKA 99701-4897
PHONE 907/452-8251 • FAX 907/459-3850

December 12, 1997

received


Bobby Winer, 1st Chief
Beaver Tribal Council
Gen. Del.
Beaver, AK. 99724

Dear Mr. Winer:

This letter is in support of the Wood Bison Project in the Yukon Flats region. It is one of the goals of TCC to protect and enhance the resources for the Tribal members of TCC.

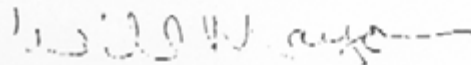
This letter is in response to the meeting that Gabe Sam held with Mr. Williams and Yukon Flats Area Biologist Bob Stephenson. The topic of discussion was the *Yukon Flats Wood Bison Project*. This particular project has a great potential to ensure that the people that live out on the Yukon Flats have a substantial subsistence resource to fall back upon.

From what was gathered about the history of this area, there once were wood bison that the Native people subsisted-on for food and clothing. If this would be the case, the only course to take is to bring back the Wood Bison and ensure that it will not be subject to extinction again.

If there is a way that this project will bring benefits to the region in terms of improving the economic base, TCC has an employment department to ensure that our people can be trained to care for the Wood Bison for generations to come. If there are any questions that you may have, do not hesitate to call.

Sincerely,

TANANA CHIEFS CONFERENCE, INC.



Will Mayo
President TCC

From: CATG NR

907 662-3047

Page 2 of 3

08/15/01 16:31



COUNCIL OF ATHABASCAN TRIBAL GOVERNMENTS

P.O. BOX 33 - FORT YUKON, ALASKA 99740 - (907)662-2587
FACSIMILE (907)662-3333

RESOLUTION 01-07

Title: Bison Reintroduction

WHEREAS: The Council of Athabascan Tribal Governments (CATG) is a Tribal organization authorized by the ten tribal governments of the villages in the Yukon Flats; and,

WHEREAS: The purpose of the Council of Athabascan Tribal Governments is to conserve and protect tribal land and other resources; to encourage and support the exercise of tribal powers of self-government; to aid and support economic development; to promote the general welfare of each member tribe and its respective individual members; to preserve and maintain justice for all; and to otherwise, exercise all powers granted to its member villages; and,

WHEREAS: The Council of Athabascan Tribal Governments is committed to the implementation of plans which increase sustainable culturally appropriate economic activities; and,

WHEREAS: Research has shown that bison could be a viable sustainable resource for subsistence use and economic benefit.

NOW THEREFORE BE IT RESOLVED THAT: The Council of Athabascan Tribal Governments directs staff to review and provide options for reintroducing bison as a wild or captive stock into the Yukon Flats and present these findings to the Council during reports at the next meeting; and,

BE IT FURTHER RESOLVED THAT: The Council requests specific information on options for ownership and control of the herd, private lands vs. public lands, regulatory discretion, and authority over guiding and hunting.

CERTIFICATION: This resolution was adopted and approved on December 8, 2000.

ATTEST:

Shirley H. Nathaniel
Title: Chairman

Date: 12-8-00

Joel J. Trutt
Title:

Date: 12/8/00

C-2: SUMMARY OF PUBLIC COMMENT FROM THE SPRING 2005 *WOOD BISON NEWS*

A total of 20 response forms, letters and e-mails were received, including responses to the Spring 2005 *Wood Bison News* and written comments submitted at the Wood Bison Restoration Advisory Group Meetings. Comments that responded to the questions on the *Wood Bison News* response form are numerically tabulated below. All the narrative comments received were categorized as closely as possible to the response form questions and are included below.

1. Do you support the Alaska Department of Fish and Game continuing to pursue restoring wood bison in Interior Alaska?

Yes 11 No 3

Comments:

- ✓ Maybe, it depends on many things but the first is “what’s is going to cost and can you afford it”? With the current financial situation we need to know a projected cost and source of funding. If we are to sacrifice other ADF&G programs to make this restoration happen, will we the public get a chance to evaluate these options?
- ✓ I think that they might give disease to our moose, it’s not our traditional food and the meat does not taste good and you can put it in your own backyard.
- ✓ Disrupt ecosystem. Like to see current ecosystem evolve on its own without adding anything new. Thinks bison will disrupt caribou and moose (*phone call to Craig G. call disrupted before comment form was completed 6-1-05*)
- ✓ I feel wood bison are natural and much better suited for Alaskan conditions. I think they could provide an expanded resource for multiple uses- recreation, viewing, consumption, hunting, etc.
- ✓ What a great conservation project to reintroduce these animals.
- ✓ They were indigent to Alaska before being over harvested to elimination. The modern (future) generations should be able to enjoy the viewing, harvesting and managing of the wood bison, as it was a natural part of the landscape in recent history.
- ✓ Restoration of an indigenous species. Fill a blank space in the ecosystem.
- ✓ I think it is a good deal transplanting wood bison where planned. Another resource of subsistence food since the moose population is going down.
- ✓ Restoration of wood bison would be a positive contribution to Alaskan ecosystems, to people’s opportunities for uses and appreciation of Alaska’s outdoors, and a significant conservation accomplishment by helping to perpetuate a species population that was formerly viable in Alaska, but was probably diminished through human activity. A real parallel with muskox.
- ✓ These animals are not a native species having been naturally extirpated from the area 500 or more years ago. Alaska already has the best hunting opportunities in the world; further introduction of non-native game species simply for hunting purposes is unnecessary and environmentally irresponsible. Even a small risk of disease transmittal to native species is too great a risk to our crucial subsistence resources.
- ✓ It may help balance our ecosystem in our arctic global warming conditions and would provide better subsistence opportunities in our declining moose habitat in the future.

- ✓ Most important, North American wood bison need to be separated into enough large groups to insure their survival should something happen to the “base” herd in Alberta. Next, they are “resistant” to most Alaskan four legged predators and won’t need to have their hooves held to survive.
- ✓ Wood Bison roamed the reintroduction site only a few decades ago. The Canadian Wood Bison program is a great success. Evidence shows that they were here and belongs here.
- ✓ Improve Alaska big game experience.
- ✓ It is important to grow a population of species that was once more common to the state.

2. Of the three main areas of suitable wood bison habitat shown on the map in the Wood Bison News (Yukon Flats, Minto Flats, the lower Innoko River), do you have any comments or suggestions about a particular site or recommendations for which site(s) should be considered first? Please explain why.

- ✓ Minto Flats: This is the obvious first choice. It’s closer to Fairbanks, which makes it less expensive and easier to monitor the condition of the herd. But perhaps more importantly this area is comprised of mostly State Land with the least amount of private land. We don’t need to expend huge sums of public money establishing a herd of bison on private land (and don’t use the Delta herd as an example of cooperation between private and state interests – there’s a world of difference between the cooperation of Delta Farmers and that of the Alaskan Natives – just look at the Chitina Dip netting fiasco).
- ✓ The lower Innoko River because it is far away from our area.
- ✓ I guess personally I would like to see bison (wood) started at Minto Flats because the greatest number of residents would be able to see them the easiest.
- ✓ Minto Flats because they would be on state land. I think this project should stay as far as possible from the feds. Feds would just gum it up.
- ✓ 1st: Yukon Flats, 2nd, Minto Flats. Just don’t ever let them be classified for “traditional” subsistence use. Traditional “subsistence” hunters wiped them out in the first place! Make them accessible for viewing and hunting to everyone, with no special opportunities for any group of the population.
- ✓ To do a proper restoration it would be necessary to start groups in several (all) of the areas mentioned.
- ✓ I think they should stay where they are marked on the map. Look like a good habitat for bison.
- ✓ My impression is that more habitat may be available on the Yukon Flats, and that that area may have been the most recent area that supported wood bison. However, the seemingly incomprehensible, irrational position of the USFWS with regard to Yukon Flats Refuge purposes may argue for Minto Flats as the initial site. But, I don’t think FWS should be let “off the hook” given the history of wood bison in the area.
- ✓ All three sites are unsuitable. The potential effects of wood bison on Alaskan ecology are unknown and potentially mildly damaging to our local ecosystem and the native species that depend on it. I believe in the precautionary principle which to my mind is similar to a doctor’s hypocrite oath – First do no harm! If you don’t know what the effects will be you cannot assume they will only be positive.

- ✓ Yukon Flats seems to be the best habitat for woods bison combined with the fact of its most recent extinction in that area. However, I believe they would do well in many places in Alaska.
- ✓ Transplant them to Minto, then Yukon Flats, then to Innoko. Three Alaskan “herds” would help their survival. Minto is the most accessible area for seeing, and hopefully, eventually hunting them.
- ✓ Yukon Flats has endless prime wood bison habitat. Native elders remember wood bison stories passed on by their parents. We should restore wood bison for the native community.
- ✓ Whatever area looks best for science-based replant should be picked first. I favor two area planning and development.
- ✓ Whatever site suits them best and is the best to monitor them from.

3. If restored to the wild, wood bison would be a public resource. The Alaska Department of Fish and Game would like to develop strategies to ensure that the benefits of wood bison restoration are shared by all users, including local and non-local hunters and wildlife viewers. Please provide any comments or suggestions you may have about how wood bison should be managed to ensure the benefits can be shared by all users.

- ✓ I couldn’t help but notice that the benefits are to be shared by all users (but no mention of equally)! Immediately, get a signed statement from the Natives that these animals will not be determined a subsistence species. That’s the only way there will ever be any chance for wood bison becoming a true public resource which all can utilize. If the Natives can determine that this will become a subsistence animal STOP WITH THE RESTORATION PROGRAM RIGHT THERE! It then becomes a private venture and the Native Corporations currently have the funding available to complete this without using public money.
- ✓ No comment.
- ✓ I agree, that all users should be able to share these animals. If feasible, I would also like to see wood bison on the Kenai Peninsula.
- ✓ No group should have exclusive use. This is why I do not want to see them on federal land.
- ✓ Never, ever allow a separate use (consumptive or non-consumptive) of the restored population to any group of people. All citizens must have equal opportunity to view, enjoy, harvest and manage the re-introduced bison. Do not ever list them for subsistence use – last time they were exterminated in their habitat!
- ✓ I also would like to see use of their resources by all – ADF&G has present mechanisms to work this out by enforcement involving the local people, etc.
- ✓ I don’t think anyone should be allowed to process the animals now, but for the future until they build for 5 years or so. Make them grow in their population. They will have a good look over the years pass by to see how they populate. Also build a fence if possible.
- ✓ A binding agreement among all parties that a rural subsistence priority under federal law would not be sought or claimed would be good, but probably unattainable. Therefore, a federal law mending ANILCA, or just in addition to it, explicitly stating that wood bison in Alaska are not subject to terms of ANILCA, Title VIII would be essential. Otherwise, wood bison use will surely go the way of muskox use – hunting shut off to “non-rural”

people, even though local folks might not push that, outfits like NARF and AFN, etc., surely would. The amendment could also make wood bison conservation/use a Refuge purpose!

- ✓ This entire project is ill advised.
- ✓ I think at least in the beginning bison should be for subsistence use only when the population allows, and only by those people in the area where they exist. Whatever that would be. That would create a stewardship for the bison and help protect them from outside poaching and predation.
- ✓ Make then “non-subsistence” resources (both State and Federal) as a condition of acquisition and transplant. Manage for maximum population growth until the ability to live in Alaska is certain, and then adopt a harvest strategy.
- ✓ The resource should be used by all; like the rest of the animals in this state.
- ✓ I urge Fish & Game to manage restored herds for maximum yield.
- ✓ Once a healthy population is established, utilizing hunting and other game management strategies will be essential – they will also be wonderful to view ☺

4. Please provide comments on any other topic that you feel the ADF&G needs to take into consideration regarding the potential for wood bison restoration in Alaska.

- ✓ There are three places that they are looking at right now; 1- Yukon Flats; 2 – Holy Cross, 3 – Minto Flats. All three have different land managers or management of these areas and also state management of state land. The big problems are land (private and corporation and federal). They should be put on state lands. With private land the owners have a right to charge to hunt, corporation land could also charge or restrict access if US Fish and Wildlife made the statement that they could be put on private land and fenced in???? The State of Alaska says no way they are to be free roaming and available to all residents of Alaska. If they do stray to private lands or corporation land then they should be available to all residents. I spoke for myself and stated when there is a surplus they should be available to all residents of Alaska by drawing permit ??? And if they stray or are put on private land or corporation land that access would not be denied to the general public of the state and if a fee was legal it would be reasonable???? I mentioned the access problem that is going on right now at O’Brien Creek and that we do not want something like that to happen again. And not be consider a subsistence animal the State thinks in order to get them back there may have to be some subsistence needs but they would be very restricted and be in black and white and sign of by all and that the state would have complete control of the wood land bison. In a meeting of Fish and Game people after the regular meeting they believe that the Minto Flats area would be the best and less area for problems and could most likely come to a good agreement with the Minto people. I also stated that if they stray or are put on federal land the State of Alaska would have complete control of them and the feds could not set any seasons or say that so many had to go for subsistence. The only thing we need the US Fish & Wildlife for is to okay getting woodland bison back into Alaska by giving the State a permit to do so. Or do we need them if we put them on State land.
- ✓ DEMAND THAT ALL REINTRODUCED BISON BE DISEASE FREE – don’t lower this standard! DEVELOP AN AGREED UPON LONG-RANGE PLAN FOR THIS RESTORATION. ADF&G’s track record with the Delta Bison Range Management has

been anything but consistent with the original agreements (verbal and implied). DEVELOP AN EQUITABLE SYSTEM FOR A USER'S FEE, not one that places the majority of the cost on hunters while the subsistence and non-consumptive users reap most of the benefits. Some examples already in use are Application Fees for any use that is limited, Consumptive Fees for all consumptive uses of these bison, Non-Consumptive Fees for all other uses. If Wood Bison becomes a public resource, their cost should be borne by all those that utilize the resource. Thanks for the opportunity to comment. I hope you will consider them carefully.

- ✓ Bob S. don't put wood bison in our Yukon Flats. Thanks Bob. My question is why are you putting wood bison in our area? Can you put the herd somewhere else? What is the difference between bison and buffalo? Thank you.
- ✓ Hello, we would like to be included in the Wood Bison Restoration and Advisory Group and/or any of the committee findings and decisions. Please view our website at www.bisonandelk.com to see some photos of our operation here in Delta Junction. We have a good history and knowledge of bison, their needs and particular handling specialties. Thank you for considering us for participation in the wood bison restoration project should it go ahead.
- ✓ I was just wondering if the State of Alaska has started to reintroduce wood bison and if not, what is holding them back? I think that the bison of Wyoming/Montana are the backbone of the West. They are definitely awesome creatures. I came upon the information about wood bison as I had read about them in Alberta before. I was in Alberta in January 2005, but did not get a chance to see them. Anyway, being that I'm from Pennsylvania, I really miss seeing bison. Hopefully, I will get to Alaska this spring to work with wildlife. Thanks for your time.
- ✓ The best place to introduce wood bison would be the Minto area...no federal land to deal with and close to Fairbanks to keep track of the critters. Thanks.
- ✓ I wish we could have kept the two wood bison that naturally crossed the Alaskan border near Tok some six or eight years ago. I encourage you to re-introduce this species as soon as possible. I would also like to see them planted on the Kenai Peninsula.
- ✓ Just be sure to cover importation, quarantine – for disease control, various government permit requirements, stocking area/habitat requirements, etc., before moving bison in. I've personally seen (and been part of) failed transplant efforts because all of the ducks were not in a row with BLM, USFWS, DNR, ADF&G and the "greenies" who want to do nothing and let it happen naturally!
- ✓ This project has genuine benefits for all of Alaska and the people of Alaska. This project should be pursued with great vigor. Please do not study this important project to death! Have a proper service of urgency pilot program now!
- ✓ Make sure when they are planted on the Yukon Flats to have low enforcement check on them once a week so that's the way people will know they are protected at all times so the numbers could increase in the future years to come. Plus I'm concerned about the spring break up if the Yukon Flats gets flooded out, what's happen then that is any consideration.
- ✓ Successful reintroduction – and even the substantial ADF&G efforts demonstrates, or would demonstrate, the difference between the do nothing policy of the federal agencies versus the initiative of ADF&G in making a solid conservation contribution or at least attempting to do so. It seems apparent that once again a federal agency is mired in its own

politics and policy, and needs to receive new direction from the public via legislative action. ADF&G should encourage that. P.S. I assume P-R funds are used in the wood bison effort – that means hunters have a big stake!

- ✓ Since in all likelihood the state will not listen to reason in its frantic bloodlust and search for greater hunting related revenues, I would only like to add that it is imperative that the state ensure that the bison that are unfortunately imported be fed a diet of strictly native-Alaskan grasses so that exotic weed species do not become introduced to the Alaskan landscape.
- ✓ I feel that introduction should start with calves in an area with an armed caretaker with feed, medicine, etc., for a year or two until the calves grow and become independent and habituated to the area. They then could take care of themselves and could be monitored. Feel free to contact me; I would like to help with this project.
- ✓ If it's going to take congressional action to circumvent the "endangered species act", get on with it. With both our senators in influential positions and our congressman's leadership abilities, don't negotiate away the chance to import wood bison to appease federal bureaucratic strategies and whims.
- ✓ I totally support the Wood Bison reintroduction and would push the government to move quickly on this and quit dragging their feet. Great idea for many benefits. Good luck on the project.
- ✓ If the roadblock is the opinion of the USF&W and they will not change then the state should arbitrate. If the science shows that wood bison should roam as they did in Alaska and do in Canada, how can the FWS stop the majority?
- ✓ Perhaps the effects of this species on other species in the affected areas – how will the reintroduction of the wood bison affect the areas where they are reintroduced?

APPENDIX D — List of presentations at the WBAG meetings**April 2005 WBAG Meeting**

1. **Opening comments-** David James, ADF&G/DWC Regional Supervisor
2. **Review of wood bison biology and project history-** Bob Stephenson ADF&G, Yukon Flats Area Biologist
3. **History of Pleistocene and wood bison history in Alaska-** Dr. Dale Guthrie, University of Alaska Fairbanks, Institute of Arctic Biology, and Bob Stephenson
4. **Current status of wood bison conservation in Alaska and Alaska's potential contribution to wood bison conservation programs-** Bob Stephenson
5. **Food habits and grazing behavior of wood bison and habitat availability in Alaska-** Maria Berger (private consultant) and Craig Gardner, ADF&G Research Biologist
6. **Report on the Alaska Chapter of *The Wildlife Society's* Technical Peer Review of "Reintroducing Wood Bison to the Upper Yukon Valley, Alaska: A Feasibility Assessment"-** Dr. Brad Griffith, UAF Institute of Arctic Biology, Associate Professor of Wildlife Ecology and Assistant Leader of the Alaska Cooperative Wildlife Research Unit
7. **Biological issues and relationship with other species: report on the ADF&G/USFWS joint review on wood bison restoration in Alaska-** Craig Gardner and Tony De Gange, USFWS Associate Regional Director
8. **ADF&G Transplant Policy-** Craig Gardner
9. **Classification of wood bison under the U.S. Endangered Species Act-** Tony De Gange
10. **Wood bison disease considerations-** Dr. Bob Gerlach, Alaska Department of Environmental Conservation, Alaska State Veterinarian
11. **Considerations of state and federal subsistence laws on wood bison harvest allocation-** Dr. Terry Haynes, ADF&G Federal Subsistence Program Liaison and Dan LaPlant, USFWS Office of Subsistence Management Wildlife Liaison to ADF&G
12. **The interest and activities of Yukon Flats residents related to wood bison restoration -** Craig Fleener, Chief Administrative Officer, Council of Athabascan Tribal Governments

Landownership and management considerations in wood bison restoration (topics 13-17):

13. **Alaska Department of Natural Resources-** Harry Bader, Northern Regional Manager, Division of Mining, Land and Water Management

14. **U.S. Fish and Wildlife Service-** Ted Heuer, Refuge Manager, Yukon Flats National Wildlife Refuge
15. **Doyon, Limited-** Jim Mery, Vice President
16. **Bureau of Land Management-** Jim Herriges, Wildlife Biologist
17. **Dinyee Corporation-** Howard Taylor, General Manager
18. **National Environmental Policy Act (NEPA) requirements-** Gary Foreman, Bureau of Land Management
19. **Safari Club International involvement in wood bison restoration-** Bob Byrne, Conservation Program Manager, Safari Club International Foundation
20. **Stevens Village wood bison projects-** Randy Mayo, First Chief Stevens Village and President of Dinyee Village Corporation
21. **Wood bison stock, public education and potential temporary holding facility-** Mike Miller, Alaska Wildlife Conservation Center
22. **Potential costs and benefits of wood bison restoration-** Dr. Peter Fix, UAF School of Agriculture and Land Resources Management
23. **Wood bison project funding opportunities and challenges-** David James

June 2005 WBAG Meeting

24. **Potential ecological and vegetation effects from wood bison grazing-** Dr. Terry Chapin, UAF Institute of Arctic Biology
25. **Potential effects on waterfowl from wood bison restoration and suggestions for monitoring-** Dr. Mark Lindberg, UAF Department of Wildlife Biology
26. **ADF&G evaluation of biological monitoring needed in association with wood bison restoration and group discussion of monitoring priorities-** Craig Gardner
27. **Wood bison restoration environmental analysis project-** Gale Skaugstad, representing Hunter Environmental Associates
28. **Biological or other resource management concerns about wood bison restoration that have been identified by the Yukon Flats National Wildlife Refuge and review of USFWS regulations and decision-making process –** Ted Heuer

-
29. **A review of studies on Athabascan oral history and other historical data about wood bison in Alaska and a comparison of the historical records of wood bison and muskox in Alaska-** Dr. Craig Gerlach, UAF Anthropology Department
 30. **An international perspective on Alaska's wood bison restoration effort and experiences with wood bison restoration in the Yukon-** Tom Jung, Yukon Department of the Environment
 31. **ADF&G response to the recommendations in the Alaska Chapter of *The Wildlife Society's* review of the Feasibility Assessment for Reintroducing Wood Bison to the Upper Yukon Valley, Alaska-** Craig Gardner
 32. **Overview of state, federal and/or private authorizations needed for wood bison restoration at various sites-** Bob Stephenson
 33. **Land-ownership patterns at the three main potential wood bison restoration sites-** Craig Gardner
 34. **Wood bison stock availability, transport options and health and safety considerations-** Bob Stephenson

APPENDIX E — Environmental Review scoping comments**E-1: LIST OF SCOPING LETTERS SENT AND RESPONSES RECEIVED****I. Government Agencies**

Name	Title	Organization	Date contacted	Date final response received
Jim Fish	Fishery Biologist	AK Dept. of Fish and Game, Div. of Sport Fish	7/27/2005	8/15/2005 (Todd Nichols)
Robert Gerlach	Alaska State Veterinarian	Alaska Dept. of Env. Conservation	7/27/2005	8/8/2005
Tom Irwin	Commissioner	AK Dept. of Natural Resources	7/14/05	No response received
Kerry Howard	Director	AK Dept. of Nat Resources, Office of Habitat Management and Permitting	7/14/2005	7/26/2005 (Robert McLean)
Larry DeVilbiss	Director	AK Dept. of Natural Resources, Division of Agriculture	7/14/2005	7/19/2005
Richard LeFevre	Acting Director	AK Dept. of Natural Resources, Div. of Parks/Outdoor Rec.	7/14/2005	7/22/2005
Judith Bittner	State Historic Preservation Officer	AK Dept. of Nat Resources, Div. of Parks/Outdoor Rec, Office of History/Archeology	7/14/2005, 7/23/2005	11/7/2005
Mike Barton	Commissioner	AK Dept. of Transportation	7/19/2005	8/17/2005
Christy Everett		U.S. Army Corps of Engineers	7/14/2005	10/14/2005 (Sharon Seim)
Gary Brickler	Area Veterinarian	U.S. Department of Agriculture, Veterinary Services	8/8/2005	8/31/2005
Jim Herriges, Jeff Denton, Gary Foreman and John Payne		Bureau of Land Management	7/14/2005	9/16/2005 (Henri Bisson, State Director)
Ted Heuer	Refuge Manager	U.S. Fish and Wildlife-Yukon Flats National Wildlife Refuge	7/14/2005	10/26/2004 (Rowan Gould, Regional Director); 11/06/06 (Tom Melius Regional Director)

II. Village Councils and Corporations

Name	Organization	Date contacted	Date response received, if any
Carl Jerue	Anvik Village Council	7/19/2005	
	Bean Ridge Corporation (Manley Hot Springs)	7/19/2005	
Patricia Billy	Beaver Kwit'chin	7/19/2005	
Selina Petruska	Beaver Village Council	7/19/2005	
Winston James	Birch Creek Tribal Council	7/19/2005	
Paul Edwin	Chalkyitsik Village Council	7/19/2005	
Robin Jonas	Chalkyitsik Native Corporation	7/19/2005	
Minnie Kanter	City of Shageluk	7/19/2005	
Bruce Thomas	Council of Athabascan Tribal Governments	7/19/2005	9/15/2005
	Deloycheet, Inc. (Holy Cross)	7/19/2005	8/3/2005 (e-mail- Sam Demientieff)
Ernest Demoski	De Loy Ges, Inc. (Anvik)	7/19/2005	8/15/2005
Gabe Nicholai	Grayling Village Council	7/19/2005	
	Hee-Yea-Lingde Corporation (Grayling)	7/19/2005	
Eugene Paul	Holy Cross Tribal Council	7/19/2005	9/21/2005 (Debbie Turner)
	Manley Village Council	7/19/2005	9/19/2005 11/7/2005 (e-mails- Elizabeth Woods)
	Minto Village Council	7/19/2005	8/8/2005 (phone call- Patrick Smith)
	Nenana Native Village	7/19/2005	
	Seth-De-Ya-Ah Corporation (Minto)	7/19/2005	
Richard Peters	Shageluk Village Council	7/19/05	
Randy Mayo	Stevens Village Council	7/19/2005	
	Toghotthele Corporation (Nenana)	7/19/2005	
Adlai Alexander	Village of Fort Yukon	7/19/2005	
	Zho-Tse, Inc. (Shageluk)	7/19/2005	

E-2: EXAMPLE SCOPING LETTER

To Whom it May Concern,

7-19-05

I would like to request a consultation from Seth-De-Ya-Ah Corporation for an ADF&G project involving the reintroduction of wood bison. There will be four activities I would like to request your input as to whether permitting or further regulations/documentation will need to be met.

- 1) The bison will eventually roam across 800-3,800 square miles, depending on the specific area and herd size (alternative site) involved (Fig. 1-4).
- 2) A temporary fence will be installed around 10-15 acres of land. Trees will be used to support the structure whenever possible.
- 3) A temporary supply of hay will be established in a manner that will preclude access by other wildlife, and a small, temporary camp to support personnel tending bison while in captivity (approximately 6-8 weeks) will be constructed (a mobile camper may be used).
- 4) Existing trails will be utilized to access the temporary camp and bison enclosure.

Detailed descriptions of each activity are attached in the enclosed letter under project description. If any of the above activities would trigger further compliance, can you please include suggestions for mitigation (ie...smaller diameter posts for fence, non-placement in certain areas, etc). The above activities are flexible in their placement and can be arranged to accommodate agency requests.

HEA, Inc. and ADF&G would like to request that a signed letter be returned on Seth-De-Ya-Ah Corporation letterhead for inclusion in our environmental analysis report no later than August 15th, 2005. Please address all comments to Andrea Hunter at the following address:

Hunter Environmental Associates, Inc.
3570 Basin St
Fairbanks, AK 99709

We greatly appreciate your guidelines, comments, and suggested mitigation.

Sincerely,

Andrea Hunter, HEA, Inc.
907-451-5593

David D. James, ADF&G
907-459-7222

3570 Basin St. Fairbanks, AK 99709

Website: www.acsalaska.net/~heainc

E-3: COPIES OF SCOPING COMMENTS RECEIVED

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME*Division of Sport Fish***FRANK MURKOWSKI, GOVERNOR**

1300 College Road
Fairbanks, AK 99701
PHONE: (907) 459-7363
FAX: (907) 456-2259

MEMORANDUM

TO: Andrea Hunter
Hunter Environmental Associates, Inc.
3570 Basin St.
Fairbanks, AK 99709

FROM: Todd Nichols
Habitat Biologist

DATE: August 15, 2005

SUBJECT: Permits For The Reintroduction Of Wood Bison Onto The Minto Flats
State Game Refuge

The Alaska Department of Fish and Game (ADF&G), Division of Sport Fish has reviewed your request to examine permit requirements regarding the potential reintroduction of Wood Bison onto the Minto Flats State Game Refuge (MFSGR).

Pursuant to AS 16.20.037(b) MFSGR was established to ensure the protection and enhancement of habitat, conservation of fish and wildlife, and continuation of hunting, fishing, trapping, and other compatible uses.

Goals and policies in the 1992 MFSGR Management Plan (5 AAC 95.530) govern the protection and enhancement of fish and wildlife habitat, and conservation of fish and wildlife populations and diversity. In accordance with the management plan enhancement of habitat includes diversifying habitat function, and applies to historically occurring wildlife. Management objectives also provide for enhancement of hunting, fishing, and trapping opportunities when consistent with the conservation of fish and wildlife habitat and populations.

However, "harmful disturbance" of fish and wildlife must be "minimized." Definitions for this stipulation are defined as follows:

- 1) Harmful disturbance is anything (excluding legal harvest) that displaces fish or wildlife from their natural habitat or interrupts their seasonal activities at a frequency, duration, or intensity which cause a significant impact to the refuge resources.
- 2) Minimize means to reduce an adverse effect below a threshold where the action or object would not significantly impact fish and wildlife populations or their habitat.

Therefore, if conducted on MFSGR, permits (5 AAC 95.420) for the proposed Wood Bison reintroduction project would require stipulations (5 AAC 95.720) including, but not limited to monitoring and mitigating impacts that are or may become inconsistent with purposes of the refuge. For instance, MFSGR contains high quality waterfowl habitat, thus, monitoring potential impacts on waterfowl should be addressed. Also, MFSGR contains a core area (i.e., the Minto Flats Management Area) of high value resources. Therefore, mitigation of disturbances from the temporary, small-scale holding facility to potentially significant long-term, landscape scale habitat alterations must be addressed.

No permit from ADF&G is required if the temporary holding facility is constructed outside of the MFSGR, however, a land use permit will be required from the Alaska Department of Natural Resources, Division of Mining, Land & Water (ADNR) if constructed on state land regardless of land designation (i.e., in or out of the refuge). No permit from ADNR is required for release of bison; however, with the intent of having MFSGR as the heart of the home range for the bison it is likely, but undetermined at this time if a permit from ADF&G is applicable for their release outside of the refuge boundary.

Regardless, based on background research compiled by the Wood Bison Restoration Advisory Group the proposal appears to be compatible with the purposes for which the refuge was established.

Sincerely,



Todd Nichols
Habitat Biologist
ADF&G, Fairbanks
(907) 459-7363

Cc: David James, ADF&G, Fairbanks
Cathy Harms, ADF&G, Fairbanks
Randy Rodgers, ADF&G, Fairbanks
Bob Stephenson, ADF&G, Fairbanks
Craig Gardner, ADF&G, Fairbanks
Jim Fish, ADF&G, Fairbanks
Chris Milles, ADNR, Fairbanks

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF ENVIRONMENTAL HEALTH
OFFICE OF THE STATE VETERINARIAN

FRANK H. MURKOWSKI, GOVERNOR

500 S. ALASKA STREET
PALMER, ALASKA 99645

(907) 745-3236

FAX (907) 745-8125

<http://www.state.ak.us/dec/eh/vet/index.htm>

August 8, 2005

Andrea Hunter
HEA, Inc.
3570 Basin Street
Fairbanks, Alaska 99709

Dear Ms Hunter:

The Office of the State Veterinarian has the responsibility to regulate the importation of animals into the Alaska to prevent the introduction and spread of infectious and contagious diseases. Since the bison will be crossing international borders the USDA-Veterinary Services should be contacted, there are specific regulations that will need to be followed to allow an importation of bison into the United States. Dr. Gary Brickler is the Area Veterinarian in Charge for the region and should be contacted (360)753-9430.

There are specific requirements that will need to be met to allow bison to enter the state, these are outlined in the Alaska Animal Health Regulations 18AAC 36.005 - 36.930:

(a) Cattle and bison imported into the state must be accompanied by a permit and a health certificate which, for cattle or bison over six months of age, must include certification that within 30 days before importation the cattle or bison tested negative to the following tests at laboratories approved by the United States Department of Agriculture to conduct such tests:

(1) a brucellosis test unless the animal is under 18 months of age and has been officially vaccinated and permanently identified as an official brucellosis vaccinee;

(2) an anaplasmosis test; and

(3) a blue tongue test.

(b) Cattle and bison over six months of age must be negative to a tuberculin test within 30 days before importation.

(c) The health certificate required by (a) of this section must indicate that the animals are free of ectoparasites or have been dipped or sprayed within 10 days before importation with an insecticide approved by the United States Department of Agriculture.

(d) Cattle and bison imported into Alaska are subject to being retested 30 to 120 days after their arrival in the state at the discretion of the state veterinarian. Imported cattle and bison must be kept isolated from resident livestock until retests are concluded or the state veterinarian has approved the release of the animals.

These regulations specifically deal with domestic livestock that will be confined to a premise and easily controlled with regular oversight and opportunity for repeated examination and sampling. These wood bison pose a greater risk since the goal is to release them to the wild where they will be free-ranging and interact with other wildlife species. These wood bison should be confined for an extended period of time to allow adequate time for repeated examination and additional diagnostic testing. Diagnostic tests to include:

- Examination for external and internal parasites (treatment for parasites may be indicated)
- Tests for Viral respiratory disease (Infectious Bovine Rhinotracheitis, Bovine Viral Diarrhea, Bovine Syncytial Respiratory Virus)
- Tests for Bacterial diseases (Leptospirosis, Anthrax, Mycobacterium avium paratuberculosis, also known as Johne's Disease)

Testing for Johne's Disease presents some unique diagnostic challenges in bison. The animals would be treated as a group or batch, if one tests positive for Johne's Disease the group would be classified as positive and not allowed to be released. The bison would be required to be confined/quarantined on a fenced premise, testing would begin when the youngest animal is at least 2 years old (aged by dental eruption). Then each animal would be re-examined and re-tested for Johne's Disease at 6 month intervals. The group would be released from quarantine if the two fecal tests are negative on both fecal culture and PCR analysis.

These testing requirements seem formidable but the goal is to protect the wildlife resources of the state. Please contact me if you have any questions.

Sincerely,



Robert Gerlach
Alaska State Veterinarian

Cc: David James, ADF&G
Dr Kimberlee Beckmen, ADF&G
Dr Gary Brickler DVM USDA-APHIS-VS
Kristin Ryan, Director-Environmental Health

STATE OF ALASKA

FRANK H. MURKOWSKI,
GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF HABITAT MANAGEMENT AND PERMITTING

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 456-3091

July 26, 2005

Ms. Andrea Hunter
Hunter Environmental Associates, Inc.
3570 Basin Street
Fairbanks, AK 99709

Dear Ms. Hunter:

RE: ADF&G Wood Bison Reintroduction

The Alaska Department of Natural Resources – Office of Habitat Management and Permitting (OHMP) has reviewed your consultation request dated July 14, 2005 regarding the Alaska Department of Fish and Game's proposed reintroduction of wood bison to three potential reintroduction sites including the Yukon Flats, Minto Flats, and the Innoko Flats. Historically wood bison were indigenous to central Alaska, having disappeared as recently as the early 1900s. OHMP supports the proposed reintroduction and believes it will increase habitat and ecosystem diversity while providing enhanced socio-economic benefits.

OHMP has reviewed the project description and has no additional recommendations for mitigating impacts associated with the proposed temporary holding facilities. All practicable measures to reduce wetland and habitat impacts have been incorporated in the project description. No permit authorizations from OHMP are required.

Thank you for the opportunity to review this project description.

Sincerely,



Robert F. "Mac" McLean, Area Manager
Office of Habitat Management and Permitting

cc: David James, ADF&G, Fairbanks
Kerry Howard, OHMP, Juneau

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF AGRICULTURE

FRANK H. MURKOWSKI, GOVERNOR

- ☒ CENTRAL OFFICE
1800 GLENN HIGHWAY, SUITE 12
PALMER, ALASKA 99645-6736
PHONE: (907) 745-7200
FAX: (907) 745-7112
- ☐ NORTHERN REGION OFFICE
3700 AIRPORT WAY
FAIRBANKS, ALASKA 99709-4699
PHONE: (907) 451-2780
FAX: (907) 451-2751
- ☐ PLANT MATERIALS CENTER
HC04 BOX 7440
PALMER, ALASKA 99645-9706
PHONE: (907) 745-4469
FAX: (907) 746-1568

July 19, 2005

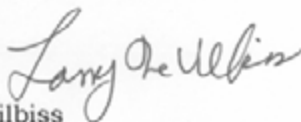
Andrea Hunter
HEA, Inc.
3570 Basin Street
Fairbanks, Alaska 99709

Dear Ms. Hunter:

The Division of Agriculture has no specific concerns or permitting jurisdiction over any of the proposed release sites for the wood bison. However, we would like to insure that you are working with the State Veterinarian's Office. We would certainly be concerned about bringing any animals into the state, for the purpose of creating a wild population, if they posed a threat to other wildlife and/or livestock.

Thank you for the opportunity to review and comment on this project.

Sincerely,



Larry DeVilbiss
Director

LD/lh

Cc: Robert Gerlach, State Veterinarian, DEC
David D. James, ADF&G
Steve Trickett, Natural Resource Officer

"Develop, Conserve, and Enhance Natural Resources for Present and Future Alaskans."

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS AND OUTDOOR RECREATION

FRANK H. MURKOWSKI, GOVERNOR

550 W. 7TH AVENUE, SUITE 1380
ANCHORAGE, ALASKA 99501-3561
PHONE: (907) 269-8700
FAX: (907) 269-8907

July 22, 2005

Hunter Environmental Associates, Inc.
Attn: Andrea Hunter
3570 Basin St.
Fairbanks, AK 99709

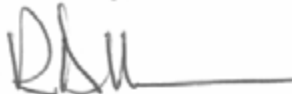
Re: Reintroduction of Wood Bison

Dear Ms. Hunter:

I've reviewed your proposal to reintroduce Wood Bison in various places in interior Alaska. Since this proposal does not appear to affect any units of the Alaska State Park system, we have chosen to not become involved in this process.

Thank you for considering our perspective. Best wishes for a successful project.

Sincerely,



Richard A. LeFebvre
Acting Director

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS AND OUTDOOR RECREATION
OFFICE OF HISTORY AND ARCHAEOLOGY

FRANK H. MURKOWSKI, GOVERNOR

550 W. 7TH AVENUE, SUITE 1310
ANCHORAGE, ALASKA 99501-3585
PHONE: (907) 269-8721
FAX: (907) 269-8908FAXED
11/6/05

November 7, 2005

File No.: 3130-1R EPA
3130-2R DFG

SUBJECT: Wood Bison Restoration Project

Andrea Hunter
HEA, Inc.
3570 Basin St.
Fairbanks, AK 99709

Dear Ms. Hunter,

Our office has received your letter (9/23/05) containing the additional information which we requested in our letter of 8/15/05. In speaking with Ms. Joan Dale of our office, our review and compliance staff understands that the proposed temporary fences and camps (for on-site personnel) will be located within areas where there are no reported archaeological sites or in areas of medium to high archaeological potential. However, in reviewing the maps which accompanied your letter, there appear to be sites which may be in the immediate vicinity of the proposed project which is likely due to the scale of your map:

- Birch Creek
 - FYU-040 is located in the NENWSE quarter (the NE ¼ of the NW ¼ of the SE ¼) of Section 33, F17N09E (T. 17N, R. 09E, Fairbanks Meridian) on USGS Map, Fort Yukon B4.
 - FYU-00035 is located in the SWSWSW quarter of Section 13, F21N18E on USGS Map, Fort Yukon B4.
 - FYU-055 is located in the NESENE quarter of Section 33, F17N09E on USGS Map, Fort Yukon B4.
- Chalkyitsik
 - BLR-039 is located in the E ½ of the NE ¼ of Section 13, F21N18E on USGS Map, Black River C6.
 - BLR-056 is located in the SENESW quarter of Section 18, F21N09E on USGS Map, Black River C6.
- Holy Cross
 - XHC-055 is located in the SWNWNW quarter of Section 12, S24N57W on USGS Map, Holy Cross A2.
 - XHC-056 is located in the NESENW quarter of Section S24N57W on USGS Map, Holy Cross A2.

*Review and Compliance**Page 2**11/7/2005*

- Shageluk
 - o XHC-081 is located in the NENWNW quarter of Section S30N55W on USGS Map, Holy Cross C2.

As was stated above, Hunter Environmental Associates, Inc. has shown a willingness to work with the State Historic Preservation Office in locating the proposed temporary fences. Therefore, we are confident that the above listed sites will not be in areas which are selected as temporary fence locations. Consequently, our office concurs with your finding of No Historic Properties Affected.

Please contact Joan Dale at 269-8718 if you have any questions regarding site locations. For all other questions please contact Margie Goatley at 269-8722.

Sincerely,



Judith E. Bittner
Deputy State Historic Preservation Officer

JEB:mmg

STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES
OFFICE OF THE COMMISSIONER

FRANK H. MURKOWSKI, GOVERNOR

3132 CHANNEL DRIVE
JUNEAU, ALASKA 99801-7898

TEXT : (907) 465-3652
FAX : (907) 586-8365
PHONE : (907) 465-3900

August 17, 2005

Ms. Andrea Hunter
Hunter Environmental Associates
3570 Basin Street
Fairbanks Alaska 99709

Dear Ms. Hunter:

Thank you for the opportunity to comment on your proposed reintroduction of wood bison.

The Alaska Department of Transportation and Public Facilities (DOT&PF) has no objection to your proposal. No permitting will be required provided there are no improvements made within the Right of Way. Any improvements within the Right of Way, including temporary or permanent driveways, will require approval and an encroachment permit. Encroachment permit procedures and applications are available online at: <http://www.dot.state.ak.us/permits/index.shtml>

Sincerely,



Mike Barton
Commissioner



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
3437 AIRPORT WAY
SUITE 206 WASHINGTON PLAZA
FAIRBANKS, ALASKA 99709-4777

October 14, 2005

Regulatory Branch
North Section
Corps General Files 1145
Wood Bison Restoration

Ms. Andrea Hunter
Hunter Environmental Associates, Inc.
3570 Basin Street
Fairbanks, Alaska 99709

Dear Ms. Hunter:

This is in response to your September 29, 2005, application requesting a Department of the Army (DA) permit for the proposed wood bison reintroduction project located in various areas throughout Interior Alaska, including Beaver, Birch Creek, Chalkyitsik, Minto, Shageluk, and Holy Cross. Proposed work includes the construction of fenced enclosures and 25' x 25' platforms supported by cement blocks.

Based on our review of the information you furnished, we have determined that the proposed project would not require a DA permit, even for work conducted in wetlands. The number and configuration of proposed poles and blocks would not raise the bottom elevation of wetland areas and therefore do not constitute fill under our regulatory jurisdiction. If you decide to alter the method, scope, or location of your proposed activity, The Corps asks that you contact this office for a determination of DA jurisdiction and, if applicable, the required DA authorization.

Your proposed project was reviewed pursuant to Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Section 10 of the Rivers and Harbors Act requires that a DA permit be obtained for certain structures or work in or affecting navigable waters of the U.S., prior to conducting the work (33 U.S.C. 403). Section 404 of the Clean Water Act requires that a DA permit be obtained for the placement or discharge of dredged and/or fill material into waters of the U.S., including wetlands, prior to conducting the work (33 U.S.C. 1344).

For regulatory purposes, the Corps of Engineers defines wetlands as those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Navigable waters of the U.S. are those waters subject to the ebb and flow of the tide shoreward to the mean high water mark, and/or other waters identified as navigable by the Alaska District.

-2-

Please be advised that land clearing operations involving vegetation removal with mechanized equipment such as front-end loaders, backhoes, or bulldozers with shear blades, rakes, or discs; windrowing of vegetation, land leveling, or other soil disturbances in waters of the U.S., including wetlands are considered placement of fill material under our jurisdiction.

Nothing in this letter shall be construed as excusing you from compliance with other Federal, State, or local statutes, ordinances, or regulations that may affect this work. For informational purposes, a copy of this letter is being sent to the agencies and individuals on the enclosed list.

Please take a moment to complete and return the enclosed questionnaire. Our interest is to see how we can continue to improve our service to you, our customer, and how best to achieve these improvements. Upon your request, you may also provide additional comments by telephone or a meeting. We appreciate your efforts and interest in evaluating the Regulatory Program.

We thank you for your cooperation with the Corps of Engineers' Regulatory Program. Corps files associated with this project are stored in our General Files under Wood Bison Restoration. If you have any questions concerning this determination, please contact me by phone at (907) 474-2166, by FAX at (907) 474-2164, by email at Sharon.G.Seim@poa02.usace.army.mil, at the letterhead address.

Sincerely,



Sharon Seim
Regulatory Specialist

Enclosures



United States
Department of
Agriculture

Animal and Plant Health
Inspection Service

Veterinary Services

AK/HI/WA/PTT Area
2604 12th Court SW
Suite B
Olympia, WA
98502

Phone: 360-753-9430
Fax: 360-753-9585

August 31, 2005

Andrea Hunter
Hunter Environmental Associates
3570 Basin Street
Fairbanks, AK 99709

Dear Ms. Hunter:

As a part of the Animal and Plant Health Inspection Services (APHIS) mission of protecting American agriculture, the agency is charged with regulating the import and export of animals, animal products, and biologics.

Relative to the importation of bovines from Canada, APHIS published a final rule on January 4, 2005, entitled "Bovine Spongiform Encephalopathy; Minimal-Risk Regions and Importation of Commodities." As a result of this publication, regulations are now in place to govern the importation of certain live ruminants into the United States from Canada. The following live ruminants may be imported into the United States:

1. Feeder bovines (cattle or bison) if they are accompanied by an official health certificate, are less than 30 months of age, and are transported under seal to a feedlot.
2. Bovines for slaughter that are less than 30 months of age if they are accompanied by a health certificate and consigned directly to a recognized slaughtering establishment in a sealed vehicle.
3. Feeder sheep and goats with an import permit, and official health certificate, less than 12 months of age, and transported under seal directly to a designated feedlot.
4. Sheep and goats for slaughter accompanied by an official health certificate, less than 12 months of age, and are transported under seal directly to a recognized slaughtering establishment.
5. Camelids (such as camels, llamas, alpacas, vicunas, and guanacos) of any age may be imported for any purpose. They must be accompanied by an official health certificate.
6. Cervids (such as deer, elk, moose, and related species) of any age may be imported for any purpose. They must be accompanied by an official health certificate.



Safeguarding American Agriculture
APHIS is an agency of USDA's Marketing and Regulatory Programs
An Equal Opportunity Provider and Employer

Federal Relay Service
(Voice/TTY/ASCII/Spanish)
1-800-877-8339

The final rule does not allow importation of breeding bovines, sheep, or goats.

At this time, I do not know if or when a rule to allow the import of breeding animals will be proposed.

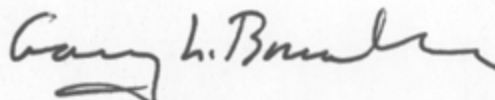
Additional information regarding the international import regulations may be requested from the National Center for Import and Export at:

USDA-APHIS-VS-NCIE
4700 River Road Unit 40
Riverdale, MD 20737

301-734-8364

fax 301-734-4704

Sincerely,

A handwritten signature in black ink, appearing to read "Gary L. Brickler", with a stylized flourish at the end.

Gary L. Brickler, D.V.M.
Area Veterinarian

Cc: Dr. Robert Gerlach
Dr. Mike Philo



United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Alaska State Office
222 West Seventh Avenue, #13
Anchorage, Alaska 99513-7599
<http://www.ak.blm.gov>



SEP 16 2005

1745 (931)

Ms. Andrea Hunter
Hunter Environmental Associates, Inc.
3570 Basin Street
Fairbanks, Alaska 99709

Dear Ms. Hunter,

We are in receipt of your letter dated July 14, 2005, requesting the Bureau of Land Management's (BLM) position on the reintroduction of wood bison on lands under its administration. Outlined below are the procedures the BLM must follow when the introduction, transplant, augmentation, or reestablishment of a fish, wildlife or plant species is proposed that could potentially involve lands under our administration.

BLM's guidance comes from BLM Manual 1745, Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife, and Plants, and from Executive Order 13112, dated February 3, 1999. Both of these documents define Native Species as all species of plants and animals naturally occurring, either presently or historically in an ecosystem. The State of Alaska, Department of Fish and Game has determined wood bison occurred historically in areas of Alaska which reintroduction has been proposed. BLM generally considers it the responsibility of the state wildlife management agency to determine most wildlife related actions such as species reintroductions. This would include actions by the state that could potentially affect adjacent BLM administered lands. In addition, Title VIII, Section 810 of the Alaska National Interest Lands Conservation Act requires federal agencies to evaluate such actions on subsistence.

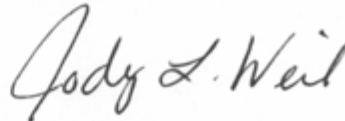
BLM Manual 1745 requires BLM to amend its land use plan, if that plan does not address reestablishment of a population within the planning area. Two of the potential areas being considered for the reestablishment of wood bison have BLM administered lands within the reestablishment boundaries. Neither of the areas considered wood bison reestablishment when the land use plans were developed. In the case of the Innoko area, much of which is BLM administered, BLM is operating under a Management Framework Plan (MFP) established in 1981, and is currently scheduled to begin a Resource Management Plan (RMP) in 2008, with completion in 2010. There are currently no plans to amend the MFP for any proposed action. Within the delineated area of high-value bison habitat in Minto Flats, BLM currently has 43

sections under its administration with all of those sections Native selected under the Alaska Native Claims Settlement Act of 1971. The majority of the selected lands in this area are scheduled to be conveyed within the next year and would not likely include the remaining selected lands in the scheduled (2009) Central Yukon RMP. BLM has no lands within the boundaries of the Yukon Flats proposed reestablishment area.

If wood bison holding areas and temporary supplemental feeding (as outlined in your July 14, 2005, letter) are proposed on BLM administered lands, BLM would be required to complete a National Environmental Policy Act evaluation. Executive Order 13112, Invasive Species Management may apply if there is a potential threat of introducing non-Native species through such a holding facility and supplemental feeding program.

The BLM will continue to work closely with the Alaska Department of Fish and Game during the planning phase for wood bison reestablishment. If you have any questions about the policy outlined above, please contact John Payne (907) 271-3431.

Sincerely,



Henri R. Bisson
State Director

ACTING

2 Enclosures

- 1 - BLM 1745 Manual – Introduction, Transplant, Augmentation, and Reestablishment of Fish, Wildlife and Plants (12 pages)
- 2 - Executive Order 13112 of February 3, 1999, Invasive Species (6 pages)

cc:

Matt Robus, Director, Wildlife Conservation Division,
Alaska Department of Fish and Game
David James, Regional Supervisor, Interior Regional Office,
Alaska Department of Fish and Game
Field Manager (020)
Field Manager (040)



United States Department of the Interior

FISH AND WILDLIFE SERVICE

1011 E. Tudor Rd.

Anchorage, Alaska 99503-6199

IN REPLY REFER TO:

NWRS705-244c.jas

SEP 8 2005

Mr. David D. James
Regional Supervisor
Alaska Department of Fish and Game
1300 College Road
Fairbanks, Alaska 99701

Ms. Andrea Hunter
Hunter Environmental Associates, Inc.
3570 Basin Street
Fairbanks, Alaska 99709

Dear Mr. James and Ms. Hunter:

This responds to your July 14, 2005, letter to Ted Heuer, Refuge Manager of the Yukon Flats National Wildlife Refuge, Alaska. Mr. Heuer has forwarded your letter to me for response. Mr. Heuer and I concur that your letter accurately summarizes the previous meetings and correspondence between you and Mr. Heuer. However, I would like to use this letter to restate the Service's position, in full, on the proposed introduction of wood bison to Alaska.

The Service would strongly prefer that the initial proposed wood bison introduction occur on the Minto or Innoko locations as described in the draft ADF&G Bison Reintroduction project description included with your letter. We assume that any wood bison introduction would be accompanied by close monitoring of the wood bison, other wildlife, and habitats. Results of such studies would provide important information for future consideration of the appropriateness and desirability of the establishment of wood bison onto other lands in Alaska.

Lastly, we concur with the view that the listing of the wood bison in Canada under the Endangered Species Act does not need to be modified to add the imported population of wood bison in Alaska as endangered or threatened. We intend to treat any wood bison imported into Alaska as a foreign listed species and have no intention of revising the list so that they are listed domestically.

Thank you for the opportunity to distil and clarify the Service's position on the proposed wood bison introduction.

Sincerely,

Rowan Gould
Regional Director



IN REPLY REFER TO:

United States Department of the Interior

FISH AND WILDLIFE SERVICE

1011 E. Tudor Rd.

Anchorage, Alaska 99503-6199

FWS/AEA

NOV 2 2006

Mr. McKie Campbell, Commissioner
Alaska Department of Fish and Game
Post Office Box 115526
Juneau, Alaska 99811-5526

Dear Commissioner Campbell: *McKie*

Thank you for your letter of August 31, 2006, which summarized recent activities by the Alaska Department of Fish and Game (ADF&G) and others to facilitate restoration of wood bison in Alaska. You summarized the Service's past positions on the Wood Bison Restoration Project and asked that we reconsider our previously stated concern with potential introductions of wood bison into the Yukon Flats National Wildlife Refuge. Lastly, you requested that we meet to discuss interagency cooperation on this project.

I am pleased that we were able to meet last week on this issue. As I noted, the record shows that the Service has been supportive of many aspects of your efforts to date. For example, in 2004 we formally stated that the listing of wood bison in Canada under the ESA does *not* need to be modified to add the imported population in Alaska as endangered or threatened. We would treat any wood bison imported into Alaska as a foreign listed species and see no conservation benefit of revising the list so wood bison can be listed domestically. Also, for the past decade the Service has channeled federal wildlife grants to ADF&G for research on wood bison restoration efforts in Alaska.

We appreciate the opportunity to review the pre-release environmental review document on the Alaska Wood Bison Restoration Project. The draft environmental review, along with our meeting on October 26, 2006, provided a better understanding of this effort. Overall, we found the draft environmental review well crafted and we will provide detailed comments separate from this letter.

The draft environmental review concludes that Yukon Flats, Minto Flats, and the lower Innoko/Yukon River area are all suitable restoration sites for wood bison. The review concludes that Yukon Flats is most favorable and recommends simultaneous introductions to Yukon Flats and Minto Flats if Service concerns can be resolved.

Former Regional Director Rowan Gould's letter of September 8, 2005, to David James and Andrea Hunter, stated the Service's position as follows:

"The Service would strongly prefer that the initial proposed wood bison introduction occur on the Minto or Innoko locations as described in the draft ADF&G Bison

RECEIVED

NOV 2 2006

DEPT. OF FISH & GAME
COMMISSIONER'S OFFICE

reintroduction project description included with your letter. We assume that any wood bison introduction would be accompanied by close monitoring of the wood bison, other wildlife, and habitats. Results of such studies would provide important information for future consideration of the appropriateness and desirability of the establishment of wood bison onto other lands in Alaska.”

The Service does not view our compatibility or biological integrity policies as insurmountable obstacles to introduction of wood bison into the Yukon Flats. For example, a compatibility determination by the refuge manager is required before any activity can be permitted within a refuge. However, if ADF&G should introduce wildlife onto refuge lands as a partner with the Service as a “refuge management activity” the compatibility determination would no longer be a major factor.

Likewise, the Service’s biological integrity policy states:

“Where practical, we support the reintroduction of extirpated native species. We consider such reintroduction in the context of surrounding landscapes. We do not introduce species on refuges outside their historic range or introduce species if we determine that they were naturally extirpated.”

Information exists to support the environmental review’s conclusion that the Yukon Flats was within the wood bison’s historic range. Less clear, however, is the cause of extirpation. Gardner and DeGange concluded:

“Factors that are responsible for the extirpation of wood bison from Alaska may never be known with certainty. However the combined effect of changes in habitat and harvest by humans is the most likely cause.”

From the above, one can argue that wood bison reintroduction into the Yukon Flats *could* contribute to the refuge’s biological diversity. However, the uncertainty of the authors’ conclusion and questionable applicability of this conclusion specifically to the Yukon Flats Refuge demands a cautionary approach. This remains the primary basis for the Service’s position as stated by my predecessor(s).

The potential for unintended consequences cannot be dismissed. The environmental review acknowledges possible negative affects on water quality, fisheries, waterfowl, moose forage availability, predation rates on moose, and ground nesting raptors. You suggest most of these should be minor, if not negligible. We do not disagree that your conclusions are *most likely* correct. The draft environmental review also suggests neutral and positive effects on some resources and species as well. We agree that these conclusions are *most likely* correct as well.

In conclusion, I’ll state my position in two parts. First, I reiterate the position stated by Dr. Gould in 2005 – the Service prefers that ADF&G initiate the wood bison restoration project *outside* the Yukon Flats National Wildlife Refuge. The State of Alaska is the primary proponent of wood bison reintroduction and has identified a suitable introduction site dominated by state lands. While the environmental review presents a reasonable justification for simultaneous

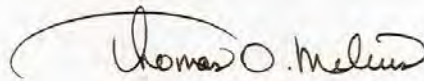
3

reintroductions on Minto Flats and Yukon Flats, the Service believes there is a compelling argument for a sequenced approach starting with Minto Flats. As we have previously stated, monitoring an introduction into the more readily accessible Minto Flats would provide important information for future consideration of the appropriateness and desirability of the establishment of wood bison onto other lands in Alaska.

My second point reflects the fact that the Service and ADF&G have many mutual goals and a long standing record of cooperation, collaboration and, as needed, deference for one another's differing missions and legal mandates. While the Service prefers wood bison restoration in a sequential approach and learning from actions taken on Minto Flats before advancing to other areas, our concerns are *not* sufficient to object to your proposal to pursue reintroduction of wood bison onto *private lands* in the Yukon Flats as described in the environmental review. We expect that the ADF&G will do appropriate monitoring of the wood bison and their impacts. If you choose this approach, we will accept your offer to cooperatively develop management and development plans.

Thank you for considering my concerns. Be assured, I welcome opportunities to find common ground so future conflicts arising from differing legal mandates, objectives, and policies of our respective agencies can be avoided or minimized.

Sincerely,

A handwritten signature in black ink, reading "Thomas O. Melius". The signature is fluid and cursive, with a large, sweeping initial "T" and a distinct "O" before the last name.

Regional Director



Council of Athabascan Tribal Governments
Natural Resource Department
P.O. Box 283
Fort Yukon, AK 99740-0283
(907) 662-2667 FAX: (907) 662-3047

September 15, 2005

Andrea Hunter
Hunter Environmental Associates, Inc.
3570 Basin Street
Fairbanks, Alaska 99709

David James
Alaska Department of Fish and Game
1300 College Road
Fairbanks, Alaska 99701

RE: Restoration of Wood Bison to the Yukon Flats, Alaska

Dear Ms. Hunter:

Thank you for the opportunity to comment on the proposed wood bison restoration project. The Council of Athabascan Tribal Governments (CATG) fully supports this project. The restoration of wood bison to the Yukon Flats was identified by our Tribes in the early 1990's as a key element of the comprehensive regional development strategy. Traditional Chief David Salmon, respected elder and Traditional Athabascan Chief of over 40 Tribes across interior Alaska, has been a primary advocate of this effort. In 2004, following Chief Salmon's lead, the CATG Board of Directors designated this project as a high priority for the staff of the CATG Natural Resource Department. Chief Salmon and other elders have shared oral history of wood bison on the Yukon Flats with Tribal, State and Federal Natural Resource Managers for the purpose of restoring wood bison to the Yukon Flats.

Our staff is currently coordinating the Tribal planning process within the Yukon Flats to discuss wood bison management principles, Tribal involvement in long-term management objectives, harvest allocations, and private land owner involvement. We plan to work with the Alaska Department of Fish & Game (ADF&G) to expand this effort in the near future to include wider participation, and expect to work closely with other interests to develop cooperative agreements and plans for wood bison restoration. We place a high priority on this project for several critical reasons:

1. A more reliable and diverse supply of subsistence foods for local communities is needed. Wood bison will provide an additional source of food and materials and would strengthen the subsistence-based economy of the region. The Yukon Flats has the lowest moose population in interior Alaska and salmon cannot be relied upon as a source of food as the annual migrations have become unreliable.
2. Wood bison have been of great spiritual, cultural and historical significance to the people of the Yukon Flats; their restoration will help to reconnect the people with their traditional, cultural and spiritual ways leading to healthier lifestyles. Traditional Chief David Salmon has stated the strength, health and well-being of our people will return only with the return of the wood bison.
3. This project has international and global significance; if implemented, this project will help to secure the long term survival of wood bison, which were nearly extinct 100 years ago. Restoration of the wood bison to the Yukon Flats could help ensure the survival of this subspecies, and again allow this animal to roam free in a major part of its original range. The Yukon Flats has been identified as the primary restoration site by habitat assessments conducted by various entities such as ADF&G, Canada's National Recovery Team for Wood Bison, and the International Union for the Conservation of Nature's (IUCN) bison specialist group.
4. Restoration of wood bison would help to enhance biological and habitat diversity within the Yukon Flats. The restoration of wood bison will reestablish a native grazing animal that will help to maintain meadows and therefore increase the ecological productivity of the Yukon Flats. In 1994, ADF&G conducted a feasibility study that found, in terms of habitat suitability, effects on other wildlife, the environment, and human activities, that a restoration is feasible. Additionally, in extensive discussion and research no evidence of negative environmental impacts has been discovered. Reviews were completed by The Wildlife Society in 1998, and more recently by the U.S. Fish & Wildlife Service (USFWS) and ADF&G, which completed a joint review of historical and biological information in 2003. These reviews concluded that previous environmental evaluations were generally accurate and also recognized the value of the extensive historical information that is available. Both reviews support the conclusion that wood bison are an extirpated, indigenous species. They also conclude that as our elders have said in their accounts, hunting in the early days was heavy and may be one reason the bison finally disappeared. This was recently confirmed during the Wood Bison Restoration Advisory Group meetings (WBAG), in which we participated, where a variety of experts presented information on bison history and ecology. After reviewing the information this group found no reason for concern about environmental effects, acknowledged the extensive historical information and

recommended moving ahead to restore wood bison on the Yukon Flats and in two other areas.

5. Wood bison restoration encourages development of local economies based upon renewable resources. Wood bison in the Yukon Flats will provide local people economic opportunities in eco-tourism and guiding businesses that are not currently present. In addition, wood bison will be located on the huge tracts of private, Native-owned lands, which will raise the value of those lands.
6. Finally, this project allows for a unique and historical partnership among entities with different backgrounds and philosophies to work towards the common goal of wood bison restoration. This project has such wide public interest and support, including but not limited to: the Tribes of Yukon Flats, State and Federal Agencies, Canada's National Recovery Team for Wood Bison, the Canadian Wildlife Service, Environment Canada, International Union for the Conservation of Nature, Alaska Outdoor Council, Safari Club International, Tanana Chiefs Conference, Eastern Regional Subsistence Advisory Council, Alaska Village Initiatives, Native Corporations, Governor Frank Murkowski, Senator Ted Stevens, Congressman Don Young and various environmental organizations.

In your letter you asked for specific comments or concerns regarding four activities related to the facilities that will be needed to implement the project, and the long term effects of wood bison on the landscape. As noted above, our discussions with people on the Yukon Flats indicate that wood bison are expected to have favorable affects on other animals and the environment. The Tribes of the Yukon Flats have expressed little concern about negative effects, and our Department's review of the technical information and discussions with biologists and ecologists in Alaska and Canada indicate that wood bison are compatible with the environment and other human activities within the Yukon Flats.

Our local communities are very interested in working with partners to establish the temporary holding facility on their private lands. We are not aware of any local concerns about the minor, short term disturbance in the small area needed for the temporary fence, hay supply and small camp mentioned in your letter. There are many sites that would be suitable for this facility, and we are eager to work with ADF&G and local communities to implement the restoration, including assisting in developing cooperative agreements with local tribal councils and village corporations.

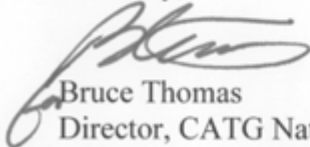
For these reasons, we support the efforts to restore wood bison back to the Yukon Flats. We also look forward to working with all parties to bring appropriate wildlife management actions to play. We support the recommendation of the WBRAG that ADF&G should move forward as expeditiously as possible in developing wood bison restoration programs for three areas in Alaska. However, we would oppose any effort to remove the Yukon Flats from consideration or to postpone further development of

the Yukon Flats proposal. We think this would be unfair considering the effort our elders, tribal governments and other residents have made to build the restoration effort, the fact that the Yukon Flats has a much lower moose population than other areas, and also because the amount and quality of wood bison habitat is superior to other areas.

During the WBAG meetings it was apparent that the only significant opposition to wood bison restoration on the Yukon Flats is the US Fish and Wildlife Service (USFWS). We continue to hope that the USFWS will reevaluate the situation and join others in contributing to the success of wood bison restoration.

Again, thank you for allowing us to comment on this innovative and important wildlife conservation and restoration effort.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Bruce Thomas', with a stylized flourish at the end.

Bruce Thomas
Director, CATG Natural Resource Dept.

Andrea Hunter HEA, Inc.

From: Sam n Mary [samuel@mosquitonet.com]
Sent: Thursday, August 11, 2005 10:32 AM
To: Andrea Hunter HEA, Inc.
Subject: Re: Holy Cross

I think we are interested in the project, where would the herd be kept?

----- Original Message -----

From: Andrea Hunter HEA, Inc.
To: 'Sam n Mary'; 'Rudy Walker'
Cc: 'Robert Stephenson'
Sent: Sunday, August 07, 2005 5:30 PM
Subject: RE: Holy Cross

Dear Sam and Rudy,

Thank you for your interest in the Wood Bison reintroduction project. Any comments you have regarding mitigation suggestions, potential impacts or permitting requirements are encouraged for inclusion in our environmental analysis, ready for review in September. We will be happy to provide you with more information if you have specific questions or concerns. HEA, Inc. and ADF&G look forward to your participation and receiving your input on the project.

Sincerely, Andrea

Andrea Hunter

Hunter Environmental Associates, Inc.

3570 Basin Street
Fairbanks, AK 99709
907-451-5593 phone, fax
heainc@acsalaska.net
hunterenv@acsalaska.net
www.acsalaska.net/~heainc

-----Original Message-----

From: Sam n Mary [mailto:samuel@mosquitonet.com]
Sent: Wednesday, August 03, 2005 11:11 AM
To: Andrea Hunter; Rudy Walker
Subject: Holy Cross

We are interested in the project of reintroduction of Wood Bison. More information and a continued dialog would greatly benefit our corporation and its board and ultimate the people of the region. The four villages of the lower yukon area, Anvik, Shageluk, Grayling and Holy Cross participate in many other areas of state and federal programs, so we would also be interested in the other villages viewpoints too. Our board met recently and expressed interest in the project, so we would like to express that interest. My email address is ... samuel@mosquitonet.com and our president's email address is rdwalker@acsalaska.net his name is Rudy Walker.



August 15, 2005

Hunter Environmental Associates, Inc.
Attn: Andrea Hunter, HEA, Inc.
3570 Basin Street
Fairbanks, AK 99709

Dear Ms. Hunter:

This is in response to your letter of July 19, 2005 regarding the reintroduction of wood bison.

- 1) Ingalik Corporation is no longer a valid corporation name; it was changed to Deloy Ges, Inc. Would you please correct your records to reflect the correct name of Deloy Ges, Inc.
- 2) Deloy Ges supports the reintroduction of wood bison into our area and have no issues at this time with them grazing on our land.

Sincerely,

A handwritten signature in cursive script, appearing to read "Ernest L. Demoski, Sr.".

Ernest L. Demoski, Sr.
President, Deloy Ges, Inc.

05 09:23a Holy Cross Tribal Council 907-476-7132

p

P.O. Box 89
Holy Cross, Ak. 99602
(907) 476-7124
Fax (907) 476-7132

HOLY CROSS VILLAGE

September 21, 2005

Hunter Environmental Associates, Inc.
3570 Basin St.
Fairbanks, Ak. 99709

Dear Ms. Hunter and Mr. James:

Although I realize that the request for comments on the bison ended on August 15, 2005 the Holy Cross Tribal Council would like to still express their concerns on this possible project. The tribal council did not get to thoroughly go over the details of this project. The main concern of the council is that they would like a community survey conducted to determine the input of the community members. Projects such as this affects the entire community. The Holy Cross Tribal Council also would like a report on the environmental impact on the area surrounding and used for this project.

We also request a copy of your analysis report. Please send it to the address listed above. Thank you.

Sincerely,



Debbie M. Turner
Tribal Administrator
Holy Cross Village

Andrea Hunter HEA, Inc.

From: Elizabeth Woods [elizabeth.woods@tananachiefs.org]
Sent: Monday, September 19, 2005 1:06 PM
To: heainc@acsalaska.net
Subject: Comments on the Wood Bison introductions

Dear Andrea,

The Tribal Council held a meeting on Sept. 8, 2005 and one the discussion was the introduction of the Wood Bison. The Tribal Council voted no, because there was too many questions. Such as what would the hunting regulations be and who would be the regulators?, did all land owners agree?, what kind of effected would they have on the current vegetation and animals?, and subsistence hunting rights? After all these questions we felt that more studies would be needed, first.

If there is any thing more please don't hesitate to email me at the above address and I will relay it back to the Tribal Council. Liz

Randy R Rogers

From: Randy R Rogers [randy_rogers@fishgame.state.ak.us]
Sent: Monday, November 07, 2005 3:46 PM
To: 'Elizabeth Woods'
Subject: RE: Regarding reintroductions of the Woodland Bison

Hi Elizabeth: I remember speaking with you about the Manley Village Council's discussion about wood bison before. Wood bison is on the agenda for the Minto-Nenana Fish and Game Advisory Committee meeting in Nenana on November 15. I will let you know what the committee has to say about wood bison. We would still hope to meet with the Manley Village Council at some time in the future to provide more information on wood bison, if possible.

Thanks for keeping us informed, Randy

Randy R. Rogers, Wildlife Planner
Alaska Department of Fish and Game
Division of Wildlife Conservation
1300 College Road
Fairbanks, AK 99701-1599
(907) 459-7335

-----Original Message-----

From: Elizabeth Woods [mailto:elizabeth.woods@tananachiefs.org]
Sent: Monday, November 07, 2005 3:02 PM
To: randy_rogers@fishgame.state.ak.us
Subject: Regarding reintroductions of the Woodland Bison

Hi Randy,

My name is Elizabeth Woods, I'm the Tribal Administrator for the Manley Village Council. We have been discussing this issue at our regular monthly meetings. This last meeting on Oct. 31, 2005 the Council voted no on the reintroduction and felt there was not need to meet again. Thanks for your time and effort.

APPENDIX F — ADF&G/DWC Wildlife Transplant Policy Findings**F-1: DIRECTOR'S FINDING ON THE STATUS OF WOOD BISON IN ALASKA**

**Alaska Department of Fish and Game
Division of Wildlife Conservation
Finding Regarding the
Legal and Management Status of Wood Bison in Alaska**

Finding: Wood bison (*Bison bison athabascaae*) in Alaska are recognized as an extirpated indigenous species that, once restored, will be managed as a resident wildlife species and considered an integral part of the natural diversity of wildlife in Alaska.

Discussion: Published scientific information shows that bison were present in Alaska for at least 400,000 years, and were a dominant part in Alaska's fauna during this time (Guthrie 1990). Dated bison skeletal remains range from over 40,000 to 170 years old, with the most recent dated specimen found at Anchorage. The historical information shows that wood bison were the last subspecies of bison to live in Alaska and northern Canada. Skeletal remains and historical accounts show that wood bison persisted in a large region in interior and southcentral Alaska and Canada during the last 10,000 years and were a component in the economies of Athabascan people in central and eastern Alaska and in adjacent parts of Canada during this period (Stephenson et al. 2001). Historical accounts from Alaska Native elders describe how bison were hunted and used and, along with dated skeletal remains, provide details on their distribution in recent times. Archaeological evidence and oral accounts from Native Alaskan elders indicate wood bison were hunted by humans until they disappeared from Alaska during the last few hundred years. The most recent records of wood bison occur in the early 1900s, and include sightings of small groups or single bison in northeastern Alaska, some of which were reported to have been killed.

Historical accounts and other scientific information indicate that the most likely reason for the extirpation of bison was the combined effects of unregulated hunting and changes in habitat distribution (Stephenson et al. 2001; Griffith et al. 1998). There are many similarities between muskoxen and wood bison in terms of their historical occurrence in Alaska, as well as the timing and causes for their recent disappearance. As is the case with wood bison, published studies indicate that unregulated harvest was one of the primary causes for the extirpation of muskoxen (Lent 1999).

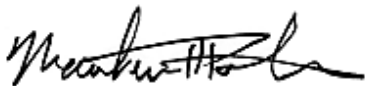
Historical evidence is most abundant in the eastern interior, but there is reason to believe that wood bison occurred in western and southcentral Alaska as well. The most recent wood bison skeletal remains were found in southcentral Alaska. The remains of large-horned steppe bison are common in western Alaska, which was part of the Beringian glacial refugia. The remains of a wood bison were found near St. Michael in western Alaska, and there is one unpublished historic account suggesting the recent presence of bison in the Galena area. Recent habitat studies, as well as the existence of a healthy herd of plains bison near Farewell, indicate that bison habitat continues to exist in the western interior. Based on these data, ADF&G recognizes the area

where recent historical information is already available, as well as the western interior, as part of the original range of wood bison, and the area where restoration programs should be considered.

Muskoxen and other species have been reestablished in parts of their original range in Alaska during the last several decades. ADF&G believes that wood bison restoration deserves the same attention from wildlife conservation agencies and interests. This is appropriate in view of the scientific knowledge regarding the history of bison in Alaska, the important contribution Alaska can make to wood bison conservation and ecosystem restoration in North America, the contribution this effort can make to the long term well being of Alaskans and others and widespread public interest in wood bison restoration.

Conclusions: Based on published historical information the Alaska Department of Fish and Game (ADF&G) finds that wood bison are an extirpated indigenous species and are native to Alaska. Once restored to Alaska wood bison will again be an integral part of Alaska's natural wildlife diversity and will be managed by ADF&G like other resident species of wildlife. This finding is in agreement with the conclusions reached in a review by the Alaska Chapter of *The Wildlife Society* (Griffith et al. 1998), and is consistent with the International Union for the Conservation of Nature/Species Survival Commission guidelines for the Translocation of Living Organisms and also the IUCN guidelines for the Re-Introduction of native species. This finding is also supported by a joint review prepared by ADF&G and the US Fish and Wildlife Service (Gardner and DeGange 2003).

Bison are widely regarded as a keystone North American herbivore by wildlife ecologists. Restoring bison populations in areas from which the species has been extirpated is recognized as a way to restore and maintain the integrity of ecosystems, and particularly to repair past disturbance (Knapp et al. 1999, Gates et al. 2001, Arcese and Sinclair 1997). ADF&G recognizes that restoring wood bison to parts of their original range in Alaska is a priority in wood bison conservation (Gates et al. 2001), and will continue to work with other agencies and the public to develop opportunities to restore wood bison in suitable habitats. This is in accordance with the ADF&G, Division of Wildlife Conservation Wildlife Transplant Policy, which will continue to guide the department's actions and final evaluation of wood bison restoration.



Matthew H. Robus, Director
Division of Wildlife Conservation

August 28, 2006
Date

F-2: FINDINGS OF THE WILDLIFE TRANSPLANT POLICY REVIEW COMMITTEE

**Findings of the
Wood Bison Restoration
Wildlife Transplant Policy Review Committee**
January 2007

Introduction

The Alaska Department of Fish and Game, Division of Wildlife Conservation (ADFG/DWC) has been evaluating the potential for restoring wood bison to Alaska since the early 1990's. Since that time a great deal of oral history research, habitat reconnaissance, and public consultation has occurred. These efforts have not identified adverse ecological impacts that are likely to be widespread or significant, yet they have demonstrated strong public support for the project. During this evaluation numerous agency permitting requirements and approvals that are necessary for the project to move forward have been identified. One of these is the requirement for the project to comply with the ADFG/DWC Wildlife Transplant Policy (WTP). Because the potential for wood bison restoration appeared promising, in July 2006 the DWC initiated procedures to evaluate the project according to the requirements of the WTP. These draft findings have been prepared by the DWC Wood Bison Restoration Wildlife Transplant Policy Review Committee (Review Committee) and are intended to be made available for a minimum 30-day public review and comment period. The Review Committee's findings will be included as one component of the report titled "Wood Bison Restoration in Alaska: A Review of Environmental and Regulatory Issues and Recommendations for Project Implementation" (Environmental Review). A public meeting will be held in Fairbanks to inform the public and accept comment on the Environmental Review and the findings of the Review Committee. Following the public meeting the Review Committee will consider any public comments received, finalize their findings and submit them to the Director of the DWC. If the wood bison restoration project proceeds, additional public meetings will be held in communities in the vicinity of areas proposed for wood bison transplants to gauge support for the project before a final decision to proceed is made.

Background

The WTP was established in July 1995 and was designed to contribute to:

5. the conservation of Alaska's native wildlife and their habitats;
6. the restoration and maintenance of wildlife diversity;
7. the protection of the state's rich natural heritage; and
8. the enhancement of wildlife values for the benefit of the people.

The purposes of the WTP are to identify concerns that must be appraised and establish a protocol for systematically evaluating those concerns to ensure that the public benefits from transplants substantially outweigh ecological and socioeconomic risks.

Pursuant to the WTP, DWC staff prepared a Scoping Report on wood bison restoration in interior Alaska for consideration by the Director. In August 2006 the Director accepted the scoping report and found that it is in the best interest of the State of Alaska to proceed with considering wood bison transplants to the three locations identified in the scoping report which are: 1) Yukon Flats, 2) Minto Flats, and 3) the lower Yukon/Innoko River area. The Director found the project consistent with the twelve evaluation criteria in the WTP and directed staff to complete the review of the wood bison restoration project according to the WTP and additional guidance he provided. Specifically, he directed that the process take into consideration the extensive documentation and public process that has occurred on the project over the years and not to duplicate work that has already been completed. He also stated that “although existing analyses indicate that wood bison are compatible with other wildlife, it will benefit the proposal to have a final review by experienced Alaskan biologists” and “the need for review by experts on wildlife diseases and parasites is already being met by consultation with Dr. Kimberlee Beckman, DWC Veterinarian, and Dr. Bob Gerlach, Alaska State Veterinarian.”

Members of the Review Committee

1. Kris Hundertmark, University of Alaska Fairbanks, Assistant Professor of Wildlife Ecology (Committee Chairman, experience with wildlife population biology and genetics)
2. Don Young, ADFG/DWC, Fairbanks Area Biologist (responsibilities include management of wildlife on the Minto Flats State Game Refuge)
3. Steve DuBois, ADFG/DWC, Delta Area Biologist (extensive experience with management of the Delta plains bison herd)
4. Tom Paragi, ADFG/DWC, Research Biologist (experience with ungulate habitat requirements and carrying capacity)
5. Todd Nichols, ADFG/Sport Fish Division, Habitat Biologist (experience with grazing ungulates, responsibilities include Minto Flats State Game Refuge permitting)
6. Bob Stephenson, ADFG/DWC, Wood Bison Project Biologist (former Yukon Flats Area Biologist, member of Canada’s Wood Bison Recovery Team and the IUCN North American Bison Specialist Group)
7. Roger Seavoy, ADFG/DWC, McGrath Area Biologist (experience with management of the Farewell plains bison herd, management area includes the lower Innoko–Yukon River site)

The primary duty of the review committee, as defined in the WTP, is to determine whether wood bison restoration is likely to effect a significant reduction in the range, distribution, habitat, or pre-existing human use of other species. The committee was given latitude to evaluate the project according to the criteria in the WTP, and develop additional recommendations on the wood bison restoration project, should they choose to do so. The primary sources of information used by the Review Committee in their analyses were:

- ◆ Reintroducing Wood Bison to the Upper Yukon Valley, Alaska: A Feasibility Assessment (June 1994)
- ◆ The Alaska Chapter-*The Wildlife Society* Technical Peer Review of Reintroducing Wood Bison to the Upper Yukon Valley, Alaska: A Feasibility Assessment, June 1994 (August 1998)

- ◆ Canada's National Recovery Plan for the Wood Bison (October 2001)
- ◆ A Review of Information on Wood Bison in Alaska and Adjacent Canada, With Particular Reference to Yukon Flats (July 2003)
- ◆ Information presented at the Wood Bison Restoration Advisory Group (WBRAG) meetings (April and June 2005)
- ◆ The proposed public review draft of "Wood Bison Restoration in Alaska: A Review of Environmental and Regulatory Issues and Recommendations for Project Implementation"

In his memo approving the wood bison WTP scoping report, Director Robus stated "The Environmental Review of wood bison restoration in Alaska (ER) that is currently being completed will satisfy the WTP requirement for an extensive social and biological risk analysis. Together, these documents (those listed above) satisfy the requirement for a feasibility assessment for all three sites that are being considered for wood bison restoration."

Findings of the Wood Bison Restoration Wildlife Transplant Policy Review Committee

1. **Members of the committee unanimously agreed that wood bison restoration is not likely to effect a significant reduction in the range, distribution, habitat, or pre-existing human use of other species.**
2. Members of the committee also agreed that available information convincingly demonstrates that the wood bison restoration project is likely to meet the Transplant Evaluation Criteria in the WTP.
3. Members of the committee agreed that the available historical information demonstrates that wood bison were a component of Alaska's natural wildlife diversity until fairly recently, and also agreed with the conclusions of Griffith et al. (1998) and Stephenson et al. (2001) that the most likely cause for the disappearance of bison involved the combined effects of unregulated hunting and changes in habitat distribution. They also conclude that wood bison restoration is consistent with commonly used ecological definitions relating to the restoration of extirpated indigenous species, including those used by state and federal agencies and national and international conservation organizations, including the World Conservation Union.
4. Members of the committee recommended that the following points be addressed in any reintroduction plan:
 - a. Accepted strategies are employed to ensure that non-native parasites (e.g., winter tick, *Dermacentor albipictus*) that could pose a substantive threat to native species are not introduced. The risk of introducing winter ticks can be addressed by treating bison with Ivermectin both before and after import. Bison are not a suitable host for ticks, and this approach essentially eliminates the risk of introducing external parasites.
 - b. Cooperative management plans prepared with participation by landowners and other stakeholders should include provisions for reasonable levels of public access for consumptive or non-consumptive uses of wood bison, while recognizing the prerogatives and land management policies of both private and public landowners.
 - c. Management plans should also specify that reintroduced bison populations will be allowed to reach a minimum population of at least 400-500 animals, and where

possible should provide for the reestablishment of larger populations in order to preserve greater genetic diversity over the long term.

- d. Strategies should be implemented to monitor and maintain or enhance genetic diversity of reintroduced herds.
- e. Biological monitoring of reintroduced populations should be given a high priority by DWC. This should include basic population monitoring, and to the extent funding allows, some long term habitat monitoring, recognizing that any effects of bison on other wildlife and the environment are likely to be difficult or impossible to measure until populations approach carrying capacity, and even then may be subtle.
- f. Strategies to ensure that there is no contact between herds of plains bison and wood bison should be included in management plans for areas where contact between the two subspecies might occur in the future.

If these findings and recommendations are followed, and pending additional public review and comment, the Review Committee unanimously endorses a continued effort by DWC to restore wood bison in one or more locations in Interior Alaska.

PROPOSED VISION FOR THE FUTURE OF WOOD BISON IN ALASKA

Wild, free-ranging wood bison again occupy suitable habitat and we continue to make significant contributions to international wood bison conservation. Wood bison are again an integral part of Alaska's natural wildlife diversity, can be enjoyed by Alaskans and visitors to the state, and also provide local and statewide economic benefits.



Photo by Alaska Wildlife Conservation Center

Wood bison at the Alaska Wildlife Conservation Center, Portage, Alaska.